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April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Big Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Big Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Big Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Big Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. While the GSP documents challenges with conducting outreach to DAC stakeholders during the COVID-19 pandemic and lack of resources, recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Notice and Communication chapter, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process. While some of these resources have already been stated in the GSP, we recommend that the GSAs should improve utilization of these resources and documentation of the engagement process.[7]
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map DACs in the basin or explicitly state the population of DACs in the basin. The GSP does not explicitly identify the water source for DACs. The GSP states that the entire basin is considered a DAC, however we recommend that the GSP provide a map identifying DAC blocks, tracts, or places.

Table 2 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**No Change**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Provide a map of the locations of DACs within the basin and provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide supporting information for the ISW analysis. To assess ISWs, the GSP assumes streams to be interconnected where the depth to water is less than 15 feet below ground surface, based on spring 2015 contours. However, it is common practice to utilize deeper thresholds, such as 50 feet below groundwater surface, to indicate a disconnected stream reach.[10,11] Furthermore, using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. Using depth-to-groundwater contours from one point in time, especially from the height of a historic drought, is not sufficient evidence to state that reaches are not connected to groundwater. In California's Mediterranean climate, groundwater interconnections with surface water can vary seasonally and interannually, and that natural variability needs to be considered when identifying ISWs.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] Jasechko, S. et al. 2021. Widespread potential loss of streamflow into underlying aquifers across the USA. Nature, 591: 391-395. doi: https://doi.org/10.1038/s41586-021-03311-x

[11] The Nature Conservancy. 2021. ICONS Tool. Available at: https://icons.codefornature.org/

RECOMMENDATIONS

- Use a deeper depth threshold, such as 50 feet, to determine which stream reaches in the basin are potentially interconnected with groundwater.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" to aid in the determination of ISWs.[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.
- On the map of stream reaches in the basin (Figure 5-18), consider any segments with data gaps as potential ISWs and clearly mark them as such. Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[12] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP used groundwater data from one point in time (fall 2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types to determine the range of depth to groundwater around NC dataset polygons. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

Furthermore, the GSP does not provide an inventory of the flora or fauna species present in the basin's GDEs, except to present the common plant species and their rooting depths. The GSP does not acknowledge endangered, threatened, or special status species in the basin.

Table 4 shows the GSP satisfactorily answered two of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[12]

- Provide depth-to-groundwater contour maps, noting best practices.[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape. Map the location of groundwater wells on the contour maps to illustrate monitoring locations in relation to GDEs.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Include an inventory of the fauna and flora present within the basin's GDEs (see Attachment B of this letter for a list of freshwater species located in the Big Valley Basin). Note any threatened or endangered species.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was improperly omitted in the historical, current, and projected water budgets. The Final GSP does not state whether there are managed wetlands present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of the eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the basin.
- Establish water quality SMC. Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[14] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around **GDEs** and **ISWs** in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate **GDE**-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Eel River Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Eel River Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of the identification of GDEs in the basin.

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Eel River Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
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CivicWell (formerly Local Government Commission)

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Eel River Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communications and Engagement Plan, describe active and targeted outreach to engage DACs, drinking water users, tribes, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Provide information on whether the GSA has initiated contact with tribal stakeholders in the basin during GSP development, and how tribal concerns were considered during the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map or provide the population of DACs in the basin, but instead mapped and discussed economically distressed areas (EDAs), which are not always the same as DACs. Furthermore, the GSP did not identify the water sources for DACs in the basin.

Table 2 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**No Change**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide maps of DACs and SDACs within the basin.
- Provide the population of DACs and SDACs within the basin.
- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not discuss the data gaps that should be filled in order to adequately characterize the interaction between groundwater and surface water within the basin. The GSP should consider any segments with data gaps as potential ISWs and clearly marked as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis and discuss the screening depths of the wells.

- Describe data gaps for the ISW analysis. We recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 4 shows the GSP satisfactorily answered all of the eight questions for this criteria. We appreciate the GSA for its comprehensive identification of GDEs in the GSP. Recommendations that would further improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[12,13]

[12] Webtool available at: https://igde-work.earthengine.app/view/sage

[13] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[14]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, it is unclear whether the GSP incorporated climate change into key inputs (e.g., precipitation, evaporation, and surface water flow) of the projected water budget. The GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered two of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[14] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into the precipitation, evapotranspiration, and surface water flow inputs and include the values in projected water budget tables.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[15,16] Based on our review, we found native vegetation was improperly omitted in the water budget. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the basin.

Table 6 shows the GSP did not satisfactorily answer the one relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[15] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[16] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[17,18,19] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[20]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[21,22,23] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[17] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[18] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[19] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[20] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[21] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[22] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] Water Code §10727.4(l)

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds, but does not mention measurable objectives.

For the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Consider minimum threshold exceedances during single dry years when defining the groundwater level undesirable result across the basin.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[24] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the maximum contaminant level trigger level.
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

[24] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

- Evaluate impacts on GDEs when establishing SMC for chronic lowering of groundwater levels. When defining undesirable results, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[26] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[27]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[28] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[17,29]

- Provide discussion that adaptive changes in SMC for ISWs will be made, if groundwater, streamflow, or biological monitoring reveals that existing SMC are not protective of surface water beneficial users.

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[30,31]

[26] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[27] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[28] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[29] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[30] Webtool available at: https://igde-work.earthengine.app/view/sage

[31] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[32] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[11] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around **GDEs** and **ISWs** in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate **GDE**-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[32] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to

"Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[35]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[36]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[35] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[36] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Yolo Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Yolo Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of the identification of beneficial users, including DACs, domestic wells, tribes, and GDEs in the basin.

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Yolo Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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American Rivers

Attachment A

Specific Comments on the Yolo Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Final Improved**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, further describe active and targeted outreach to engage DACs, domestic well owners, environmental stakeholders, and tribal stakeholders during the remainder of the GSP development process and throughout the GSP implementation phase, as the current engagement plan is mainly focused on outreach to farmers within the basin. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all of the six questions for this criteria. We appreciate the GSA for providing more detail on these beneficial users in the Final GSP.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Final Improved**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

Table 3 shows the GSP satisfactorily answered all of the five questions for this criteria. We appreciate the GSA for providing a thorough, comprehensive evaluation of ISWs in the basin.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Draft Sufficient**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 4 shows the GSP satisfactorily answered all of the eight questions for this criteria. Recommendations that would further improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[12,13]

[12] Webtool available at: https://igde-work.earthengine.app/view/sage

[13] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[14]

In our review of climate change in the projected water budget, we found that the GSP did not incorporate climate change into surface water flow inputs of the projected water budget. Furthermore, the GSP did not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

RECOMMENDATIONS

- Incorporate climate change into surface water flow inputs for the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

[14] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[15,16] Based on our review, we found native vegetation and managed wetlands were properly included as distinct water use sectors in the water budget. Although managed wetlands are represented as a distinct water use sector in the basin water budget, the managed wetland acreage inputs are inaccurate and need to be refined, as acknowledged in the GSP. Table 6 shows the GSP satisfactorily answered both questions for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**

RECOMMENDATIONS

- Provide a timeline and description of the work required to update the acreage of managed wetlands and their associated water demands for the water budget. The current managed wetlands acreage in the GSP (55 acres) is substantially less that the acreage of the Yolo Bypass Wildlife Area (16,600 acres) or the Land IQ 2016 land cover dataset for wetlands (30,000 acres), either of which could be used as a benchmark to determine a more accurate managed wetlands acreage for the basin.

[15] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[16] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[17,18,19] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[20]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[21,22,23] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[17] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[18] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[19] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[20] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[21] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[22] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Final Improved**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant	Analyzed and described	**No Change**

		sustainability indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Establish SMC for the identified constituents of concern in the basin that may be impacted or exacerbated by groundwater use and/or management. Ensure they align with drinking water standards.[24] Also, evaluate the cumulative or indirect impacts of proposed criteria for degraded water quality on DACs and drinking water users.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin. Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[26,27]
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

[24] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[26] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[27] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[28] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[17,29]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[30,31]

[28] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[29] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[30] Webtool available at: https://igde-work.earthengine.app/view/sage

[31] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[32] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[11] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around **GDEs** and **ISWs** in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate **GDE**-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs, domestic wells, tribes, and GDEs when identifying new RMSs.
- Further describe the biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

[32] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a detailed drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[35] The GSP

[35] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

includes a brief discussion of a domestic well Impact mitigation program in Table 5-1, but very few details are provided.

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the South American Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the South American Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs and drinking water users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the South American Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Roger Dickinson
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CivicWell (formerly Local Government Commission)

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the South American Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Describe efforts to engage with stakeholders during the GSP *implementation* phase in the Stakeholder Communication and Engagement Plan. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin. Furthermore, the GSP did not provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Final Improved**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly map potential ISWs in areas of the basin with data gaps. We also found that the GSP mapped ISWs by taking 4-year averages of 2005-2018 seasonal (spring and fall) groundwater level data and comparing against streambed elevation, which will mute reaches that are likely interconnected in wetter years and seasons.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- While the GSP clearly identifies data gaps and their locations, we recommend that the GSP considers any segments with data gaps as *potential* ISWs and clearly marks them as such on maps provided in the GSP.

- Instead of averaging over 4-year sliding seasonal periods, use individual seasonal measurements to capture seasonal variability when mapping ISWs. This method will not mute or dampen the seasonal high peaks that may occur in wet years, and will therefore not incorrectly disregard reaches with short periods of connection of surface water to groundwater.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not provide an inventory of flora and fauna present in the basin, nor identify threatened and endangered species residing within the basin.

Table 4 shows the GSP satisfactorily answered seven of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- The GSP states that a complete list of special status species is presented in Appendix E of the GSP, but this was not included in the public review draft. We recommend that the GSP includes a clear description of the fauna (e.g., birds, fish, amphibians) and flora (e.g., plants) that are present in the basin's GDEs (see Attachment B of this letter for a list of freshwater species located in the basin). Also note any threatened or endangered species.

- Refer to The Nature Conservancy's plant rooting depth database.[12] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (Quercus lobata). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-feet threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[12] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using the 2070 central tendency scenario from the American River Basin Study. However, the GSP did not consider multiple climate scenarios in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets, or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found it unclear whether the GSP adjusted imported water for climate change and incorporated it into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Final Improved**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	**Unclear**	Yes	**Final Worsened**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		**Yes**	**Final Improved**

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation was properly included in the water budget. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the basin.

Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the water quality sustainability indicator. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation, water quality, and depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered four of eleven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels.
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for chronic lowering of groundwater levels on DACs.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider domestic water users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Section 2.3.4 (Groundwater quality) discusses total dissolved solids (TDS), however Section 3.3.3 (Maximum threshold for degraded groundwater quality) discusses specific conductivity. Choose one measurement to describe salinity and use it consistently throughout the GSP.
- The plan only sets minimum thresholds and measurable objectives for nitrates and specific conductivity. The GSP should set SMC for the additional constituents of concern in the basin (arsenic, iron, and manganese) and ensure they align with drinking water standards.
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[26,27]

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[26] Webtool available at: https://igde-work.earthengine.app/view/sage

[27] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[28] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[11] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around **GDEs** and **ISWs** in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate **GDE**-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

[28] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Provide maps that overlay representative monitoring sites (RMSs) with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Ensure that existing and proposed RMSs adequately cover DAC and domestic well areas of the basin.
- Provide specific steps to fill data gaps relating to RMSs that lack historical data or well screen information for wells on private lands.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[29,30]

[29] Webtool available at: https://igde-work.earthengine.app/view/sage

[30] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, further discuss the drinking water well impact mitigation program (termed the shallow well protection program in the GSP) to proactively monitor and protect drinking water wells through GSP implementation. Describe project benefits that are specific to DACs. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[31]

[31] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur. For example, groundwater recharge projects can have potential negative impacts to water quality which could cause undesirable results to drinking water beneficial users. Ensure that appropriate monitoring and mitigation aspects are included in the project development plans for recharge projects.

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Colusa Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Colusa Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Colusa Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

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Samantha Arthur
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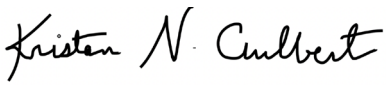

Kristan Culbert
Associate Director, California Central Valley River Conservation
American Rivers

Attachment A

Specific Comments on the Colusa Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage DACs, drinking water users, tribes, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Describe efforts to consult and engage with DACs and domestic well owners within the basin.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]
- Describe efforts to consult and engage with environmental stakeholders within the basin.

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each DAC. Furthermore, the GSP did not provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a map showing domestic well locations and average well depth across the basin (i.e., a map similar to Figure 2-7 showing average well depth per square mile). Refer to DWR Well Completion Reports database for well depth information.[9]

[9] DWR Well completion Reports
https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a comprehensive map of ISWs in the basin. Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled as interconnected (gaining and losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Discuss stream reaches in the interior of the basin. For example, discuss whether they were included in the groundwater model and discuss relevant depth to groundwater data. Clearly state that they are considered to be disconnected, if that is the case, and what data was utilized to support that conclusion.

- To confirm the results of the groundwater modeling analysis and support conclusions about the smaller interior stream reaches, overlay the stream reaches shown with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset".[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[14] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**No Change**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Provide a comprehensive set of maps for the basin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained, removed, or added to/from the NC dataset (include the removal reason if polygons are not considered potential GDEs, or include the data source if polygons are added). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network. It is not clear from the description in the GSP whether NC dataset polygons labeled with a 'GDE Likelihood Score' of 1 to 3 on Figure 3-36 are retained as potential GDEs.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found it unclear whether the GSP adjusted imported water for climate change and incorporated it into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were properly included in the water budget. Table 6 shows the GSP satisfactorily answered both questions for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans to implement a drinking water well mitigation program in the GSP.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans to implement a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- For electrical conductivity, provide a summary table that presents the pre-2015 historical maximums, the salinity objective from the Basin Plan, the secondary maximum contaminant levels, and the resulting minimum thresholds. Ensure that the minimum thresholds do not exceed the salinity objective in the Basin Plan.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[28]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

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[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around **GDEs** and **ISWs** in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate **GDE**-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, tribes, GDEs, and ISWs to clearly identify potentially impacted areas.
- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, tribes, and GDEs.
- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- Clarify the planning horizon of the described domestic well mitigation program to ensure that it will proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plans to mitigate such impacts.

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the North American Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the North American Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and tribal stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the North American Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Roger Dickinson
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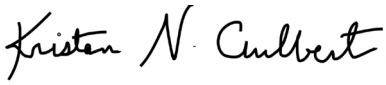
CivicWell (formerly Local Government Commission)

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy



Kristan Culbert
Associate Director, California Central Valley River Conservation
American Rivers

Attachment A

Specific Comments on the North American Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Notice and Communications section, describe active and targeted outreach to engage DACs, domestic well owners, tribes, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the subbasin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the DAC population within the basin. Table 2 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- On applicable figures in Section 3, make block group map layers more transparent so that the cities and features are visible underneath, to help with understanding the communities and beneficial users that lie within each block group.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide enough supporting information for the ISW analysis. To assess ISWs, the GSP presents depth-to-water contours from Spring 2020. However, using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. Using depth-to-groundwater contours from one point in time, especially after the 2015 SGMA benchmark date, is not sufficient evidence to state that reaches are not connected to groundwater. In California's Mediterranean climate, groundwater interconnections with surface water can vary seasonally and interannually, and that natural variability needs to be taken into account when identifying ISWs. The GSP also discounts surface water supported by perched groundwater as potential ISW. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the basin's pumping is occurring in deeper principal aquifers.[10]

Table 3 shows the GSP satisfactorily answered none of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] "'Principal aquifers' refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." [23 CCR §351(aa)]

RECOMMENDATIONS

- On the map of stream reaches in the subbasin (Figure 5-31), identify gaining and losing reaches in addition to interconnected and disconnected reaches. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Provide depth-to-groundwater contour maps using data from additional time periods other than just spring of 2020. Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not use adequate temporal data to characterize groundwater conditions under GDEs. As in the ISW section of the GSP, the GSP presents depth-to-water contours from Spring 2020. However, use of depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) is essential to characterize groundwater conditions and the natural variability in conditions across the basin, and therefore should be used to determine the range of depth to groundwater around GDEs.

We also found that the GSP incorrectly disregarded GDEs within areas of known perched groundwater. However, Appendix O states that some perched aquifers may maintain GDEs and that the perched aquifer may be connected to the principal aquifer in areas of the basin.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Final Worsened**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[13]

- Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used, if these species are present in the subbasin. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater.

- Re-evaluate the NC dataset polygons that rely on perched groundwater. Provide more supporting evidence of 1) vertical groundwater gradients between the perched system and deeper principal aquifers, and 2) whether perched groundwater is providing significant or economic quantities of water to streams, wells (e.g., domestic wells), and ecosystems (e.g., GDEs). If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[13] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using data from the American River Basin Study. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not adjust imported water for climate change and incorporate it into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	**Unclear**	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		**Yes**	**Draft Sufficient**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into imported water flow inputs for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were properly included in the water budget. However, it appears that these two categories were combined into one term in the water budget tables. The GSP could be improved by describing these land use categories separately (i.e., providing the acreage of each) and providing separate line items for each term in the water budget tables.

Table 6 shows the GSP satisfactorily answered two of two questions for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Describe the native vegetation and managed wetlands land use categories separately and provide the acreage of each. Provide separate line items for each category in the water budget tables.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, but does not provide an analysis of measurable objectives for either sustainability indicator. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators. The Final GSP has added discussion on the impacts to terrestrial vegetation in the groundwater elevation minimum thresholds section.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that may be impacted or exacerbated by groundwater use and/or management. Ensure they align with drinking water standards.[28]
- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs should include "impacts on groundwater dependent ecosystems."
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached.[29] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,30]
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

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[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

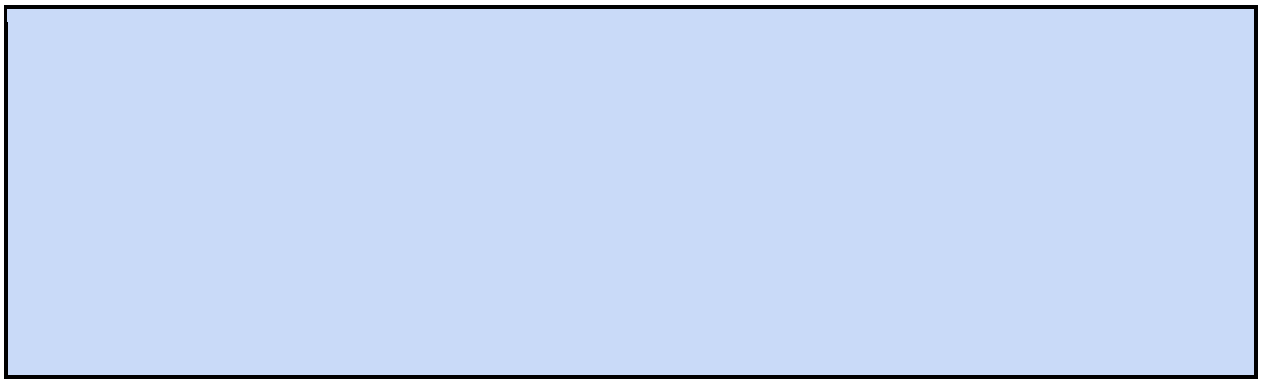
[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[30] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full



8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[17] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around **DACs, domestic wells, tribes, and GDEs** (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around **GDEs** and **ISWs** in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate **GDE**-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, tribes, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites in the shallow aquifer across the subbasin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs, domestic wells, tribes, and GDEs when identifying new representative monitoring sites.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Final Improved**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]
- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.
- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Vina Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Vina Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Vina Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

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Samantha Arthur
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The Nature Conservancy

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American Rivers

Attachment A

Specific Comments on the Vina Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered five of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage DAC members, drinking water users, and environmental stakeholders through the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each identified DAC, or identify the sources of drinking water for DACs.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Final Improved**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a clear map of ISWs in the basin to clearly communicate which stream segments were retained as ISWs or potential ISWs in the GSP. Furthermore, the GSP did not describe the data used in the Butte Basin Groundwater Model (BBGM), such as the groundwater level monitoring well data and stream gauge data that were incorporated into the model. The GSP did not provide a description of the temporal (seasonal and interannual) variability of the data used to calibrate the model.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Describe the legend labels used on Figure 2-26 in the GSP text to make clear which stream segments are retained as ISWs or potential ISWs in the GSP.
- Further describe the groundwater elevation data and stream flow data used in the BBGM analysis. Ensure depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) are used to determine the range of depth and capture the variability in environmental conditions inherent in California's climate.
- For the depth-to-groundwater contour maps provided in the GSP, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[13] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or due to the presence of surface water supplies. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields or surface water.

The GSP did not discuss how the NC dataset was verified with the use of groundwater data from the shallow aquifer. Without an analysis of groundwater data to verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation. Furthermore, the GSP did not provide a complete inventory of the flora or fauna species present in the basin's GDEs or identify threatened or endangered species in the basin.

Table 4 shows the GSP satisfactorily answered one of eight questions for this criteria. We thank the GSA for retaining all Valley oak (*Quercus lobata*) polygons in the NC dataset based on the recognition that they can access groundwater at deeper depths. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Final Worsened**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Provide a comprehensive set of maps for the basin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained, removed, or added to/from the NC dataset (include the removal reason if polygons are not considered potential GDEs, or include the data source if polygons are added). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network. It is not clear from the description in the GSP whether NC dataset polygons labeled as 'Not Likely a GDE' are retained as potential GDEs.

- Include an inventory of the fauna and flora present within the basin's GDEs (see Attachment B of this letter for a list of freshwater species located in the Vina Basin). Note any threatened or endangered species.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the sustainable yield is based on historic pumping rates instead of the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation and managed wetlands were included in the historical, current, and projected water budgets. For the projected budget, however, we would like to see justification for the decrease in projected managed wetlands acreage in the future.

Table 6 shows the GSP satisfactorily answered both questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Revisit the current and projected water demands for managed wetlands, which are represented in the GSP as approximately half the historical water demands. Refine the model inputs for wetland acreage, so managed wetland acreage and water demands do not inaccurately decrease in the future water budget.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

Drinking Water Users

The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, it does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality sustainability indicator. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP mentions but does not analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation, water quality, and depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels (in addition to describing impacts to drinking water users).
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[27]
- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs should include "impacts on groundwater dependent ecosystems".

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- Clarify the planning horizon of the described domestic well mitigation program to ensure that it will proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[37]

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[38]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

American Rivers
RIVERS CONNECT US®

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Los Molinos Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Los Molinos Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Los Molinos Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
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Roger Dickinson
Policy Director
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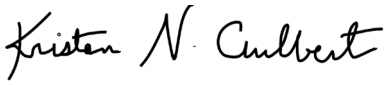

Kristan Culbert
Associate Director, California Central Valley River Conservation
American Rivers

Attachment A

Specific Comments on the Los Molinos Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communications and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8] While some of these resources have already been stated in the GSP, we recommend that the GSA should improve utilization of these resources and documentation of the engagement process.
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not identify the sources of drinking water for DACs.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly state whether streams located in areas of data gaps are retained as potential ISWs in the GSP.

The Final GSP updated the ISW analysis with a figure showing likely interconnected, likely disconnected, and interconnectivity uncertain stream reaches based on The Nature Conservancy's ICONS dataset.[11] The Final GSP describes losing and gaining stream segments categorized using the Tehama Integrated Hydrologic Model in Appendix G of Appendix 2-J, however we could not locate this sub-appendix of Appendix 2-J.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] The Nature Conservancy. 2021. ICONS Tool. Available at: https://icons.codefornature.org/

RECOMMENDATIONS

- Include sub-Appendix G of Appendix 2-J in the GSP.
- Consider any stream reaches with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- In the main text of the GSP, summarize the groundwater elevation data and stream flow data used in the modeling analysis. Discuss temporal (seasonal and interannual) variability of the data used to calibrate the model.
- To confirm and illustrate the results of the groundwater modeling, overlay the basin's stream reaches with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[12] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that while the GSP mapped GDEs using the NC dataset,[15] the GSP used depth-to-groundwater data from a single point in time (spring 2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate. Furthermore, we found it to be unclear whether GDEs in areas of data gaps were mapped and described as "potential GDEs" in the GSP.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	**Data gaps described clearly**	**Draft Sufficient**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

[15] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	No Change

RECOMMENDATIONS

- Include the missing Figures 1-4 in the GDE Appendix 2-I. The response to comments states that these are included in the Final GSP, but they still do not appear to be included.
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[12]
- Provide depth-to-groundwater contour maps, noting best practices.[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- Refer to The Nature Conservancy's plant rooting depth database.[16] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[17,18]

[16] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[17] Webtool available at: https://igde-work.earthengine.app/view/sage

[18] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[19]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[19] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[20,21] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. Managed wetlands were not discussed in the Draft GSP, but the Final GSP added text and a figure describing managed wetlands. However, the Final GSP did not include water demands of managed wetlands in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[20] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[21] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[22,23,24] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[25]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation and water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[26,27,28] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

---

[22] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[23] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[25] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[26] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[27] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[28] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the basin.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[29] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[30]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted or exacerbated by groundwater use and/or management.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[31] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[32]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in

[29] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[30] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[31] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[32] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

the basin are reached.[33] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[22,34]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[33] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[34] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[37] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[14] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[37] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Additional studies of GDEs and groundwater - surface water interactions are briefly discussed in the Projects and Management Actions chapter, but very few details are provided.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[38,39]

[38] Webtool available at: https://igde-work.earthengine.app/view/sage

[39] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[40]

[40] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Solano Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Solano Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of GDEs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of stakeholder engagement by describing activities that involve, collaborate with, and empower DAC, tribal, and environmental stakeholders.

Our specific comments related to the GSP in the Solano Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
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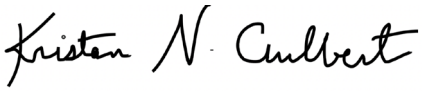

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Attachment A

Specific Comments on the Solano Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all questions for this criteria. We appreciate the GSA for describing activities that involve, collaborate with, and empower DAC, tribal, and environmental stakeholders. Recommendations that would further improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[7]

[7] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all questions for this criteria. We appreciate the GSA for including a map of average domestic well depth across the basin in the Final GSP.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[8] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

Table 3 shows the GSP satisfactorily answered all questions for this criteria.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Draft Sufficient**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[8] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[9,10] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not map potential GDEs in the basin. The GSP acknowledges potential wetlands in the basin, but does not consider them groundwater dependent or retain them as potential GDEs in the GSP.

Table 4 shows the GSP satisfactorily answered seven of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[10] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Refer to The Nature Conservancy's plant rooting depth database.[11] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- If insufficient data are available to describe groundwater conditions within or near mapped wetlands and riparian communities, include those areas as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[12,13]

[11] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[12] Webtool available at: https://igde-work.earthengine.app/view/sage

[13] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[14]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found it unclear whether the GSP adjusted imported water for climate change and incorporated it into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[14] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

- Incorporate climate change into imported water inputs for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[15,16] Based on our review, we found native vegetation was properly included in the water budget as presented in the GSP appendices. For clarity, we would like to see this separation by water use sector in the main GSP text in addition to the appendices.

The GSP did not include the current, historical, and projected demands of managed wetlands. The GSP identified wetlands that account for up to 42% of the basin, noting this is based on older datasets and many of these wetland areas are mapped as agricultural in recent land use surveys. However, the GSP does not state if these areas include any *managed* wetlands. Managed wetlands are present in DWR's 2016 statewide cropping dataset. If there are wetlands present in the basin that are not groundwater dependent, then they should be identified as managed wetlands and included in the water budget as a specific water use sector.

Table 6 shows the GSP satisfactorily answered none of the two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Include evapotranspiration separately for each sector (including native vegetation) in the main GSP text, in addition to the appendices.
- Discuss and map the presence of managed wetlands in the basin, if present. Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[15] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[16] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[17,18,19] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[20]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP does not provide a complete analysis of the direct or indirect impacts on drinking water users when defining undesirable results. While impacts from groundwater level declines are discussed, the water quality impacts of all COCs are not discussed. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the impacts of the measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[21,22,23] The GSP should describe direct and indirect

[17] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[18] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[19] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[20] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[21] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[22] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] Water Code §10727.4(l)

impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- In the well impact assessment, include well data from older wells (>50 years old) to better represent minimum threshold impacts to wells across the basin.
- Similar to the description provided for drinking water users and GDEs, describe direct and indirect impacts on DACs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[24] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that may be impacted by groundwater use and/or management.
- Similar to the trigger levels for measurable objectives, set minimum thresholds that do not allow water quality to degrade to the maximum contaminant levels (MCL) level.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[26] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[27]

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[24] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[26] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[27] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[28] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[17,29]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[30,31]

[28] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[29] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[30] Webtool available at: https://igde-work.earthengine.app/view/sage

[31] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[32] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[10] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas and assess the adequacy of the monitoring network.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[32] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Discuss the well construction data gap in more detail and propose specific measures and a timeline to fill this data gap.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Describe the explicit benefits or impacts to DACs from identified projects, including the Multi-Benefit Recharge projects identified in Section 8.2.1.
- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to

"Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[35]

[35] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Sutter Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Sutter Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Identification of DACs, drinking water wells, and tribes
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Sutter Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
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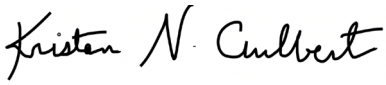

Kristan Culbert
Associate Director, California Central Valley River Conservation
American Rivers

Attachment A

Specific Comments on the Sutter Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Outreach and Communication chapter, describe active and targeted outreach to engage DACs, drinking water users, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map the locations of tribal lands or tribal interests in the basin. The GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin. Furthermore, the GSP did not identify the sources of drinking water for DAC members.

Table 2 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Consult with tribal representatives to identify and map any potential tribal interests within the basin.
- Include a map showing domestic well locations and average well depth across the basin.
- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not retain stream reaches as potential ISWs in the GSP in areas of data gaps. The GSP does not evaluate the interaction of streams in the Sutter Buttes foothills with underlying water table because the C2VSimFG-Sutter model does not contain stream nodes in those areas. We recommend that these stream reaches are retained as potential ISWs in the GSP until further data is gathered.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Draft Sufficient**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- To confirm the results of the groundwater modeling analysis and support conclusions about the Sutter Buttes foothills stream reaches, overlay the stream reaches shown with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. For the depth-to-groundwater contour maps, use the best practices presented inThe Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

- Describe data gaps for the ISW analysis in the ISW section, in addition to the discussion in Section 7.2.6.6.5 (Interconnected Surface Water Monitoring Network Data Gaps). While the GSP identifies data gaps and their locations in the text, we recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[13] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or adjacent to rivers and streams. However, this removal criteria is flawed since GDEs can rely on multiple water sources – including shallow groundwater receiving inputs from surface water flow or irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to these additional water sources.

We also found that the GSP did not describe or present the groundwater data used to characterize groundwater conditions supporting the basin's GDEs (such as depth-to-groundwater contour maps). Furthermore, it is unclear which GDEs are retained as potential GDEs for the purposes of establishing monitoring and sustainable management criteria.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	**Yes**	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Final Improved**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that are adjacent to irrigated fields or streams and rivers. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.
- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. The plan reports some calculations in the Appendix for an Extremely Dry scenario to stress-test the system, but does not seem to report and compare such results outside the Appendix or incorporate them into the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that imported water was not adjusted for climate change and incorporated into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were properly included in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered both questions for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, it does not provide an analysis of the impacts of the proposed measurable objectives for these sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP mentions but does not fully analyze the impacts of the proposed minimum thresholds for the groundwater elevation, water quality, and depletion of surface water sustainability indicators. The GSP does not mention or analyze the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant	Analyzed and described	**No Change**

		sustainability indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- For total dissolved solids (TDS) and nitrate, provide a summary table that presents the pre-2015 historical maximums, the objectives from the Basin Plan, the maximum contaminant levels (MCLs), and the resulting minimum thresholds. Ensure that the minimum thresholds do not exceed the objectives in the Basin Plan.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger level.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Provide further details for the biological monitoring (described in the Projects and Management Actions section of the GSP) that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered five of six questions for this criteria. The GSP scored a "Yes" for the third question in the table because the GSP included project and management actions that benefit GDEs and other environmental beneficial users. There were no other PMAs that identified benefits or impacts to other beneficial users such as DACs and drinking water users. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Butte Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Butte Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of DACs, drinking water wells, and tribes
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Butte Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
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Samantha Arthur
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The Nature Conservancy

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The Nature Conservancy

Attachment A

Specific Comments on the Butte Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Stakeholders Communication and Engagement Plan that describes active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not identify DACs by name or location on a map, provide the population of DACs, or identify the sources of drinking water for DAC members. Furthermore, the GSP did not map the density of domestic wells or their depth (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered none of the five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**No Change**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Provide a map of the boundaries of the recognized DACs in the basin. Provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).
- Include a separate domestic well density map for the basin (instead of grouping domestic wells with all production wells).
- Include a map showing domestic well locations and well depth (such as minimum well depth, average well depth, or depth range) across the basin. Figure 4-2 provides a point location map of all wells within the basin, but groups all wells together and does not differentiate between well types.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a clear map of ISWs in the basin. The GSP states that it is likely that all streams traversing or bounding the basin are connected to the groundwater system. Figure 2-30 presents a map of stream reaches in the basin, showing the percentage of months of a gaining condition in the basin as predicted by the BBGM model. We recommend that the reaches are also labeled as interconnected, so that it is clear that all stream segments are retained as ISWs in the GSP.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Label stream reaches on Figure 2-30 as interconnected, to make clear that all stream segments are retained as ISWs in the GSP. Figure 2-30 presents stream reaches in the basin based on percentage of monthly connection simulated by the BBGM model, but does not label the reaches as ISWs.
- Provide reference to Appendix 2D in the ISW section of the main GSP text, where the groundwater and stream flow data used in the BBGM analysis is further described.
- To confirm and illustrate the results of the groundwater modeling, overlay the stream reaches shown on Figure 2-30 with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[14] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or due to the presence of surface water supplies. However, this removal criteria is flawed since GDEs can rely on multiple water sources – including shallow groundwater receiving inputs from surface water flow or irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to these additional water sources.

We also found that the GSP did not describe or present the groundwater data used to characterize groundwater conditions supporting the basin's GDEs (such as depth-to-groundwater contour maps). Without an analysis of groundwater data to verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation. Furthermore, it is unclear which GDEs are retained as potential GDEs for the purposes of establishing monitoring and sustainable management criteria.

The GSP did not provide a complete inventory of the flora or fauna species present in the basin's GDEs or threatened or endangered species in the basin.

Table 4 shows the GSP satisfactorily answered one of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Final Improved**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Final Improved**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that are adjacent to irrigated fields or due to the presence of surface water. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Provide depth-to-groundwater contour maps, noting best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "potential GDEs" in the GSP until data gaps are reconciled in the monitoring network. It is not clear from the description in the GSP Appendix whether NC dataset polygons considered as 'Uncertain' or 'Not Likely a GDE' are retained as potential GDEs.
- Include an inventory of the fauna and flora present within the basin's GDEs (see Attachment B of this letter for a list of freshwater species located in the Butte Basin). Note any threatened or endangered species.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were properly included in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered both questions for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, it does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality sustainability indicator. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP mentions but does not fully analyze the impacts of the proposed minimum thresholds for the groundwater elevation, water quality, and depletion of surface water sustainability indicators. The GSP does not mention or analyze the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACS and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACS and drinking water users.
- Provide a table in the GSP that presents the minimum thresholds for electrical conductivity (EC). Ensure that the minimum thresholds remain below the upper secondary maximum contaminant level (SMCL) of 1,600 µS/cm.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[28]
- Describe how chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater will be developed when the monitoring network is updated. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

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[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify which beneficial users are not adequately being monitored. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. The GSP scored a "Yes" for the third question in the table because the GSP included additional monitoring for surface water depletion and GDEs as a project and management action. While this PMA is related to GDEs, there were no other PMAs that identified benefits or impacts to other beneficial users such as DACs and drinking water users. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plans to mitigate such impacts.

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Cosumnes Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Cosumnes Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Cosumnes Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
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Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
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Union of Concerned Scientists

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Attachment A

Specific Comments on the Cosumnes Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[7]

[7] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not explicitly identify the water source for DACs in the basin. Furthermore, the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).
- Include a map showing average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[8] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not use data from multiple water year types to analyze the interconnectivity of surface water and groundwater in the basin. Groundwater data from fall 2018 are used to conclude that surface water and groundwater are likely disconnected across most of the basin. While a groundwater-surface water model simulated the period from 1999-2018, there is no figure presented which summarizes the conclusions about which reaches are interconnected or disconnected.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[8] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Correlate explanation in the GSP text to a map of stream reaches in the basin, with reaches clearly labeled as interconnected or disconnected. On the stream reach map, include reaches with data gaps as potential ISWs.
- Further describe the groundwater elevation data and stream flow data used in the ISW analysis. Ensure depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) are used to determine the range of depth and capture the variability in environmental conditions inherent in California's climate. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[9,10] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[11] NC dataset polygons were incorrectly removed based on the assumption that they are supported by the shallow, perched water table. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the basin's pumping is occurring in deeper principal aquifers. If there are no data to characterize groundwater conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP. NC dataset polygons were also incorrectly removed based on the presence or proximity of surface water. However, partial reliance on surface water does not necessarily prove that the plants and animals do not access groundwater. Many GDEs often simultaneously rely on multiple sources of water (i.e., both groundwater and surface water), or shift their reliance on different sources on an interannual or inter-seasonal basis.

Furthermore, the GSP used depth-to-groundwater data from a single date (fall 2018) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types to determine the range of depth to groundwater around NC dataset polygons.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[10] Refer to Attachment B for a list of freshwater species located in the basin.

[11] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[12]

- Refer to The Nature Conservancy's plant rooting depth database.[13] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[12] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[13] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did not clearly describe how climate change was incorporated into surface water flow inputs of the *projected* water budget. This input is stated to be adjusted for climate change in the GSP text. However, we found that while this input is in a separate line item in the water budget tables for historical and current conditions, it is not separately included for projected conditions.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. We appreciate the GSA for considering extreme scenarios in the projected water budget. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Incorporate climate change into surface water flow inputs for the projected water budget.

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the *projected* water budget. While native vegetation was included in historical and current budget tables as 'Riparian ET, it was not separated out in projected budget tables. Furthermore, managed wetlands were identified as part of native vegetation, but not separated into a separate line item in the water budget tables.

Table 6 shows the GSP satisfactorily answered neither of the two questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**

RECOMMENDATIONS

- Discuss and map the presence of managed wetlands in the basin.
- Quantify and present all water use sector demands in the historical, current, and *projected* water budgets with individual line items for each water use sector, including separate items for native vegetation and managed wetlands.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the water quality sustainability indicator. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[19] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[20] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[21] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[22] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

[23] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[24] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds, but does not fully analyze measurable objectives.

For the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant	Analyzed and described	**No Change**

		sustainability indicators		
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels (in addition to describing impacts to drinking water users).
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin, including naturally occurring constituents that can be exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[27]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs should include "impacts on groundwater dependent ecosystems".

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[10] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[37]

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[38]

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Tracy Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Tracy Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Tracy Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Tracy Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all of the five relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the size of the population in each DAC.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a clear map of stream reaches in the basin, with reaches labeled with stream name and interconnected, disconnected, or potential ISW. The GSP did not use data from multiple water year types to analyze the interconnectivity of surface water and groundwater in the basin.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled with stream name and interconnected or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" to aid in the determination of ISWs.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not verify the NC dataset with groundwater data from the underlying principal aquifer.[13] Without an analysis of groundwater data to verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the GDEs throughout GSP implementation. Furthermore, the GSP did not provide a complete inventory of flora and fauna present in the basin.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Overlay GDE locations with depth-to-groundwater contour maps. For these contour maps, note best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth to groundwater contours across the landscape.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin and note any threatened or endangered species (see Attachment B in this letter for a list of freshwater species located in the Tracy Basin).

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

The GSP did not clearly describe how climate change was incorporated into surface water flow inputs of the projected water budget. Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered one of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate surface water flow inputs that are adjusted for climate change to the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered neither of the two questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including separate items for native vegetation and managed wetlands.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of the eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for drinking water users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider domestic water users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds on DACs and drinking water users.
- Set minimum thresholds at the maximum contaminant level (MCL) for TDS, nitrate, and boron, instead of 10% higher than the MCL at some wells.
- Set minimum thresholds for the additional constituents of concern: sulfate, 1,2,3-TCP, and arsenic. Ensure they align with drinking water standards.[27]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]
- For the interconnected surface water SMC, the undesirable results should include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

basin.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Final Improved**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered none of the six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- Recharge ponds, reservoirs and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge

projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

- For DACs and domestic well owners, include discussion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the East Contra Costa Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the East Contra Costa Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the East Contra Costa Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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Samantha Arthur
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The Nature Conservancy

Attachment A

Specific Comments on the East Contra Costa Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage DAC members and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all of five relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide analysis of the interconnectivity of surface water and groundwater in the basin using data from multiple water year types. Groundwater data from 2018 are the only data included, and while these data are considered "conservative" because it was a wet water year, the temporal variability in gaining, losing and disconnected reaches are not incorporated. The GSP did not fully discuss the data gaps that should be filled in order to adequately characterize the interaction between groundwater and surface water within the basin. We recommend the GSP should consider any segments with data gaps as potential ISWs and clearly marked as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

- On the ISW map (Figure 3-25b), clearly label the areas with data gaps. While the GSP discusses data gaps in the text, we recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not use depth-to-groundwater data from the underlying principal aquifer to verify the NC dataset. The GSP acknowledges that groundwater level data is lacking in much of the basin, and thus did not make changes to the NC dataset except to eliminate small acreage with agricultural or urban land use.

Table 4 shows the GSP satisfactorily answered five of seven relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	**Not incorporated**	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Not Applicable**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	**Data gaps described clearly**	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	**Clearly mapped AND described**	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

RECOMMENDATIONS

- Refer to The Nature Conservancy's plant rooting depth database.[12] Utilize a deeper threshold for plants with greater rooting depths (e.g., 80-foot threshold for valley oak (*Quercus lobata*).

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[12] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management. Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation was properly included in the water budget. The GSP did not include the current, historical, and projected demands of managed wetlands. Managed wetlands are not mentioned in the GSP, but are present in DWR's statewide cropping dataset.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Discuss and map the presence of managed wetlands in the basin. Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, while the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, it does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered three of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels (in addition to describing impacts to drinking water users).
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds that are based on individual exceedances of regulatory standards, not based on a 3-year running average.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[26] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[27]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[28] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,29]

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[26] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[27] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[28] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[29] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[14,15]

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[30] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment B) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. We appreciate the GSA for including plans to incorporate GDE-related biological monitoring into their monitoring network. The Final GSP includes plans to use The Nature Conservancy's GDE Pulse Tool to monitor trends in Normalized Derived Vegetation Index (NDVI) and Normalized Derived Moisture Index

[30] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

(NDMI).[31] Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[31] The Nature Conservancy's GDE Pulse Tool. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-pulse/

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered none of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[34]

[34] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[35]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[35] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Fillmore Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Fillmore Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Fillmore Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
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Clean Water Action/Clean Water Fund

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The Nature Conservancy

Attachment A

Specific Comments on the Fillmore Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Communication and Engagement Plan that describes active and targeted outreach to engage DAC members and domestic well owners during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide detailed information about the sources of drinking water for DAC members.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide detailed discussion in the GSP about the groundwater elevation data and streambed elevation data used to verify interconnected reaches, nor discuss screening depth of monitoring wells to verify that they are monitoring the shallow principal aquifer. The Final GSP includes a map which shows interconnected reaches in the basin, but does not label the interconnected reaches as gaining or losing. Under SGMA's ISW definition,[11] ISWs include losing reaches that maintain a connection with the saturated zone at *any* point in time and space.

While the GSP clearly identifies data gaps and their locations in the text, we recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] "'Interconnected surface water' refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." [23 CCR §351(o)]

RECOMMENDATIONS

- On the map of stream reaches in the basin, clearly label reaches with interconnected (gaining, losing) or disconnected status.
- Provide more discussion in the GSP about the groundwater elevation data and streambed elevation data used to verify interconnected reaches. Include a map of the interpolated groundwater elevations and spatial extent of groundwater monitoring wells used to produce the map. Discuss screening depth of monitoring wells and ensure they are monitoring the shallow principal aquifer.
- Overlay the stream reaches shown with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches.
- On the ISW map, clearly label the areas with data gaps. While the GSP clearly identifies data gaps and their locations in the text, we recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP presented a comprehensive evaluation of GDEs in the basin, as presented in the GDE Technical Memorandum (Appendix D). The GSP mapped GDEs and potential GDEs using multiple sources, including the NC Dataset (also referred to in the GSP as the iGDE database), California Department of Fish and Wildlife (CDFW) VegCAMP, US Department of Agriculture (USDA) CalVeg, and National Wetlands Inventory data. However, we found that some mapped features in the NC dataset were improperly disregarded (i.e., coastal live oak (*Quercus agrifolia*) on slopes). NC dataset polygons were incorrectly excluded for mapped vegetation growing on a clear slope, based on landscape position and improbable connection to groundwater. The Final GSP does present more discussion of the reasoning behind their exclusion. However, without groundwater data, there is no way to confirm that these NC dataset polygons are not GDEs. If no data are available, then these polygons should be retained as potential GDEs.

Table 4 shows the GSP satisfactorily answered seven of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Final Improved**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that were removed based on their location on a slope. If groundwater elevation data are not available to verify connection to groundwater, retain these polygons as potential GDEs in the GSP.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		**Yes**	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extreme wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The GSP response to comments indicates that there are no managed wetlands present in the basin. However, the main GSP text was not changed to indicate this.

Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin *within the main text of the GSP*.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, but does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality nor depletion of surface water sustainability indicators. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

The GSP notes that the Cienega Riparian Complex has historically shown the greatest degradation due to groundwater levels (p. 2-76). It also describes this impact as an undesirable result due to groundwater levels declining, resulting in (p. 3-5) "*die off of riparian vegetation (e.g., cottonwood or willow species in the Cienega Riparian Complex GDE unit), due to groundwater level declines below the critical water level, that are attributable to groundwater pumping.*" If the minimum threshold is exceeded, the referenced mitigation action (Cienega *Springs* Restoration project), although not mapped, would require years to implement. However, there is no discussion of interim pumping reductions or other actions that could have an immediate positive impact on the undesirable result.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**

Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe further the direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for drinking water users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Include the minimum thresholds established for the identified constituents of concern in Section 3 (Sustainable Management Criteria) of the GSP, instead of just stating that they align with drinking water standards.
- State directly what the depth to groundwater corresponds to under the GDEs for the proposed minimum threshold (10 feet below 2011 groundwater levels).
- Consider GDEs when establishing measurable objectives and evaluate the measurable objectives based on GDE water needs.
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[27,28]

[27] Webtool available at: https://igde-work.earthengine.app/view/sage

[28] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[29] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Final Worsened**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

[29] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide maps that overlay monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin for the groundwater elevation and water quality groundwater condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.

- Provide maps that overlay existing and proposed monitoring well locations with the locations of GDEs (in addition to ISWs) to clearly identify potentially impacted areas.

- Describe further the biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Appendix D discusses remote sensing of GDEs using NDVI or other data to monitor the health of GDEs through time, but few details are provided.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[30,31]

[30] Webtool available at: https://igde-work.earthengine.app/view/sage

[31] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The plan's commitment to mitigate the undesirable result on the Cienega Riparian Complex GDE is insufficient. The plan is confusing in that the mitigation refers only to the unmapped Cienega *Springs* Restoration project and does not seem to propose any mitigation for the Cienega Riparian Complex GDE. Furthermore, it is not clear how proposed projects 1 & 2 would mitigate impacts to the Cienega Riparian Complex GDE even if part of it is in the Cienega *Springs* Restoration project area.

Table 9 shows the GSP satisfactorily answered none of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include detailed plans for a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP

implementation. Refer to “Framework for a Drinking Water Well Impact Mitigation Program” for specific recommendations on how to implement a drinking water well mitigation program.[32]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- For GDEs, include the following: 1) Add a map showing the locations of the Cienega Riparian Complex GDE and the Cienega Springs Restoration project, 2) Explain how the proposed management actions will mitigate the undesirable result occurring at the Cienega Riparian Complex GDE, 3) Develop immediate and longer term management actions to address the undesirable result occurring at the Cienega Riparian Complex (e.g., immediate pumping reductions when the minimum threshold is reached, non-native vegetation removal should die-off occur).

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the “Multi-Benefit Recharge Project Methodology Guidance Document.”[33]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[32] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[33] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Piru Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Piru Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Piru Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Piru Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Communication and Engagement Plan that describes active and targeted outreach to engage DAC members and domestic well owners during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide detailed information about the sources of drinking water for DAC members.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide detailed discussion in the GSP about the groundwater elevation data and streambed elevation data used to verify interconnected reaches, nor discuss screening depth of monitoring wells to verify that they are monitoring the shallow principal aquifer. The Final GSP includes a map which shows interconnected reaches in the basin, but does not label the interconnected reaches as gaining or losing. Under SGMA's ISW definition,[11] ISWs include losing reaches that maintain a connection with the saturated zone at *any* point in time and space.

While the GSP clearly identifies data gaps and their locations in the text, we recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] "'Interconnected surface water' refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." [23 CCR §351(o)]

RECOMMENDATIONS

- On the map of stream reaches in the basin, clearly label reaches with interconnected (gaining, losing) or disconnected status.
- Provide more discussion in the GSP about the groundwater elevation data and streambed elevation data that could be used to verify the modeling analysis for interconnected reaches. Include a map of the interpolated groundwater elevations and spatial extent of groundwater monitoring wells used to produce the map. Discuss screening depth of monitoring wells and ensure they are monitoring the shallow principal aquifer.
- To confirm the results of the groundwater modeling, overlay the stream reaches shown with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches.
- On the ISW map, clearly label the areas with data gaps. While the GSP clearly identifies data gaps and their locations in the text, we recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP presented a comprehensive evaluation of GDEs in the basin, as presented in the GDE Technical Memorandum (Appendix D). The GSP mapped GDEs and potential GDEs using multiple sources, including the NC Dataset (also referred to in the GSP as the iGDE database), California Department of Fish and Wildlife (CDFW) VegCAMP, US Department of Agriculture (USDA) CalVeg, and National Wetlands Inventory data. However, we found that some mapped features in the NC dataset were improperly disregarded (i.e., coastal live oak (*Quercus agrifolia*) on slopes). NC dataset polygons were incorrectly excluded for mapped vegetation growing on a clear slope, based on landscape position and improbable connection to groundwater. The Final GSP does present more discussion of the reasoning behind their exclusion. However, without groundwater data, there is no way to confirm that these NC dataset polygons are not GDEs. If no data are available, then these polygons should be retained as potential GDEs.

Table 4 shows the GSP satisfactorily answered seven of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Final Improved**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Final Improved**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Identify aquatic GDE habitats (e.g., steelhead critical habitat) in the GSP, and specify which reaches support migration, spawning, and rearing.
- Re-evaluate the NC dataset polygons that were removed based on their location on a slope. If groundwater elevation data are not available to verify connection to groundwater, retain these polygons as potential GDEs in the GSP.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that imported water was not included in the projected water budget or stated to be adjusted for climate change.

Table 5 shows the GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate imported water inputs that are adjusted for climate change to the projected water budget.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The GSP response to comments indicates that there are no managed wetlands present in the basin. However, the main GSP text was not changed to indicate this.

Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin *within the main text of the GSP*.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP mentions but does not fully analyze the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

Drinking Water Users

The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, but does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality nor depletion of surface water sustainability indicators. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

The GSP notes that the Cienega Riparian Complex has historically shown the greatest degradation due to groundwater levels (p. 2-74). It also describes this impact as an undesirable result due to groundwater levels declining, resulting in (p. 2-5 [note incorrect page numbering as this should be p. 3-5]) "*die off of riparian vegetation (e.g., cottonwood or willow species in the Cienega Riparian Complex GDE unit), due to groundwater level declines below the critical water level, that are attributable to groundwater pumping.*" If the minimum threshold is exceeded, the referenced mitigation action (Cienega *Springs* Restoration project), although not mapped, appears to not be located in the Fillmore Basin. And even if a portion of the project is located in the Piru basin, it would require years to implement. However, there is no discussion of interim pumping reductions or other actions that could have an immediate positive impact on the undesirable result.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**

Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe further the direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for drinking water users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Include the minimum thresholds established for the identified constituents of concern in Section 3 (Sustainable Management Criteria) of the GSP, instead of just stating that they align with drinking water standards.
- State directly what the depth to groundwater corresponds to under the GDEs for the proposed minimum threshold (10 feet below 2011 groundwater levels), and how it compares to plant rooting depth information.
- Consider GDEs when establishing measurable objectives and evaluate the measurable objectives based on GDE water needs.

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[27,28]

[27] Webtool available at: https://igde-work.earthengine.app/view/sage

[28] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[29] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Final Worsened**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring points (RMSs) in the shallow aquifer across the basin for the groundwater elevation and water quality groundwater condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.
- Provide maps that overlay existing and proposed monitoring well locations with the locations of GDEs (in addition to ISWs) to clearly identify potentially impacted areas.

[29] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Describe further the biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Appendix D discusses remote sensing of GDEs using NDVI or other data to monitor the health of GDEs through time, but few details are provided.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[30,31]

[30] Webtool available at: https://igde-work.earthengine.app/view/sage

[31] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The plan's commitment to mitigate the undesirable result on the Cienega Riparian Complex GDE is insufficient. The plan is confusing in that the mitigation refers only to the Cienega *Springs* Restoration project located in an adjacent groundwater basin and does not propose any mitigation for the Cienega Riparian Complex GDE. Furthermore, no supporting evidence is presented indicating how proposed Projects 1 & 2 would mitigate impacts to the Cienega Riparian Complex GDE.

Table 9 shows the GSP satisfactorily answered none of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to

"Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[32]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- For GDEs, include the following: 1) Add a map showing the locations of the Cienega Riparian Complex GDE and the Cienega Springs Restoration project, 2) Explain how the proposed management actions will mitigate the undesirable result occurring at the Cienega Riparian Complex GDE, 3) Develop immediate and longer term management actions to address the undesirable result occurring at the Cienega Riparian Complex (e.g., immediate pumping reductions when the minimum threshold is reached, non-native vegetation removal should die-off occur).

- If the data gathered from additional monitoring in the basin reveals that other GDEs are present, develop mitigation actions for undesirable impacts on those GDEs.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[33]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[32] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[33] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 25, 2021

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Mound Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Mound Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and tribal stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of active environmental stakeholder engagement by including a stakeholder director for environmental interests on the Mound Basin GSA Board of Directors.

Our specific comments related to the GSP in the Mound Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

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E.J. Remson
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The Nature Conservancy

Attachment A

Specific Comments on the Mound Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. In particular, we commend the GSA for nominating an environmental stakeholder director to serve on the Director Board to represent environmental interests. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Stakeholder Communication and Engagement Plan that details how the GSA will actively target and engage DAC community members during the remainder of the GSP development process and throughout the GSP implementation phase. Include plans to directly engage the DAC population for inclusion on the Board of Directors instead of having DACs represented by the City of Ventura. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on Stakeholder Communication and Engagement.[7]
- Conduct outreach at frequented locations such as farmers markets and schools across the plan area, providing translation services and technical assistance where needed.
- Continue to consult and engage with the Barbareno-Ventureno Band of Chumash Tribe. Refer to "DWR guidance for engagement with tribal governments" for specific guidance.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation https://www.cleanwateraction.org/files/publications/ca/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] DWR guidance on Engagement with Tribal Governments https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not state the population of each DAC. Furthermore, the GSP does not provide a density map of domestic wells in the basin because the GSA does not know of any domestic wells within the basin. However, we have located one domestic well in the basin (WCR2014-007358 on DWR's Well Completion Report Map; see Attachment C). The plan should provide the location and depth of this well. The GSP does not provide a map of state and federally recognized tribal lands because they state that do not exist in the basin; however the GSP has acknowledged that Mound Basin lies within the traditional tribal territory of the Chumash and we recommend that the GSA consult with tribal representatives to identify and map any potential tribal interests in the basin.

Table 2 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide clarification on the status of domestic wells within the basin. DWR Well Completion Report Map shows that there is a domestic well within the basin.[9] Include a map showing the domestic well or any others that may exist in the basin by location and depth (even if they are not currently in use). Wells previously in use may have been impacted by poor water quality or declining groundwater elevations.

[9] DWR Well Completion Report Map
https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37

- Provide the population of each identified DAC.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In response to our Draft GSP comment letter, the Mound Basin GSA included a new Appendix G in their Final GSP letter to justify its exclusion of ISWs, GDEs, and the shallow principal aquifer in Mound basin.[11] Appendix G provides a long explanation for why the shallow aquifer is not a principal aquifer in the basin, including the following rationale (in summary):

1. The shallow aquifer is poorly suited for well development due to its poor water quality and relatively smaller storage capacity (especially in comparison to the larger deeper production aquifers in the basin).
2. The contribution of groundwater into the Santa Clara River is small relative to the total discharge, and therefore not providing 'significant' quantities of groundwater to springs or surface water systems.

The appendix cites several reports to justify these general claims. The first point prioritizes standard out-of-stream beneficial uses of water over instream beneficial uses (including GDEs). While brackish groundwater may be considered poor water for drinking or crop irrigation, brackish groundwater can be suitable and even necessary for certain species such as the federally endangered tidewater goby that occupies the Santa Clara River Estuary.

As for the second point, we disagree with the GSP's claim that the shallow aquifer is not providing "significant […] quantities of groundwater to wells, springs, or surface water systems." The Santa Clara River is an ecologically significant river and important coastal access point for threatened and endangered anadromous fish, such as Southern California Steelhead. Appendix G references a 2018 report from Stillwater Sciences which estimates that groundwater discharge to the Santa Clara River from Mound Basin during the period January 2015 to Dec 2016 to be 0.2 to -0.3 cfs. They also reference the UWCD's model which estimated groundwater discharge from the Mound basin to be 0.2 to 0.6 cfs in dry years. It is with these estimates that the GSA makes the claim that groundwater from the shallow aquifer is not providing a significant quantity of groundwater to surface water systems, since the average annual discharge entering Mound Basin is 197 cfs. However there are several critical issues with this interpretation. Comparing annual groundwater discharge from Mound Basin to total discharge is not relevant to assessing the timing and importance of this discharge for aquatic species, which may depend on relatively small amounts of water relative to total discharge of the Santa Clara River. In fact, small baseflows or shallow pools, as well as saturated soils can be and often are critical to supporting aquatic species associated with GDEs.

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[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] "'Principal aquifers' refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." [23 CCR §351(aa)]

Appendix G also tries to justify the dismissal of the shallow aquifer as a principal aquifer by plotting limited groundwater level data from the shallow aquifer alongside the deeper production aquifers (Mugu and Hueneme). These data are used in Appendix G to visually approximate whether pumping the deeper aquifer is incurring any impacts on groundwater in the shallow aquifer. The GSP concludes that the shallow aquifer is unaffected by deeper pumping, since there are relatively small changes in groundwater elevations in the shallow aquifer in comparison to the declining groundwater levels observed in the deeper production aquifer during the 2012 to 2017 drought. However, the observed groundwater level data are limited (two years of data from 2015 to 2016) in the shallow aquifer. Also, lagged pumping impacts are likely given the low vertical hydraulic conductivity due to the confining clay layers between Mugu, Hueneme, and the shallow aquifer. Nevertheless, even if pumping impacts to the shallow aquifer are negligible, the shallow aquifer still provides a significant quantity of water for the Santa Clara River and the basin's GDEs, and thus needs to be considered as such in the GSP.

Table 3 shows the GSP satisfactorily answered none of the five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

- Include the shallow groundwater system as a principal aquifer in this GSP to ensure adequate monitoring and management of this critical groundwater resource for current and future beneficial users.

- Provide depth-to-groundwater contour maps using best practices presented The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset",[12] to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs.

- For more information on shallow groundwater in the basin refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[12] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[15,16] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that while the GSP includes a map of GDEs in the basin, it is unclear if a digital elevation model (DEM) was used to correct depth-to-groundwater data under NC dataset polygons (for technical details see The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset").[17] Furthermore, the GSP eliminated NC dataset polygons using the same incorrect rationale used in the ISW section to state that GDEs are not present in the basin because they do not rely on groundwater from a principal aquifer. NC dataset polygons were also incorrectly removed in areas adjacent to irrigated fields due to the presence of surface water. However, GDEs can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields. If there are no data to characterize groundwater conditions in the shallow aquifer, then we strongly recommend that GDEs should be retained as potential GDEs until there is sufficient data to prove otherwise.

Table 4 shows the GSP satisfactorily answered two of eight questions for this criteria. We appreciate the GSA providing an inventory of fauna and flora present in the basin, along with threatened and endangered species. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**

[15] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[16] Refer to Attachment B for a list of freshwater species located in the basin.

[17] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Re-evaluate the NC Dataset polygons that rely on the shallow aquifer or are adjacent to irrigated fields. When using local groundwater data to verify whether vegetation polygons are supported by groundwater in an aquifer, refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset".[12]

- Provide depth-to-groundwater contour maps, noting best practices.[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider the 2070 wet and 2070 extremely dry climate scenarios in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered six of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate extreme wet and dry scenarios into the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was improperly omitted in the water budget. The GSP response states that native vegetation is included in the evapotranspiration term of the water budget. However, native vegetation evapotranspiration should be included as a separate line item in the water budget, not lumped with a larger evapotranspiration term. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the basin.

Table 6 shows the GSP did not satisfactorily answer the one relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATION

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Final Improved**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Establish chronic lowering of groundwater level sustainable management criteria for the shallow aquifer that are protective of DACs and domestic well users. Even though the shallow aquifer is not currently pumped or treated for domestic drinking water, it could be in the future.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users within the basin.
- Establish water quality sustainable management criteria for the shallow principal aquifer that are protective of drinking water users. Even though the shallow principal aquifer is not currently pumped or treated for domestic drinking water, it could be in the future.
- Establish minimum thresholds at the representative monitoring wells that avoid the specific undesirable result of impacting water quality for potable use. For each of the two deep principal aquifers, the GSP states that undesirable results occur when all representative monitoring wells in a principal aquifer exceed the minimum threshold concentration for a constituent for two consecutive years. Because the minimum thresholds are set to the MCL, or in some cases higher than the Secondary MCL (see Table 4.1-02), this does not appear to satisfy the stated minimum threshold goal of protecting water quality for potable uses.
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds on drinking water users, including domestic wells and municipal water suppliers. The GSP states that potential effects on municipal beneficial uses would be increased costs for treatment or blending to meet drinking water standards, however this is the only impact discussed.
- Establish sustainable management criteria for the shallow principal aquifer that are protective of environmental uses and users. When defining undesirable results for chronic lowering of groundwater levels, water quality, and depletions of interconnected surface waters, please provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]
- For the interconnected surface water SMC, the undesirable results should include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

basin.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP (See Attachment B for a list of freshwater species in your basin). These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[17] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users, such as DACs, domestic wells, GDEs, and tribes. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. We appreciate that the GSA included a new project in the Final GSP (Interim Shallow Groundwater Data Collection and Analysis), which will examine the impact of deeper aquifer groundwater extractions on groundwater levels in the shallow alluvial deposits and Santa Clara River flows. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	**Not adequately cover DAC, domestic well, tribal areas, OR GDEs.**	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	**Not adequately cover DAC, domestic well, tribal areas, OR GDEs.**	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	**Yes**	**Final Improved**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	**No**	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Include representative monitoring sites (RMSs) in the shallow principal aquifer across the basin for all groundwater condition indicators. The GSP states that water quality in the shallow principal aquifer is poor, but provides no monitoring data. Prioritize proximity to GDEs and domestic wells when identifying new RMPs.

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify potentially impacted areas.
- Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and to identify DACs and shallow domestic well users that are vulnerable to undesirable results.
- Determine what ecological monitoring can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The GSP states there is no need for project and management actions to address gaps between current and projected sustainable yield. However, groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for all beneficial users. These beneficial users were not sufficiently identified in the GSP. Therefore, potential project and management actions have not been designed or proposed to protect these users.

Table 9 shows the GSP satisfactorily answered none of the six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

Because GDEs, aquatic habitats, surface water users, DACs, and shallow domestic well water users were not sufficiently identified in the GSP, please consider including the following related to potential project and management actions in the GSP:

- For GDEs and ISWs, recharge ponds, reservoirs and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

- For DACs, monitor the impacts of projects and management actions on communities and drinking water users. For example, provide locations of the improperly constructed or abandoned wells, as discussed in Section 6.5, that create conduits for migration of poor-quality water from shallow water-bearing units into the principal aquifers. Discuss how sealing these wells will benefit DACs and domestic wells users.

- For DACs and domestic well owners, take a full accounting of the locations and screened intervals of domestic wells in the basin, even those with *de minimus* use. Implement a drinking water well mitigation program to protect drinking water users.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Shasta Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Shasta Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Shasta Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Roger Dickinson
Policy Director
CivicWell (formerly Local Government Commission)

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Shasta Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered five of six questions for this criteria. We thank the GSA for providing more information on the basin's DAC population in the Final GSP. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not use data from multiple water year types to analyze the interconnectivity of surface water and groundwater in the basin. The Final GSP maps ISWs in the basin with depth to groundwater data from spring and fall of 2015. However, using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. Using depth-to-groundwater contours from a single year is not sufficient evidence to state that reaches are not connected to groundwater. In California's Mediterranean climate, groundwater interconnections with surface water can vary seasonally and interannually, and that natural variability needs to be considered when identifying ISWs.

Table 3 shows the GSP satisfactorily answered three of four relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Not Applicable**[10]

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] Not applicable because all stream reaches in the basin are considered to be ISW.

RECOMMENDATIONS

- Denote gaining and losing reaches on the ISW map.
- Describe available groundwater elevation data and stream flow data in the basin. ISWs are best analyzed using depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought), to determine the range of depth and capture the variability in environmental conditions inherent in California's climate. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not completely describe and map potential GDEs in the GSP. We recommend that if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, those polygons are included as potential GDEs in the GSP until data gaps are reconciled in the monitoring network.

Table 4 shows the GSP satisfactorily answered seven of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Final Improved**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. We appreciate the GSA for including extreme climate scenarios in the project water budget. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

RECOMMENDATIONS

- Estimate sustainable yield based on the projected water budget with climate change incorporated, to inform the basis for development of projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation was improperly omitted in the historical, current, and projected water budgets. The response to comments of the Final GSP states that there are no managed wetlands present in the basin, but the main text of the GSP was not updated.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin *in the main text of the GSP*.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the water quality sustainability indicator. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not fully analyze the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for water quality constituents within the basin including naturally occurring constituents that can be exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards[27].
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results[28] in the basin. Defining undesirable results is the crucial first step before the minimum thresholds[29] can be determined.
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the basin[30]. The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to GDEs, DACs, and drinking water users when identifying new RMSs.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to

"Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[37]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[38]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Sierra Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Sierra Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and tribal stakeholder engagement during the GSP development process
- Identification of DACs, drinking water wells, and tribes
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Sierra Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
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Clean Water Action/Clean Water Fund

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Union of Concerned Scientists

Samantha Arthur
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Attachment A

Specific Comments on the Sierra Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communications & Engagement Plan, describe active and targeted outreach to engage DACs, drinking water users, tribes, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin, nor identify the sources of drinking water for DAC members. The GSP identifies tribes with historical and cultural affiliations with the basin, but did not map tribal lands or interests. The GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Provide the population of each DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP may have disregarded some interconnected reaches through use of an unusually shallow threshold depth. Stream reaches were classified as ISWs where groundwater was within 5 feet of the land surface. It is common practice to utilize deeper thresholds, such as 50 feet below groundwater surface, to indicate a disconnected stream reach.[10,11] Furthermore, the GSP does not label interconnected stream reaches as gaining or losing.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] Jasechko, S. et al. 2021. Widespread potential loss of streamflow into underlying aquifers across the USA. Nature, 591: 391-395. doi: https://doi.org/10.1038/s41586-021-03311-x

[11] The Nature Conservancy. 2021. ICONS Tool. Available at: https://icons.codefornature.org/

RECOMMENDATIONS

- Use a deeper depth threshold, such as 50 feet, to determine which stream reaches in the basin are potentially interconnected with groundwater.
- On the map of stream reaches in the basin, clearly label reaches as interconnected or disconnected. Further designate interconnected reaches as gaining or losing. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. Include data from the dry season. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP used average spring depth to groundwater from 2017 to 2020 to characterize groundwater conditions supporting the basin's GDEs. We recommend using additional groundwater data to determine the range of depth to groundwater around NC dataset polygons and to more completely describe groundwater conditions within the basin's GDEs. While we recognize that using seasonal high data is a conservative approach, we recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

Table 4 shows the GSP satisfactorily answered seven of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Clarify the legend labels used on the GDE map (Figure 2.2.2-13). Clarify the data source for GDE polygons. For example, label polygons retained, removed, or added to/from the NC dataset (include the removal reason if polygons are not considered potential GDEs, or include the data source if polygons are added).
- If insufficient data are available to describe groundwater conditions within or near GDE polygons, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network. Label the potential GDEs on the GDE map.
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around GDE polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.
- Provide the depth-to-groundwater contour maps discussed in the GSP text. Show the location of groundwater wells used to create the map, and further discuss the screening depths of the groundwater wells to ensure they are monitoring the shallow principal aquifer. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether GDE polygons are supported by groundwater in an aquifer.[14]
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[14] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did not incorporate climate change into the imported water inputs of the projected water budget. Furthermore, the GSP did not provide a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. We thank the GSA for adding multiple climate scenarios to the projected water budget in the Final GSP. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Final Improved**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

RECOMMENDATIONS

- Incorporate imported water inputs that are adjusted for climate change to the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The GSP response to comments indicates that there are no managed wetlands present in the basin. However, the main GSP text was not changed to indicate this.

Table 6 shows the GSP satisfactorily answered the only question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin *within the main text* of the GSP.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, it does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality sustainability indicator. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation and depletion of surface water sustainability indicators, but not for the water quality indicator. However, the analysis for groundwater elevation and depletions of surface water sustainability indicators are not comprehensive due to significant shallow well data gaps around GDEs and ISWs.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**

RECOMMENDATIONS

- For the well impact assessment, include well data from older wells (>31 years old) to better represent minimum threshold impacts to wells across the basin.
- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds (expressed in the GSP as maximum thresholds) for degraded water quality on DACs and drinking water users.
- Set maximum thresholds and measurable objectives for all water quality constituents within the basin that are impacted or exacerbated by groundwater use and/or management.
- Set maximum thresholds that do not allow water quality to degrade to levels at or above the maximum contaminant level (MCL) trigger level.
- Provide discussion that adaptive changes in SMC for GDEs will be made, if GDE groundwater or biological monitoring reveals that existing SMC are not protective of these ecosystems.
- When defining undesirable results for depletion of interconnected surface water, further describe potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[29] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters, as these environmental users could be left unprotected by the GSP. These recommendations apply

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,30]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[30] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Butte Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Butte Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of drinking water wells and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans to implement a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users
- The GSP allows sustainability indicators to worsen beyond 2015 levels, without a comprehensive analysis of the impacts to beneficial users

Our specific comments related to the GSP in the Butte Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Butte Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered five of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage SDAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that while the GSP identified tribal groups, it did not map tribal lands or tribal interests. The GSP did not provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP disregarded stream reach segments in areas of the basin with data gaps as potential ISWs. The GSP clearly identifies areas of data gaps in the basin. The Final GSP also added discussion and reference to multiple depth-to-groundwater maps over the period 2008 to 2019. However, despite depth to groundwater of less than 30 feet in portions of the basin, the plan concludes that all surface water is unlikely ISW. Because the potential ISWs have not been identified, they cannot be adequately managed in the GSP. Until a disconnection can be proven, all potential ISWs should be included in the GSP. This is necessary to assess whether surface water depletions caused by groundwater use are having an adverse impact on environmental beneficial users of surface water.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- On the map of stream reaches in the basin, label reaches with stream name and interconnected (gaining/losing) or disconnected status. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Use seasonal data over multiple water year types (we recommend 10 years from 2005 to 2015) to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[12] NC dataset polygons were incorrectly removed based on the amount of time that they access groundwater. As presented in the GSP, 'potential GDEs' have access to groundwater >50% of time and 'potential not GDEs' have access to groundwater <50% of the time. However, NC dataset polygons should not be assumed to be disconnected if there is any connection to groundwater (regardless of temporal percentage). Many GDEs often simultaneously rely on multiple sources of water (i.e., both groundwater and surface water), or shift their reliance on different sources on an interannual or inter-seasonal basis.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

[12] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

RECOMMENDATIONS

- On the depth-to-groundwater level maps presented in Appendix 2-C, include the location of groundwater monitoring wells used to produce the maps. Discuss screening depth of monitoring wells and ensure they are monitoring the shallow principal aquifer.
- Use depth-to-groundwater data from multiple seasons and water year types to verify whether polygons in the NC Dataset are supported by groundwater, instead of the incorrect criteria of the amount of time connected to groundwater.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did not calculate a sustainable yield based on the projected water budget with climate change incorporated. The sustainable yield is based on historic pumping rates (from 2009-2018) and is not adjusted for climate change projections.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. We thank the GSA for including multiple climate scenarios (2070 Dry with Extreme Warming and 2070 Wet with Moderate Warming) in the project water budget. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

RECOMMENDATIONS

- Estimate sustainable yield based on the projected water budget with climate change incorporated, to inform the basis for development of projects and management actions.

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets.

The GSP included water demands of native vegetation in the water budget, but native evapotranspiration was grouped into the larger evapotranspiration term.

Appendix 2-D of the GSP included a current water budget table for the Butte Valley Wildlife Area, but managed wetlands were not provided as a separate line item in the table. Appendix 2-D was added to the Final GSP, which had been missing from the Draft GSP. This appendix included tables for the projected budget with climate change incorporated, but did not discuss how water demands of the wildlife area's managed wetlands were adjusted for climate change or incorporated into that budget.

Table 6 shows the GSP satisfactorily answered neither question for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Worsened**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Clearly describe how the Butte Valley Wildlife Area's managed wetlands are incorporated in the GSP's water budget tables.
- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

We are concerned that the GSP allows sustainability indicators to worsen from 2015 levels, without comprehensive analysis of impacts to beneficial users. The GSP has therefore not demonstrated a path to groundwater sustainability.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for boron, benzene and 1,2-dibromoethane. Ensure they align with drinking water standards.[26]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[27] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[28]
- Establish preliminary SMC for the depletion of interconnected surface water sustainability indicator, that can be refined when data gaps are filled. When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the basin[29]. The GSP

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[26] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[27] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[28] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[29] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[18,30]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[30] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[11] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Final Improved**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Increase the number of representative monitoring sites (RMSs) across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.
- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Final Improved**

RECOMMENDATIONS

- For DACs and domestic well owners, include further details for the drinking water well impact mitigation program (referred to as the well replacement program in the GSP) to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for

a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document"[37].

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the San Gorgonio Pass Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the San Gorgonio Pass Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

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Attachment A

Specific Comments on the San Gorgonio Pass Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Clearly identify which stakeholders members of the Stakeholder Advisory Group represent (e.g., DACs, environmental, tribal) and how their input was incorporated into the GSP.
- In the Communication & Outreach Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each DAC in the basin.

Table 2 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Final Improved**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide the population of each identified DAC.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide analysis of interconnectivity of surface water and groundwater in the basin using data from multiple water year types. The GSP does present groundwater hydrographs from the 1990s to present, but this data is not discussed in reference to interconnected surface water and was not referenced in the ISW section of the GSP. Neither data gaps for ISWs nor potential ISWs were discussed in the GSP.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Consider any stream reach segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not use multiple water year types (e.g., wet, average, dry) of groundwater level data to characterize groundwater conditions supporting the basin's GDEs. The GSP discusses depth to water in general terms, but does not provide depth-to-water contours, only groundwater elevation contours for spring 1998 and spring 2019. Furthermore, we found that the GSP did not provide an inventory, map, or description of fauna and flora species or habitat types in the basin's GDEs nor indicate whether threatened and endangered species are present.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin and note any threatened or endangered species (see Attachment B in this letter for a list of freshwater species located in the San Gorgonio Pass Basin).

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found it unclear whether the GSP adjusted evapotranspiration for climate change within the water budget. Furthermore, the GSP did not provide a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered three of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	**Unclear**	Yes	**No Change**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	**No**		Yes	**No Change**

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Present evapotranspiration inputs in the tables and figures for the historic, current, and projected water budgets. Estimate the amount of change in evapotranspiration due to climate change.
- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation was improperly omitted in the water budget. The GSP response to comments indicates that there are no managed wetlands present in the basin. However, the main GSP text was not changed to indicate this.

Table 6 shows the GSP did not satisfactorily answer the one relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin *within the main text of the GSP*.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the basin.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[25] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger level.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable

[25] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

results in the basin.[27] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[28]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[29] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[18,30]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[27] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[28] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[29] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[30] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Santa Monica Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Santa Monica Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Santa Monica Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Santa Monica Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Public Outreach and Engagement Plan that describes active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the location of domestic wells or provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). The GSP response to comments states that there are no known active domestic drinking water wells in the Santa Monica Basin. However, we have located one domestic well in the basin (WCR1988-015287 on DWR's Well Completion Report Map; see Attachment C). The plan should provide the location and depth of this well.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide clarification on the status of domestic wells within the basin. DWR Well Completion Report Map shows that there is a domestic well within the basin.[10] Include a map showing the domestic well or any others that may exist in the basin by location and depth (even if they are not currently in use). Wells previously in use may have been impacted by poor water quality or declining groundwater elevations.

[10] DWR Well Completion Report Map
https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[11] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP dismissed ISWs based on the incorrect assertion that the shallow aquifers are not principal aquifers, despite the recognition in the Water Budget section of the GSP that there is a likely connection between shallow groundwater and surface water. SGMA defines principal aquifers as "aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems" [23 CCR § 351 (aa)]. The shallow groundwater system, consisting of the Bellflower aquitard and the Ballona aquifer, are indeed principal aquifers that must be protected under SGMA. Because the shallow aquifers are not recognized as principal aquifers, potential ISWs are not being identified, described, nor managed in the GSP. We recommend that until a disconnection can be proven, all potential ISWs are retained in the GSP. This is necessary to assess whether surface water depletions caused by groundwater use are having an adverse impact on environmental beneficial users of surface water.

Table 3 shows the GSP satisfactorily answered none of the five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Include a map of stream reaches in the basin. Label the reaches as interconnected, disconnected, or potential ISWs.
- Include the shallow groundwater system as a principal aquifer in this GSP to ensure adequate monitoring and management of this critical groundwater resource for current and future beneficial users.
- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset,"[12] to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend that data is used from the pre-SGMA baseline period of 2005-2015.
- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[12] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP took a conservative approach to mapping GDEs in the basin by retaining all features within the NC dataset (with the exception of a small paved pond area at the Kenneth Hahn State Recreation Area Unit).[15] While this approach works in the short-term, the GSP failed to provide specific plans to verify groundwater reliance for NC dataset features and fill in groundwater data gaps around GDEs. Without an analysis of groundwater data to describe groundwater conditions and verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	**Unclear**	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	**Data gaps not identified**	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	**Clearly mapped AND described**	**Draft Sufficient**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

[15] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

RECOMMENDATIONS

- Discuss how local groundwater data can and will be used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Use depth to groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[12]

- Overlay GDE locations with depth-to-groundwater contour maps. Show well locations on these maps. For the contour maps, note best practices.[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape.

- Further discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not incorporate climate change into surface water flow inputs of the projected water budget. Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated, but instead states that the sustainable yield is based on a historical range of estimates until data gaps are filled.

Table 5 shows the GSP satisfactorily answered four of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs for the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered neither question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Worsened**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for drinking water users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Establish sustainable management criteria for the water quality sustainability indicator. Establish a representative monitoring network for this sustainability indicator to ensure that groundwater use and groundwater management does not lead to groundwater quality degradation within the basin.
- Evaluate the cumulative or indirect impacts of degraded water quality on DACs and drinking water users.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when defining minimum

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

thresholds in the basin.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[16,17]

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[32] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[14] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin for all groundwater condition indicators. Prioritize proximity to GDEs, ISWs, DACs, and drinking water users when identifying new RMSs.
- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.
- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater

Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered none of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[35]

[35] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[36]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[36] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Elsinore Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Elsinore Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, environmental, and tribal stakeholder engagement during the GSP development process
- Identification of DACs, drinking water wells, and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Elsinore Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
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Attachment A

Specific Comments on the Elsinore Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Stakeholder Outreach Plan that describes active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that while DAC blocks were mapped, they were not identified by name. The GSP provides the total DAC population in the basin, but not the population by DAC block group. The GSP did not specify the water source for DAC members. The GSP names tribal communities with ties to the basin, but did not map tribal lands or interests.

The GSP did not map the density of domestic wells nor provide their depth (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Final Improved**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Identify by name and provide the population of each DAC in the GSP text or on the DAC map.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.
- Include a map showing domestic well density and average well depth across the basin.

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP may have disregarded some interconnected reaches in the basin. Under SGMA's ISW definition,[10] ISWs include reaches that maintain a connection with the saturated zone at *any* point in time and space. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] "'Interconnected surface water' refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." [23 CCR §351(o)]

RECOMMENDATIONS

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset,"[11] to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset,[14] as follows:

- NC dataset polygons were incorrectly removed based on the presence or proximity of surface water. Wetland polygons were disregarded where vegetation was characterized as seasonally flooded, or where vegetation was assumed to rely on local accumulation of winter and spring rainfall. However, partial reliance on surface water does not necessarily prove that the plants and animals do not access groundwater. Many GDEs often simultaneously rely on multiple sources of water (i.e., both groundwater and surface water), or shift their reliance on different sources on an interannual or inter-seasonal basis.
- NC dataset polygons were incorrectly removed if Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) data did not correlate with groundwater level trends. This is an incorrect method, since a lack of a relationship does not preclude that groundwater is providing some of the ecosystem's water needs. NDVI and NDMI data are best utilized in conjunction with groundwater level data to assess how vegetation may be responding to groundwater changes. If the ecosystem is accessing groundwater and the vegetation is not stressed, then NDVI and NDMI will not change. Thus, it is better practice to use groundwater levels to verify the NC dataset than to use NDVI and NDMI trends.
- NC dataset polygons were incorrectly removed based on the assumption that they are supported by the shallow, perched water table. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the basin's pumping is occurring in deeper principal aquifers. If there are no data to characterize groundwater conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP.

Table 4 shows the GSP satisfactorily answered one of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**No Change**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that were incorrectly removed based on proximity to surface water, NDVI and NDMI trends, or reliance on the shallow aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Provide a map of the NC Dataset. On the map, label polygons retained or removed from the NC dataset (and the removal reason if polygons are not considered potential GDEs). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Use depth to groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.
- Provide depth-to-groundwater contour maps, noting best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as “potential GDEs” in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extreme wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The GSP response to comments states there are no managed wetlands within the basin, and that the water that is supplied to managed wetlands outside the basin is accounted for in the budget. However, more explanation is needed in the main text of the GSP.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Further describe the occurrence of managed wetlands in the basin within the main text of the GSP. Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on riparian vegetation when defining undesirable results, but does not provide an analysis of the direct or indirect impacts on beneficial users of surface water. The GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives on riparian vegetation, but does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives on beneficial users of surface water.

For the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for arsenic, in coordination with Santa Ana Regional Water Quality Control Board (SARWQCB). Ensure they align with drinking water standards.[28]
- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. Describe the direct or indirect impact to GDEs that result from lowered groundwater elevations, since not all of the potential GDEs in the basin are adjacent to interconnected surface waters.
- When defining undesirable results for chronic lowering of groundwater levels and depletions of interconnected surface waters, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by groundwater conditions in the basin. Thus, potential impacts on environmental beneficial uses and users need to be considered

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin for all groundwater condition indicators. Prioritize proximity to GDEs, ISWs, DACs, and drinking water users when identifying new RMSs.

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered none of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the North San Benito Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the North San Benito Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the North San Benito Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the North San Benito Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication Plan, describe active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly identify losing stream reaches in the basin as interconnected or disconnected. Figure 4-22 shows gaining and losing reaches, but does not indicate which losing reaches are interconnected with groundwater. We recommend clearly labeling reaches as interconnected (while further distinguishing gaining and losing within the interconnected category) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

We also found that the GSP did not provide sufficient description of seasonal groundwater when mapping ISWs. In California's Mediterranean climate, groundwater interconnections with surface water can vary seasonally and interannually, and that natural variability needs to be taken into account when identifying ISWs.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- On Figure 4-22 (Surface Water Connected to Groundwater), clearly label reaches as interconnected (gaining and losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. Describe how utilizing data from 1992 and 1998 represent groundwater conditions across dry and wet years. Include this discussion within the interconnected surface water section of the GSP (Section 4), in addition to the sustainable management criteria section of the GSP (Section 6). In general, we recommend using the 10-year pre-SGMA baseline period of 2005 to 2015, where data is available.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not use best available data to identify GDEs in the basin,[13] but instead mapped vegetation from aerial photographs from fall 2016. Furthermore, the GSP did not clearly identify how local groundwater data was used to verify whether vegetation polygons are supported by groundwater in an aquifer.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**No Change**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

RECOMMENDATIONS

- Develop and describe a systematic approach for analyzing the basin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained or removed from the NC dataset (and the removal reason if polygons are not considered potential GDEs). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset"[14] for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[14]

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin and note any threatened or endangered species (see Attachment B in this letter for a list of freshwater species located in the North San Benito Basin). The GSP text discusses plant and animal species dependent on groundwater, but does not provide a complete inventory in tabular form.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[14] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found it unclear whether the GSP adjusted imported water for climate change within the water budget. Furthermore, the GSP did not provide a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered three of six relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was properly included in the water budget.

For managed wetlands, the Final GSP adds further discussion of the Pajaro River Wetland Mitigation Bank and states that the water source and use amount is not known. However, the GSP does not make an estimate of its water use nor specifically identify this as a data gap to be filled in the future.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands. If there are gaps in data or understanding of water use for managed wetlands, specifically identify this as a data gap to be filled in the future.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation and water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation and water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives.

For the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**

Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for water quality constituents within the basin, including naturally occurring constituents that can be exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[28]
- Analyze depth to water data and rooting depth data for GDEs in the GDE identification section of the GSP, in addition to the sustainable management criteria section. Refer to The Nature Conservancy's plant rooting depth database.[29] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater.

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin. Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30,31]

- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found gaps in how the GSP identified and reconciled data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs and domestic wells when identifying new RMSs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[37]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- The GSP discusses potential options for additional surface water storage. Note that recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[38]

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Tulelake Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Tulelake Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Tulelake Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
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Samantha Arthur
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The Nature Conservancy

Attachment A

Specific Comments on the Tulelake Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage DACs and domestic well owners throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not clearly identify the sources of drinking water for DAC members.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a map of streams in the basin with reaches labeled as interconnected, disconnected, or potential ISWs. The GSP did not clearly describe groundwater level monitoring well data and stream gauge data that were incorporated into the model, the screening depths of wells used in the groundwater model, and description of the temporal (seasonal and interannual) variability of the data used to calibrate the model.

Table 3 shows the GSP satisfactorily answered none of the five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Further describe the groundwater elevation data, including well screen depth interval, and stream flow data used in the GSA Model.
- To confirm and illustrate the results of the groundwater modeling, overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[14] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or due to the presence of surface water supplies (including Tule Lake Sumps). However, this removal criteria is flawed since GDEs can rely on multiple water sources – including shallow groundwater receiving inputs from surface water supplies or irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields or surface water supplies.

We found that the GSP used depth-to-groundwater data from one point in time (spring 2019) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

The GSP presents a summary table of the vegetation and wetland classifications present in the NC Dataset. However, the GSP does not provide an inventory of the basin's fauna or acknowledge endangered, threatened, or special status species in the basin.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	**Yes**	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	**Clearly mapped AND described**	**Draft Sufficient**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that are adjacent to irrigated fields or surface water supplies. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- Include an inventory of the fauna and flora present within the basin's GDEs (see Attachment B of this letter for a list of freshwater species located in the Tulelake Basin). Note any threatened or endangered species.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management. We also found that the GSP did not incorporate climate change into surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

- Include surface water flow inputs in the projected water budget and incorporate climate change effects on these flows.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets. Evapotranspiration volumes associated with native and riparian vegetation were lumped into the larger evapotranspiration term of the water budgets. The GSP states that 12% of the basin is comprised of managed wetlands, but does not state how this land use category is accounted for in the water budget.

Table 6 shows the GSP satisfactorily answered neither of the questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted or exacerbated by groundwater use and/or management.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Final Improved**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[39]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[39] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Napa Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Napa Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan could be improved in the following areas:

- DAC stakeholder engagement during the GSP development
- Identification of tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of the incorporation of extreme climate in the projected water budget.

Our specific comments related to the GSP in the Napa Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Napa Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered four of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Clarify whether the GSP Advisory Committee will continue to meet and inform the GSP implementation process for the basin after the GSP is adopted by the GSA.
- Continue to Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map tribal interests in the basin.

Table 2 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not present a comprehensive map of ISWs in the basin and provided incomplete conclusions about the connected nature of reaches in the basin. Despite comprehensive discussion of stream reaches in the basin, no overall map is presented to illustrate the conclusions of the ISW analysis. The GSP is not clear about what it considers an ISW and how the model results factor into the conclusions. When describing the model results, the GSP appears to limit ISWs to the streams connected to groundwater for more than 26 weeks of the year. However under SGMA's ISW definition,[10] ISWs include reaches that maintain a connection with the saturated zone at *any* point in time and space. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] "'Interconnected surface water' refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." [23 CCR §351(o)]

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP mapped GDEs using the Natural Communities Commonly Associated with Groundwater dataset (NC dataset) and other sources, including the University of California, Davis 2019 Napa County vegetation dataset and the San Francisco Estuary Institute (SFEI) California Aquatic Resource Inventory (CARI) dataset. GDEs were identified in areas overlying groundwater within 30 feet of land surface based on spring of 2010, 2015, and 2019 groundwater depths. The GSP did not confirm that depth-to-groundwater measurements under GDEs were corrected for land surface elevations. The GSP did not fully describe data gaps in the GDE mapping and monitoring network.

Table 4 shows the GSP satisfactorily answered five of seven relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	**Clearly incorporated and described**	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	**Yes**	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Not Applicable**[14]

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Not applicable because the plan included all GDEs from the NC dataset and other local datasets.

RECOMMENDATIONS

- For the depth-to-groundwater contour maps (Figures 6-121 to 6-123), note best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- Discuss data gaps for GDEs. If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

Table 5 shows the GSP satisfactorily answered all of the seven questions for this criteria. We appreciate the GSA for clearly and transparently incorporating extreme scenarios in the basin using the CNRM-CM5 with RCP 4.5 climate model and the HadGEM2-ES with RCP 8.5 climate model. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Final Improved**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Include imported water, which is currently included in the "Non-Routed Delivery" column, as its own line item in the water budget tables. This input is adjusted for climate change, but we recommend separating it into its own item instead of combining it with recycled water and stream diversions.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered neither question for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP mentions but does not fully analyze the direct or indirect impacts on DACs when defining undesirable results. The GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, it does not provide an analysis of the impacts of the proposed measurable objectives. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

For the groundwater elevation sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds, but does not provide an analysis of measurable objectives.

For the depletion of surface water and water quality sustainability indicators, the GSP mentions but does fully analyze the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable results for all sustainability indicators across the basin.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[29] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,30]

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[30] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy,

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Verify the location of Well ID 2800030-001. Our mapping based on the GAMA database shows a different location than Figure 9-14 of the GSP.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Sonoma Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Sonoma Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Sonoma Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
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Attachment A

Specific Comments on the Sonoma Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Community Engagement Plan, describe active and targeted outreach to engage DACs and domestic well owners throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Provide more information on the role of the Advisory Committee during the GSP implementation process.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each identified DAC in the basin. The GSP did not provide a domestic well density map nor provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered two of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a separate domestic well density map for the basin.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not use sufficient data to analyze the interconnectivity of surface water and groundwater in the basin. The GSP maps ISWs in the basin with depth-to-groundwater data from 2016 to 2018, which includes two normal years and one wet year. However, using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. In California's Mediterranean climate, groundwater interconnections with surface water can vary seasonally and interannually, and that natural variability needs to be considered when identifying ISWs. The GSP could be improved by discussing available groundwater data for the pre-SGMA period of 2005 to 2015, and using data from multiple water year types during this period.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not fully describe the groundwater data used to characterize groundwater conditions supporting the basin's GDEs. The GSP response to our comments states that all available groundwater level data from 2005 to 2020 were used to evaluate areas with depth to water shallower than 30 feet, and references Appendix 4-C. However, we did not find a clear description of data in this appendix or the main text of the GSP. Furthermore, the GSP did not clearly discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.

Table 4 shows the GSP satisfactorily answered six of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	**Clearly incorporated and described**	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	**Unclear**	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	**Yes**	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	**Clearly mapped AND described**	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Discuss available shallow groundwater data. Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around Veg Map derived potential GDE polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the Veg Map derived potential GDE map are supported by groundwater in an aquifer.[13]

- Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used if these species are present in the basin. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons are connected to groundwater.

- Further discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[13] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP incorporates climate change into the projected water budget using RCP 8.5 and the HadGEM2-ES Global Climate Model, which is something we support. To improve, the GSP should consider extreme climate scenarios in the projected water budget. While HadGEM2-ES may better represent warm and dry conditions for California, other models may capture other statistics relevant for your basin and may reveal valuable information to account for uncertainty. While extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not incorporate climate change into the imported water inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Consider other GCM projections to account for uncertainty beyond median statistics.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets. The water budget includes a separate item for evapotranspiration, but combines crop, native vegetation, and riparian evapotranspiration into one term. The GSP response to comments states that managed wetlands within the basin do not likely rely on groundwater, and states that this area of uncertainty will be evaluated during GSP implementation.

Table 6 shows the GSP satisfactorily answered neither question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP mentions but does not analyze the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, it does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality sustainability indicator. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP mentions but does not analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the depletion of surface water sustainability indicator, but does not provide an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation nor water quality sustainability indicators. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[28] According to the state's anti-degradation policy,[29] high water quality should be protected and is only allowed to worsen beyond the MCL if a finding is made that it is in the best interest of the people of the State of California. No analysis has been done and no such finding has been made. Furthermore, exceedances of the MCL constitute a violation of the state's water quality law and are not permitted.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] Anti-degradation Policy https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/1968/rs68_016.pdf

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,33]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations (specifying whether they are shallow or deep wells) with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document".[40]

[40] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Ojai Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Ojai Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Environmental and tribal stakeholder engagement during the GSP development process
- Identification of drinking water wells and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of drinking water users and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Ojai Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Ojai Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Worsened**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Public Outreach and Engagement Plan, describe active and targeted outreach to engage drinking water users and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Regarding the interests of tribes, the plan states that *"the OBGMA is currently working to locate the nearest contact in the Ojai Valley and expects to send information soon after the time of print of this Outreach and Engagement Plan."* Provide this information in the final plan.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide a map of the tribal lands or tribal interests in the basin. The GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered one of three relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Not Applicable**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Not Applicable**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Not Applicable**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not map ISWs in the basin. The GSP maps streams in the basin using the USGS National Hydrography Dataset, which shows the stream reaches labeled as intermittent, perennial, and unclassified. It is not clear, however, if only perennial streams are considered to be interconnected. Note the regulations [23 CCR §351(o)] define ISW as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

The GSP does not clearly acknowledge that the perched aquifer is a shallow principal aquifer.[10] The GSP discusses perched zones in the basin, but does not clearly state whether stream reaches connected to the perched aquifer are considered ISWs. If areas of shallow or perched groundwater are discounted as ISWs, the GSP should provide more supporting evidence of 1) vertical groundwater gradients between the perched system and deeper principal aquifers, and 2) whether perched groundwater is providing significant or economic quantities of water to springs (e.g., GDEs), wells (e.g., domestic wells), and surface water systems (e.g., GDEs/ISWs).

The GSP acknowledges the gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. We recommend that any segments with data gaps are considered potential ISWs and clearly marked as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] "'Principal aquifers' refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." [23 CCR §351(aa)]

Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

- On the map of streams in the basin, clearly label reaches as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP may have improperly disregarded some mapped features in the NC dataset.[14] Some NC dataset polygons were characterized as potential GDEs not likely impacted by groundwater extraction from the deeper principal aquifer. It is not clear if the GSP retains this category of GDEs in the GSP for consideration and inclusion in the monitoring network and sustainable management criteria. Shallow aquifers that have the potential to support well development, springs, or surface water systems are principal aquifers, even if the majority of the basin's pumping is occurring in deeper principal aquifers. If there are no data to characterize groundwater conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Clarify which NC dataset polygons were retained in the GSP as potential GDEs. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Provide depth-to-groundwater contour maps, noting best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not include surface water flow inputs, including imported water, for the projected water budget and incorporate the effects of climate change on these flows.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions
- Include surface water flow inputs, inclusive of imported water, in the projected water budget and incorporate climate change effects on these flows.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was improperly omitted in the historical, current, and projected water budgets. Evapotranspiration volumes associated with native vegetation were lumped into the larger evapotranspiration term of the water budgets. The Final GSP was updated to clarify that there are no managed wetlands present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

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[21] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[22] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[23] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[24] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

[25] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[26] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Table 7 shows the GSP satisfactorily answered one of eight relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Not Applicable**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.

- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.

- Describe direct and indirect impacts on drinking water users when defining undesirable results for degraded water quality.[28] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[29]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users.

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- Evaluate impacts on GDEs when establishing SMC for chronic lowering of groundwater levels. When defining undesirable results, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of domestic wells and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to domestic wells, GDEs, and ISWs when identifying new RMSs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially domestic wells and GDEs.

- Prioritize the installation of new monitoring wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Not Applicable**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Describe the projected timeline for implementing the Salt and Nutrient Management Plan project in Chapter 4 of the GSP.
- For domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP

implementation. Refer to “Framework for a Drinking Water Well Impact Mitigation Program” for specific recommendations on how to implement a drinking water well mitigation program.[39]

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the “Multi-Benefit Recharge Project Methodology Guidance Document.”[40]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[40] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Petaluma Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Petaluma Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Petaluma Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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Samantha Arthur
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Attachment A

Specific Comments on the Petaluma Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Community Engagement Plan, describe active and targeted outreach to engage DACs and domestic well owners throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each identified DAC in the basin. The GSP did not provide a domestic well density map nor provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered two of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a separate domestic well density map for the basin.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not describe the groundwater model, the Petaluma Valley Integrated Groundwater Flow Model (PVIHM), used to estimate values of stream leakage. The GSP does not describe data incorporated into the model, including spatial location of monitoring wells and screening depths, stream gauge data, and description of the temporal (seasonal and interannual) variability of the data used to calibrate the model.

The Final GSP added a map of interconnected stream reaches in the basin, based on the modeling results. The map does not illustrate gaining or losing reaches, however, nor designate areas of data gaps as potential ISWs.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

- Include the missing appendix that describes the PVIHM. Ensure that the appendix describes data incorporated into the model, including spatial location of monitoring wells and screening depths, stream gauge data, and description of the temporal (seasonal and interannual) variability of the data used to calibrate the model.

- On the map of stream reaches in the basin, clearly label reaches as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset,"[11] to confirm and illustrate results of the groundwater modeling. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not fully describe the groundwater data used to characterize groundwater conditions supporting the basin's GDEs. The GSP response to comments states that all available groundwater level data from 2005 to 2020 were used to evaluate areas with depth to water shallower than 30 feet, and references Appendix 4-C. However, we did not find a clear description of data in this appendix or the main text of the GSP.

Table 4 shows the GSP satisfactorily answered seven of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Final Improved**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Discuss available shallow groundwater data. Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around Veg Map derived potential GDE polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the Veg Map derived potential GDE map are supported by groundwater in an aquifer.[11]

- Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used if these species are present in the basin. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons are connected to groundwater.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP incorporates climate change into the projected water budget using RCP 8.5 and the HadGEM2-ES Global Climate Model, which is something we support. To improve, the GSP should consider extreme climate scenarios in the projected water budget. While HadGEM2-ES may better represent warm and dry conditions for California, other models may capture other statistics relevant for your basin and may reveal valuable information to account for uncertainty. While extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, we found that the GSP did not incorporate climate change into the imported water inputs of the projected water budget. The GSP did not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

RECOMMENDATIONS

- Consider other GCM projections to account for uncertainty beyond median statistics.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets. The water budget includes a separate item for evapotranspiration, but combines crop, native vegetation, and riparian evapotranspiration into one term. The GSP response to comments states that managed wetlands within the basin do not likely rely on groundwater, and states that this area of uncertainty will be evaluated during GSP implementation.

Table 6 shows the GSP satisfactorily answered neither question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP mentions but does not analyze the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, it does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality sustainability indicator. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP mentions but does not analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the depletion of surface water sustainability indicator, but does not provide an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation nor water quality sustainability indicators. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[28]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations (specifying whether they are shallow or deep wells) with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document".[39]

[39] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Anderson Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Anderson Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Anderson Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Anderson Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communications & Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the subbasin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all of the six questions for this criteria.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not map gaining and losing reaches in the basin. In addition, the GSP did not discuss data gaps for ISWs. We recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- On the map of stream reaches in the subbasin (Figure 3-17), identify gaining and losing reaches in addition to interconnected and disconnected reaches.
- Describe data gaps for the ISW analysis. We recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not use multiple water year types (e.g., wet, average, dry) of groundwater level data to characterize groundwater conditions supporting the basin's GDEs. Potential GDEs were identified in areas overlying groundwater within 30 feet of land surface based solely on April 2018 groundwater conditions. In addition, the GSP did not include sufficient description of data gaps for GDEs.

We appreciate the inclusion of our species list in the Final GSP Appendix C-5. We recommend adding text in the main GSP text to reference this appendix and add discussion of the species present in the basin.

Table 4 shows the GSP satisfactorily answered six of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	**Clearly incorporated and described**	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	**Yes**	**Final Improved**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	**Clearly mapped AND described**	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[12]

- Refer to The Nature Conservancy's plant rooting depth database.[13] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Further discuss data gaps for GDEs. If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For the inventory of freshwater species located in the Anderson Subbasin included as Appendix C-5 in the Final GSP, provide reference and discussion in the main GSP text.

- For more information on shallow groundwater conditions in the basin refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[12] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[13] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP incorporates climate change into the projected water budget using RCP 8.5 and the HadGEM2-ES Global Climate Model, which is something we applaud. To improve, the GSP should consider extreme climate scenarios in the projected water budget. While HadGEM2-ES may better represent warm and dry conditions for California, other models may capture other statistics relevant for your basin and may reveal valuable information to account for uncertainty. While extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not adjust water imported via the Central Valley Project for climate change and incorporate this into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Consider other GCM projections to account for uncertainty.
- Integrate climate change into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation was properly included in the water budget. The Final GSP clarified that there are no managed wetlands in the basin. Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, but does not provide an analysis of measurable objectives for either sustainability indicator. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation, water quality, and depletion of surface water sustainability indicators, but does not provide an analysis of measurable objectives for these sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[26] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that are impacted or exacerbated by groundwater use and/or management.
- Set measurable objectives at lower levels than minimum thresholds (i.e., indicative of better water quality).
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger level.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]

[26] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[17] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, tribes, and GDEs to clearly identify monitored areas.
- Increase the number of RMSs in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater condition indicators across the

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

subbasin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, tribes, GDEs, and ISWs when identifying new RMSs.

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, tribes, and GDEs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[37]

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[38]

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Enterprise Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Enterprise Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Enterprise Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Roger Dickinson
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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Enterprise Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communications & Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the subbasin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all of the five relevant questions for this criteria.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not discuss data gaps for ISWs. We recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Draft Sufficient**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

- Describe data gaps for the ISW analysis. We recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not use multiple water year types (e.g., wet, average, dry) of groundwater level data to characterize groundwater conditions supporting the basin's GDEs. Potential GDEs were identified in areas overlying groundwater within 30 feet of land surface based solely on April 2018 groundwater conditions. In addition, the GSP did not include sufficient description of data gaps for GDEs.

We appreciate the inclusion of our species list in the Final GSP Appendix C-5. We recommend adding text in the main GSP text to reference this appendix and add discussion of the species present in the basin.

Table 4 shows the GSP satisfactorily answered six of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Final Improved**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[13]

- Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Discuss data gaps for GDEs. If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For the inventory of freshwater species located in the Enterprise Subbasin included as Appendix C-5 in the Final GSP, provide reference and discussion in the main GSP text.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[13] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that while the GSP incorporates climate change into the projected water budget using RCP 8.5 and the HadGEM2-ES Global Climate Model (GCM), the GSP does not consider other extreme climate scenarios in the projected water budget. While HadGEM2-ES may better represent median conditions, other models may better capture other statistics relevant for your basin and may reveal valuable information to account for uncertainty. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found it unclear whether the GSP included imported water in the surface water inputs that were adjusted for climate change.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Consider other GCM projections to account for uncertainty beyond median statistics.
- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was properly included in the water budget. The Draft and Final GSPs state that there are no managed wetlands within the basin. Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, but does not provide an analysis of measurable objectives for either sustainability indicator. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation, water quality, and depletion of surface water sustainability indicators, but does not provide an analysis of measurable objectives for these sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that are impacted or exacerbated by groundwater use and/or management.
- Set measurable objectives at lower levels than minimum thresholds (i.e., indicative of better water quality).
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger level.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

minimum thresholds in the subbasin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater condition indicators across the subbasin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.
- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.
- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[39]

[39] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Antelope Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Antelope Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Identification of DACs and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Antelope Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

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Attachment A

Specific Comments on the Antelope Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communications and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7] While some of these resources have already been stated in the GSP, we recommend that the GSA should improve utilization of these resources and documentation of the engagement process.
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Provide information on whether the GSA has initiated contact with tribal stakeholders in the basin during GSP development, and how tribal concerns were considered during the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not identify the sources of drinking water for DACs. While tribal stakeholders in the basin were identified, the GSP did not map tribal interests or tribal lands.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly state whether streams located in areas of data gaps are retained as potential ISWs in the GSP.

The Final GSP updated the ISW analysis with a figure showing likely interconnected, likely disconnected, and interconnectivity uncertain stream reaches based on The Nature Conservancy's ICONS dataset.[10] The Final GSP maps losing and gaining stream segments categorized using the Tehama Integrated Hydrologic Model in Appendix 2-J.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] The Nature Conservancy. 2021. ICONS Tool. Available at: https://icons.codefornature.org/

RECOMMENDATIONS

- Consider any stream reaches with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- In the main text of the GSP, summarize the groundwater elevation data and stream flow data used in the modeling analysis. Discuss temporal (seasonal and interannual) variability of the data used to calibrate the model.
- To confirm and illustrate the results of the groundwater modeling, overlay the basin's stream reaches with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that while the GSP mapped GDEs using the NC dataset,[14] the GSP used depth-to-groundwater data from a single point in time (spring 2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate. Furthermore, we found it to be unclear whether GDEs in areas of data gaps were mapped and described as "potential GDEs" in the GSP.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	**Unclear**	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	**Data gaps described clearly**	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Include the missing Figures 1-4 in the GDE Appendix 2-I. The response to comments states that these are included in the Final GSP, but they still don't appear to be included.
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Provide depth-to-groundwater contour maps, noting best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. Managed wetlands were not discussed in the Draft GSP, but the Final GSP added text and a figure describing managed wetlands. However, the Final GSP did not include water demands of managed wetlands in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation and water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the basin.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[28] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[29]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted or exacerbated by groundwater use and/or management.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Additional studies of GDEs and groundwater - surface water interactions are briefly discussed in the Projects and Management Actions chapter, but very few details are provided.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Describe the projected timelines for implementing the Invasive Plant Removal and Levee Setback and Stream Channel Restoration projects and management actions in Chapter 4 of the GSP.
- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation

Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Corning Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Corning Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Corning Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Corning Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communications and Engagement Plan, describe active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all six questions for this criteria. We thank the GSA for the improvements to the identification of beneficial users from Draft to Final GSP, which include providing the map of tribal lands and providing more detail about the DAC populations in the basin.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Final Improved**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a clear summary of the locations of groundwater wells and their screen depths used in the analysis, and description of temporal (seasonal and interannual) variability of the data used to calibrate the model. This information should be provided in the GSP to support the conclusions presented.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. We thank the GSA for confirming the results of the ISW modeling analysis with The Nature Conservancy's Interconnected Surface Water in the Central Valley (ICONS) website.[10] Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] Available online at: https://icons.codefornature.org/

RECOMMENDATIONS

- Further describe the groundwater elevation data and stream flow data used in the modeling analysis. Discuss screening depth of monitoring wells and ensure they are monitoring the shallow principal aquifer. Discuss temporal (seasonal and interannual) variability of the data used to calibrate the model.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[13] NC dataset polygons were incorrectly removed due to lack of data in some areas of the basin. While the GSP does acknowledge the data gap, the GSP should not ignore these GDEs just because there is a lack of data to support their characterization. The absence of evidence is not the evidence of absence. If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

Furthermore, the GSP used depth-to-groundwater data from a single date (spring 2018) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types to determine the range of depth to groundwater around NC dataset polygons.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	**Clearly incorporated and described**	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Final Improved**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[14]

- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used, if these species are present in the basin. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[14] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found it unclear whether the GSP adjusted imported water for climate change and incorporated it into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into imported water inputs for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was properly included in the water budget. The GSP did not include the current, historical, and projected demands of managed wetlands. The GSP states that managed wetlands exist along the Sacramento River and are managed by the Sacramento River National Wildlife Refuge.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators. While the GSP does provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation sustainability indicator, it does not provide an analysis for the water quality sustainability indicator. The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds, but does not provide an analysis of measurable objectives.

For the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin. Ensure they align with drinking water standards.[29]
- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact on GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[16,17]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[32] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

[32] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include detailed plans for a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[35]

[35] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Red Bluff Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Red Bluff Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and

the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC, tribal, and environmental stakeholder engagement during the GSP development process
- Identification of DACs and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Red Bluff Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the

the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Samantha Arthur
Working Lands Program Director
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Attachment A

Specific Comments on the Red Bluff Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communications and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7] While some of these resources have already been stated in the GSP, we recommend that the GSA should improve utilization of these resources and documentation of the engagement process.
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Provide information on whether the GSA has initiated contact with tribal stakeholders in the basin during GSP development, and how tribal concerns were considered during the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not identify the sources of drinking water for DACs. While tribal stakeholders in the basin were identified, the GSP did not map tribal interests or tribal lands.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly state whether streams located in areas of data gaps are retained as potential ISWs in the GSP.

The Final GSP updated the ISW analysis with a figure showing likely interconnected, likely disconnected, and interconnectivity uncertain stream reaches based on The Nature Conservancy's ICONS dataset.[10] The Final GSP describes losing and gaining stream segments categorized using the Tehama Integrated Hydrologic Model in Appendix G of Appendix 2-J, however we could not locate this sub-appendix of Appendix 2-J.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] The Nature Conservancy. 2021. ICONS Tool. Available at: https://icons.codefornature.org/

RECOMMENDATIONS

- Include sub-Appendix G of Appendix 2-J in the GSP.
- Consider any stream reaches with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- In the main text of the GSP, summarize the groundwater elevation data and stream flow data used in the modeling analysis. Discuss temporal (seasonal and interannual) variability of the data used to calibrate the model.
- To confirm and illustrate the results of the groundwater modeling, overlay the basin's stream reaches with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that while the GSP mapped GDEs using the NC dataset,[14] the GSP used depth-to-groundwater data from a single point in time (spring 2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate. Furthermore, we found it to be unclear whether GDEs in areas of data gaps were mapped and described as "potential GDEs" in the GSP.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	**Data gaps described clearly**	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Include the missing Figures 1-4 in the GDE Appendix 2-I. The response to comments states that these are included in the Final GSP, but they still don't appear to be included.
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- Provide depth-to-groundwater contour maps, noting best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. Managed wetlands were not discussed in the Draft GSP, but the Final GSP added text and a figure describing managed wetlands. However, the Final GSP did not include water demands of managed wetlands in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation and water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the basin.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[28] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[29]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted or exacerbated by groundwater use and/or management.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Additional studies of GDEs and groundwater - surface water interactions are briefly discussed in the Projects and Management Actions chapter, but very few details are provided.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Describe the projected timelines for implementing the Invasive Species Plant Control and Levee Setback and Stream Channel Restoration projects and management actions in Chapter 4 of the GSP.
- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation

Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Wyandotte Creek Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Wyandotte Creek Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Wyandotte Creek Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Wyandotte Creek Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage DACs, drinking water users, environmental stakeholders and consultation to tribes through the GSP development *and* implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each DAC in the basin, nor identify the sources of drinking water for DACs.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Final Improved**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Provide the population of each identified DAC. Identify the sources of drinking water for DAC populations, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a clear map of stream reaches in the basin, with reaches labeled as interconnected (gaining/losing), disconnected, or potential ISW. The GSP does not present a thorough description of the data used in the model, such as the groundwater level monitoring well data and stream gauge data that were incorporated into the model. Additionally, no description was provided of the temporal (seasonal and interannual) variability of the data used to calibrate the model.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Label stream reaches on Figure 2-20 as interconnected (gaining/losing), to make clear that all stream segments are retained as ISWs in the GSP.
- Further describe the groundwater elevation data and stream flow data used in the BBGM analysis.
- To confirm and illustrate the results of the groundwater modeling, overlay the stream reaches shown on Figure 2-20 with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[13] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal or spatial scales. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to surface water supplies.

The GSP did not verify the NC dataset with groundwater data from the underlying principal aquifer. Without an analysis of groundwater data to verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation. The GSP did not provide an inventory of flora and fauna present in the basin, nor identify threatened and endangered species residing within the basin.

Table 4 shows the GSP satisfactorily answered one of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Provide a comprehensive set of maps for the basin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained, removed, or added to/from the NC dataset (include the removal reason if polygons are not considered potential GDEs, or include the data source if polygons are added). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network. It is not clear from the description in the GSP whether NC dataset polygons labeled as 'Not Likely a GDE' on Figure 2-23 are retained as potential GDEs.

- Include an inventory of the fauna and flora present within the basin's GDEs (see Attachment B of this letter for a list of freshwater species located in the Wyandotte Creek Basin). Note any threatened or endangered species.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

The GSP did not clearly describe how climate change was incorporated into imported water inputs of the projected water budget. Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into imported water inputs for the projected water budget.
- Estimate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation and managed wetlands were properly included in the historical, current, and projected water budgets. The GSP could be further improved by describing the managed wetland acres and associated evapotranspiration values that are used as inputs in the water budget model.

Table 6 shows the GSP satisfactorily answered both questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide documentation of the managed wetland acres and associated evapotranspiration values that are used as inputs in the water budget model (BCDWRC 2021).

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the water quality sustainability indicator.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[20] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[21] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[22] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

[23] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[24] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels including dry years and periods of drought.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[27]
- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered four of six questions for this criteria. We appreciate the GSA for including a domestic well mitigation program, with stated priority for disadvantaged communities who are dependent on groundwater. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the East Side Aquifer Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the East Side Aquifer Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Stakeholder engagement during the GSP development process was lacking
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

- Lack of plans to identify and fill shallow monitoring well data gaps around ISWs in the monitoring network

Our specific comments related to the GSP in the East Side Aquifer Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the East Side Aquifer Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Under our review process, the East Side Aquifer GSP scored a "Yes" for their documentation of DAC stakeholder engagement during the GSP development process because there are two representatives of DACs on the Advisory Group. However, we have been informed by the Community Water Center - a stakeholder representing DAC interests in the basin - that even with representation of DACs on the Advisory Group, the Salinas Valley GSA failed to incorporate most of the feedback submitted for protecting drinking water users and DACs in the GSP. We were also informed that the GSA also failed to carry out the Stakeholder Outreach Plan (even though it is included in the GSP), meaning that a wide range of stakeholders, including members of DACs who rely on groundwater in the subbasin for drinking water, were not engaged in the development of the GSP. Representation on the Advisory Committee does not satisfy the GSA's duty to conduct broad community engagement. While we appreciate that Salinas Valley GSA created an advisory group to engage stakeholders, there is much to improve upon to ensure that diverse voices are heard and empowered through this engagement mechanism and incorporated into the GSP development and implementation.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP described how the GSA informed and consulted stakeholders, satisfactorily answering all relevant questions for this criteria, but we would like to stress here that based on additional information that we received from local stakeholders in the basin, **the expectations of active stakeholder engagement were not met in the**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

East Side Aquifer Basin since stakeholder input was not integrated into the GSP. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**[7]
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[8]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[8]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- DAC and environmental stakeholder engagement should be improved by incorporating feedback and recommendations from DAC and environmental stakeholders engaged in the GSP process.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[7] The specific question evaluated here is: "Does the GSP document how stakeholders were given opportunities to engage?" Thus this finding only establishes that the documentation was sufficient, not that the engagement actually happened or reached an appropriate level.

[8] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin. Furthermore, the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[8]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP disregarded some reach segments as ISW or potential ISW. The Final GSP stream reach map no longer shows ISWs in the basin, and the GSP text was updated to state there are no ISWs. However, there is no description of what changed in the assessment between the draft and final plans. Figure 4-9 (Locations of Interconnected Surface Water) shows model cells that are labeled 'Model grid stream cell for stream reach needing more information to evaluate interconnectivity,' but the GSP does not state if these cells are considered ISWs. The GSP did not identify data gaps when mapping or discussing ISWs.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Worsened**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Worsened**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Describe available groundwater elevation data and stream flow data in the basin. ISWs are best analyzed using depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought), to determine the range of depth and capture the variability in environmental conditions inherent in California's climate.

- Consider and map areas of data gaps as potential ISWs in the GSP. On Figure 4-9 (Locations of Interconnected Surface Water), denote cells labeled 'Model grid stream cell for stream reach needing more information to evaluate interconnectivity' as potential ISWs.

- Overlay the stream reaches shown on Figure 4-9 with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells in the basin used to create the contour maps.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

- Describe data gaps for the ISW analysis. Reconcile these data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that in addressing data gaps, the GSP took a conservative approach to mapping GDEs in the basin by retaining all features within the NC dataset.[14] While this approach works in the short-term, the GSP failed to provide specific plans to verify groundwater reliance for NC dataset features and fill in groundwater data gaps around GDEs. Without an analysis of groundwater data to describe groundwater conditions and verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation.

Table 4 shows the GSP satisfactorily answered two of seven relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Final Improved**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Final Worsened**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Not Applicable**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Discuss how local groundwater data can and will be used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin (see Attachment B of this letter for a list of freshwater species located in the Eastside Basin).

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered six of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was improperly omitted in the water budget. The water budget includes a separate item for evapotranspiration, but combines crop and riparian evapotranspiration into one term. The Final GSP does not state whether there are managed wetlands present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the maximum contaminant level (MCL).

Drinking Water Users

The GSP does not provide a complete analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide a complete analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The domestic well impact analysis included only 20 wells out of the total 206 domestic wells in the Online System of Well Completion Reports (OSWCR) database. We recommend instead using best available information such as Public Land Survey System (PLSS) section location data.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based

[21] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[22] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[23] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[24] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the MCL.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

[25] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]
[26] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]
[27] Water Code §10727.4(l)

Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels. For the analysis of minimum threshold impact on domestic wells, use best available information such as Public Land Survey System (PLSS) section location data.
- Establish minimum thresholds at the representative monitoring wells that account for the specific undesirable results the GSA would like to avoid.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Instead of specifying zero additional exceedances of regulatory drinking water standards, set concentration-based minimum thresholds and measurable objectives for constituents of concern in the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[29]
- Set measurable objectives at lower levels than minimum thresholds (i.e., indicative of better water quality).

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that would improve the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Final Improved**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas.
- Ensure groundwater elevation and water quality RMSs are tracking groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, GDEs, and ISWs.
- Include state and local small water systems in the water quality monitoring network. Describe the existing data gap for this aspect of the monitoring network and discuss how the data gap

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

will be filled with future monitoring. This important source of water quality information was included as a data gap in the original 2020 GSP, but removed from the 2022 GSP.

- Provide specific plans to fill data gaps in the monitoring network for GDEs and ISWs. Evaluate how the gathered data will be used to identify and map GDEs and ISWs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[40]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[40] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Langley Area Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Langley Area Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Stakeholder engagement during the GSP development process was lacking
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Langley Area Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

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Attachment A

Specific Comments on the Langley Area Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Under our review process, the Langley GSP scored a "Yes" for their engagement of DAC stakeholders during the GSP development process because there are two representatives of DACs on the Advisory Group. However, we have been informed by the Community Water Center - a stakeholder representing DAC interests in the basin - that even with representation of DACs on the Advisory Group, the Salinas Valley GSA failed to incorporate most of the feedback submitted for protecting drinking water users and DACs in the GSP. We were also informed that the GSA also failed to carry out the Stakeholder Outreach Plan while it is included in the GSP, meaning a wide range of stakeholders, including members of DACs who rely on groundwater in the subbasin for drinking water, were not engaged in the development of the GSP. Representation on the Advisory Committee does not satisfy the GSA's duty to conduct broad community engagement. While we appreciate that Salinas Valley GSA created an advisory group to engage stakeholders, there is much to improve upon to ensure that diverse voices are heard and empowered through this engagement mechanism and incorporated into the GSP development and implementation.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP described how the GSA informed and consulted stakeholders, satisfactorily answering all relevant questions for this criteria, but we would like to stress here that based on additional information that we received from local stakeholders in the basin, **the expectations of active stakeholder engagement were not met in the**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Langley Area basin since stakeholder input was not integrated into the GSP. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**[7]
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[8]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- DAC and environmental stakeholder engagement should be improved by incorporating feedback and recommendations from DAC and environmental stakeholders engaged in the GSP process.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[7] The specific question evaluated here is: "Does the GSP document how stakeholders were given opportunities to engage?" Thus this finding only establishes that the documentation was sufficient, not that the engagement actually happened or reached an appropriate level.

[8] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin. Furthermore, the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP disregarded some reach segments as ISW or potential ISW. The GSP designates ISWs as stream reaches which have surface water connected to groundwater for more than 50 percent of the number of months in the model period. However, even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- On Figure 4-9 (Locations of Interconnected Surface Water), consider any modeled stream grid cells with >0% connection to groundwater as potential ISWs until more data is available. In other words, consider any stream cell with connection to groundwater for any length of time as a potential ISW.

- Overlay the stream reaches shown on Figure 4-9 with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells in the basin used to create the contour maps.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that in addressing data gaps, the GSP took a conservative approach to mapping GDEs in the basin by retaining all features within the NC dataset.[14] While this approach works in the short-term, the GSP failed to provide specific plans to verify groundwater reliance for NC dataset features and fill in groundwater data gaps around GDEs. Without an analysis of groundwater data to describe groundwater conditions and verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation.

Table 4 shows the GSP satisfactorily answered two of seven relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Final Improved**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Final Worsened**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Not Applicable**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Discuss how local groundwater data can and will be used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]
- Provide depth-to-groundwater contour maps, noting the best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin (see Attachment B of this letter for a list of freshwater species located in the Langley Basin).
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered six of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was improperly omitted in the water budget. The GSP states that managed wetlands are not present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the maximum contaminant level (MCL).

Drinking Water Users

The GSP does not provide a complete analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide a complete analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The domestic well impact analysis included only 41 wells out of the total 823 domestic wells in the Online System of Well Completion Reports (OSWCR) database. We recommend instead using best available information such as Public Land Survey System (PLSS) section location data.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based

[20] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[21] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[22] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[23] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the MCL.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

[24] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]
[25] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]
[26] Water Code §10727.4(l)

Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels. For the analysis of minimum threshold impact on domestic wells, use best available information such as Public Land Survey System (PLSS) section location data.
- Establish minimum thresholds at the representative monitoring wells that account for the specific undesirable results the GSA would like to avoid. Use groundwater level data from the period before the SGMA benchmark date of 2015 for the analysis.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Instead of specifying zero additional exceedances of regulatory drinking water standards, set concentration-based minimum thresholds and measurable objectives for constituents of concern in the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[28]
- Set measurable objectives at lower levels than minimum thresholds (i.e., indicative of better water quality).

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin for the groundwater elevation and groundwater quality condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.
- Ensure groundwater elevation and water quality RMSs are tracking groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, GDEs, and ISWs.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Include state and local small water systems in the water quality monitoring network. Describe the existing data gap for this aspect of the monitoring network and discuss how the data gap will be filled with future monitoring. (This important source of water quality information was included as a data gap in the original 2020 GSP, but removed from the 2022 GSP.)

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered none of the six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation

Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[39]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[39] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Forebay Aquifer Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Forebay Aquifer Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Stakeholder engagement during the GSP development process was lacking
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Forebay Aquifer Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Forebay Aquifer Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Under our review process, the Forebay Aquifer GSP scored a "Yes" for their documentation of DAC stakeholder engagement during the GSP development process because there are two representatives of DACs on the Advisory Group. However, we have been informed by the Community Water Center - a stakeholder representing DAC interests in the basin - that even with representation of DACs on the Advisory Group, the Salinas Valley GSA failed to incorporate most of the feedback submitted for protecting drinking water users and DACs in the GSP. We were also informed that the GSA also failed to carry out the Stakeholder Outreach Plan (even though it is included in the GSP), meaning that a wide range of stakeholders, including members of DACs who rely on groundwater in the subbasin for drinking water, were not engaged in the development of the GSP. Representation on the Advisory Committee does not satisfy the GSA's duty to conduct broad community engagement. While we appreciate that Salinas Valley GSA created an advisory group to engage stakeholders, there is much to improve upon to ensure that diverse voices are heard and empowered through this engagement mechanism and incorporated into the GSP development and implementation.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP described how the GSA informed and consulted stakeholders, satisfactorily answering all relevant questions for this criteria, but we would like to stress here that based on additional information that we received from local stakeholders in the basin, **the expectations of active stakeholder engagement were not met in the**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Forebay Aquifer Basin since stakeholder input was not integrated into the GSP. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**[7]
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[8]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[8]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- DAC and environmental stakeholder engagement should be improved by incorporating feedback and recommendations from DAC and environmental stakeholders engaged in the GSP process.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[7] The specific question evaluated here is: "Does the GSP document how stakeholders were given opportunities to engage?" Thus this finding only establishes that the documentation was sufficient, not that the engagement actually happened or reached an appropriate level.

[8] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin. Furthermore, the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[8]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP disregarded some reach segments as ISW or potential ISW. The GSP designates ISWs as stream reaches which have surface water connected to groundwater for more than 50 percent of the number of months in the model period. However, even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Improved**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- On Figure 4-14 (Locations of Interconnected Surface Water), consider any modeled stream grid cells with >0% connection to groundwater as potential ISWs until more data is available. In other words, consider any stream cell with connection to groundwater for any length of time as a potential ISW.

- Overlay the stream reaches shown on Figure 4-14 with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells in the basin used to create the contour maps.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that in addressing data gaps, the GSP took a conservative approach to mapping GDEs in the basin by retaining all features within the NC dataset.[14] While this approach works in the short-term, the GSP failed to provide specific plans to verify groundwater reliance for NC dataset features and fill in groundwater data gaps around GDEs. Without an analysis of groundwater data to describe groundwater conditions and verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation.

Table 4 shows the GSP satisfactorily answered three of seven relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Final Improved**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Final Worsened**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Not Applicable**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Discuss how local groundwater data can and will be used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin (see Attachment B of this letter for a list of freshwater species located in the Forebay Basin).

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

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[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered six of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was improperly omitted in the water budget. The GSP states that managed wetlands are not present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the maximum contaminant level (MCL).

Drinking Water Users

The GSP does not provide a complete analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide a complete analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The domestic well impact analysis included only 8 wells out of the total 154 domestic wells in the Online System of Well Completion Reports (OSWCR) database. We recommend instead using best available information such as Public Land Survey System (PLSS) section location data.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based

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[21] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[22] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[23] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[24] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the MCL.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	Final Improved
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	No Change
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	Final Improved
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	No Change
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	No Change
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	No Change
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	Draft Sufficient

[25] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]
[26] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]
[27] Water Code §10727.4(l)

Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels. For the analysis of minimum threshold impact on domestic wells, use best available information such as Public Land Survey System (PLSS) section location data.
- Establish minimum thresholds at the representative monitoring wells that account for the specific undesirable results the GSA would like to avoid.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Instead of specifying zero additional exceedances of regulatory drinking water standards, set concentration-based minimum thresholds and measurable objectives for constituents of concern in the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[29]
- Set measurable objectives at lower levels than minimum thresholds (i.e., indicative of better water quality).
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin for the groundwater elevation and groundwater quality condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.
- Ensure groundwater elevation and water quality RMSs are tracking groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, GDEs, and ISWs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Include state and local small water systems in the water quality monitoring network. Describe the existing data gap for this aspect of the monitoring network and discuss how the data gap will be filled with future monitoring. This important source of water quality information was included as a data gap in the original 2020 GSP, but removed from the 2022 GSP.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Monterey Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Monterey Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Monterey Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
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The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Monterey Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communications and Stakeholder Engagement section, provide more information on how DACs and environmental stakeholders were included in the SVBGSA Advisory Committee and the role that it plays in GSP development and implementation.
- Provide detailed description of the manner in which MCWD will continue to engage with DACs during the GSP implementation phase of the GSP.
- DAC and environmental stakeholder engagement should be improved by incorporating feedback and recommendations from DAC and environmental stakeholders engaged in the GSP process.
- Further describe efforts to engage with stakeholders during the GSP *implementation* phase in the Communications and Stakeholder Engagement section of the GSP. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not present a map of ISWs in the basin. The GSP presents maps showing depth-to-groundwater contours for depths within 20 feet of the ground surface for two dates, fall 2017 and fall 2019. The GSP did not present an explanation of why 20 feet was chosen for the maximum depth shown on the contour maps. We note it is common practice to utilize a threshold of 50 feet below groundwater surface to indicate a disconnected stream reach.[11,12] Furthermore, using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. The use of two fall dates does not reflect the temporal (seasonal and interannual) variability inherent in California's climate.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] Jasechko, S. et al. 2021. Widespread potential loss of streamflow into underlying aquifers across the USA. Nature, 591: 391-395. doi: https://doi.org/10.1038/s41586-021-03311-x

[12] The Nature Conservancy. 2021. ICONS Tool. Available at: https://icons.codefornature.org/

RECOMMENDATIONS

- Describe available groundwater elevation data and stream flow data in the basin. ISWs are best analyzed using depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought), to determine the range of depth and capture the variability in environmental conditions inherent in California's climate.

- Provide a map of stream reaches in the basin. Overlay the stream reaches with full depth-to-groundwater contour maps (not just to 20 feet below ground surface) to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells in the basin used to create the contour maps.

- On the map of stream reaches, consider any segments with data gaps as potential ISWs and clearly mark them as such. Describe data gaps for the ISW analysis. Reconcile these data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that in addressing data gaps, the GSP took a conservative approach to mapping GDEs in the basin by retaining all features within the NC dataset,[15] and other GDEs identified through local habitat management plans and studies. While this approach works in the short-term, the GSP failed to provide specific plans to verify groundwater reliance for vegetation features and fill in groundwater data gaps around GDEs. Without an analysis of groundwater data to describe groundwater conditions and verify the vegetation polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation.

While the GSP discusses the vegetation communities at the City of Marina coastal vernal ponds observed during a site visit in June 2020, this is the only mention of vegetation communities within the basin's GDEs. The GSP does not provide further discussion or an inventory of the flora or fauna species present in the basin's GDEs or acknowledge endangered, threatened, or special status species in the basin.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	**Some details lacking on flora, fauna OR threatened or endangered species**	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	**Not incorporated**	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

[15] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Discuss available shallow groundwater data. Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[16]

- Provide depth-to-groundwater contour maps, noting best practices.[16] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin (see Attachment B of this letter for a list of freshwater species located in the Monterey Basin). Note any threatened or endangered species.

- Provide further information about the steps taken to involve or collaborate with the federal government regarding potential GDEs located within the former Fort Ord area.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[17,18]

[16] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[17] Webtool available at: https://igde-work.earthengine.app/view/sage

[18] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[19]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, the GSP did not incorporate climate change into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Final Improved**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Final Improved**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[19] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Integrate climate change into surface water flow inputs of the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[20,21] Based on our review, we found native vegetation was improperly omitted in the current and projected water budgets. Surface water budget tables were added to the Final GSP, which include native vegetation, but only for the historical period. The Final GSP does not state whether there are managed wetlands present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands (if present).

[20] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[21] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[22,23,24] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[25]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the maximum contaminant level (MCL).

Drinking Water Users

The GSP does not provide a complete analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide a complete analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The domestic well impact analysis included only 19 wells out of the total 169 domestic wells in the Online System of Well Completion Reports (OSWCR) database. We recommend instead using best available information such as Public Land Survey System (PLSS) section location data.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based

[22] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[23] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[24] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[25] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the MCL.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[26,27,28] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

[26] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]
[27] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]
[28] Water Code §10727.4(l)

Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels. For the analysis of minimum threshold impact on domestic wells, use best available information such as Public Land Survey System (PLSS) section location data.
- Establish minimum thresholds at the representative monitoring wells that account for the specific undesirable results the GSA has determined for the basin.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[29]
- Instead of specifying zero additional exceedances of regulatory drinking water standards, set concentration-based minimum thresholds and measurable objectives for constituents of concern in the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[30]
- Set measurable objectives at lower levels than minimum thresholds (i.e., indicative of better water quality).

[29] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[30] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[31] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[32]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[33] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[22,34]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[31] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[32] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[33] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[34] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[37] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[14] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

[37] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Include state and local small water systems in the water quality monitoring network. Describe the existing data gap for this aspect of the monitoring network and discuss how the data gap will be filled with future monitoring. This important source of water quality information was included as a data gap in the original 2020 GSP, but removed from the 2022 GSP.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[38,39]

[38] Webtool available at: https://igde-work.earthengine.app/view/sage

[39] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[40]

[40] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plans to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Upper Valley Aquifer Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Upper Valley Aquifer Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability.

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Stakeholder engagement during the GSP development process was lacking
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Upper Valley Aquifer Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
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Melissa M. Rohde
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The Nature Conservancy

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Policy Manager and Attorney
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Attachment A

Specific Comments on the Upper Valley Aquifer Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Under our review process, the Upper Valley Aquifer GSP scored a "Yes" for their documentation of DAC stakeholder engagement during the GSP development process because there are two representatives of DACs on the Advisory Group. However, we have been informed by the Community Water Center - a stakeholder representing DAC interests in the basin - that even with representation of DACs on the Advisory Group, the Salinas Valley GSA failed to incorporate most of the feedback submitted for protecting drinking water users and DACs in the GSP. We were also informed that the GSA also failed to carry out the Stakeholder Outreach Plan (even though it is included in the GSP), meaning that a wide range of stakeholders, including members of DACs who rely on groundwater in the subbasin for drinking water, were not engaged in the development of the GSP. Representation on the Advisory Committee does not satisfy the GSA's duty to conduct broad community engagement. While we appreciate that Salinas Valley GSA created an advisory group to engage stakeholders, there is much to improve upon to ensure that diverse voices are heard and empowered through this engagement mechanism and incorporated into the GSP development and implementation.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP described how the GSA informed and consulted stakeholders, satisfactorily answering all relevant questions for this criteria, but we would like to stress here that based on additional information that we received from local stakeholders in the basin, **the expectations of active stakeholder engagement were not met in the**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Upper Valley Aquifer Basin since stakeholder input was not integrated into the GSP. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**[7]
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[8]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[8]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- DAC and environmental stakeholder engagement should be improved by incorporating feedback and recommendations from DAC and environmental stakeholders engaged in the GSP process.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[7] The specific question evaluated here is: "Does the GSP document how stakeholders were given opportunities to engage?" Thus this finding only establishes that the documentation was sufficient, not that the engagement actually happened or reached an appropriate level.

[8] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin. Furthermore, the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[8]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP disregarded some reach segments as ISW or potential ISW. The GSP designates ISWs as stream reaches which have surface water connected to groundwater for more than 50 percent of the number of months in the model period. However, even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- On Figure 4-11 (Locations of Interconnected Surface Water), consider any modeled stream grid cells with >0% connection to groundwater as potential ISWs until more data is available. In other words, consider any stream cell with connection to groundwater for any length of time as a potential ISW.

- Overlay the stream reaches shown on Figure 4-11 with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells in the basin used to create the contour maps.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that in addressing data gaps, the GSP took a conservative approach to mapping GDEs in the basin by retaining all features within the NC dataset.[14] While this approach works in the short-term, the GSP failed to provide specific plans to verify groundwater reliance for NC dataset features and fill in groundwater data gaps around GDEs. Without an analysis of groundwater data to describe groundwater conditions and verify the NC dataset polygons, it will be difficult or impossible to adequately monitor and manage the basin's GDEs throughout GSP implementation.

Table 4 shows the GSP satisfactorily answered two of seven relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Final Improved**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Final Worsened**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Not Applicable**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Discuss how local groundwater data can and will be used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin (see Attachment B of this letter for a list of freshwater species located in the Upper Valley Basin).

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

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[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered six of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was improperly omitted in the water budget. The GSP states that managed wetlands are not present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the maximum contaminant level (MCL).

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

The GSP defines minimum thresholds for degraded water quality as zero additional exceedances of the regulatory drinking water standard. The GSP should instead specify concentration-based minimum thresholds for constituents of concern in the basin that are impacted by groundwater use or groundwater management. Minimum thresholds should be established at the MCL.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on

[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Final Improved**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**

[25] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[26] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels. For the analysis of minimum threshold impact on domestic wells, use best available information such as Public Land Survey System (PLSS) section location data.
- Establish minimum thresholds at the representative monitoring wells that account for the specific undesirable results the GSA would like to avoid.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Instead of specifying zero additional exceedances of regulatory drinking water standards, set concentration-based minimum thresholds and measurable objectives for constituents of concern in the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[29]
- Set measurable objectives at lower levels than minimum thresholds (i.e., indicative of better water quality).
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels,

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin for the groundwater elevation and groundwater quality condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.
- Ensure groundwater elevation and water quality RMSs are tracking groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, GDEs, and ISWs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Include state and local small water systems in the water quality monitoring network. Describe the existing data gap for this aspect of the monitoring network and discuss how the data gap will be filled with future monitoring. This important source of water quality information was included as a data gap in the original 2020 GSP, but removed from the 2022 GSP.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the San Antonio Creek Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the San Antonio Creek Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of GDEs
- Identification of ISWs
- Consideration of drinking water users and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the San Antonio Creek Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
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The Nature Conservancy

Melissa M. Rohde
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The Nature Conservancy

Attachment A

Specific Comments on the San Antonio Creek Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all of the three relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered both of the relevant questions for this criteria.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Not Applicable**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Not Applicable**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Not Applicable**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not present or analyze depth-to-groundwater data when identifying ISWs in the basin. Furthermore, the GSP disregards intermittent reaches as potential ISWs, which is an incorrect conclusion. Note the regulations [23 CCR §351(o)] define ISW as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Table 3 shows the GSP satisfactorily answered none of the five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled as interconnected or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" to aid in the determination of ISWs.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not use multiple water year types (e.g., wet, average, dry) of groundwater level data to characterize groundwater conditions supporting the basin's GDEs. Potential GDEs were identified in areas overlying groundwater within 30 feet of land surface based solely on spring 2015 groundwater elevations. However, using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in environmental conditions inherent in California's climate. In addition, the GSP did not include sufficient description of data gaps for GDEs.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape. The GSP maps the 30-foot groundwater depth contour on Figure 3-55, showing two areas (<= 30 ft Depth To Water and > 30 ft Depth To Water). However, full depth to groundwater contours are needed to evaluate the valley oak NC dataset polygons.

- Re-evaluate the 495 acres of valley oak present in the basin. Refer to The Nature Conservancy's plant rooting depth database.[13] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[13] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

While climate change is acknowledged to be a likely influence on future basin yields, the GSP did not provide a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Estimate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation was properly included in the water budget. Per our recommendation, the Final GSP was updated to state that there are no managed wetlands within the basin. Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, but does not provide an analysis of measurable objectives for either sustainability indicator.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

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[19] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[20] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[21] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[22] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

[23] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[24] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Table 7 shows the GSP satisfactorily answered two of eight relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Not Applicable**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users.
- In Table 4-3 (Water Quality Standards for Selected Constituents of Concern), compare WQOs, MCLs, and ambient (prior to January 2015) water quality concentrations. Present the final minimum threshold for each COC.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[27]
- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact on GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on both environmental beneficial users of groundwater and surface water as these environmental users could be left unprotected

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found gaps in how the GSP identified and reconciled data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of domestic wells, GDEs, and ISWs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to domestic wells, GDEs, and ISWs when identifying new RMSs.

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially domestic wells and GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The GSP fails to include projects and management actions with explicit near-term benefits to the environment. While the GSP documents in lieu recharge projects, they are described as being in the conceptual phase and may be considered by the GSA in the future.

Table 9 shows the GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**Not Applicable**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For domestic well owners, include further details for a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to “Framework for a Drinking Water Well Impact Mitigation Program” for specific recommendations on how to implement a drinking water well mitigation program.[37]

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the “Multi-Benefit Recharge Project Methodology Guidance Document.”[38]

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 25, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the San Jacinto Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the San Jacinto Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes and disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of

[1] Our organizations are non-tribal NGOs that are providing a review of the identification and consideration of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and

the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 Draft GSPs directly to each of the GSAs with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan described active stakeholder engagement by developing a Stakeholder Advisory Group during GSP development and implementation.

Our specific comments related to the GSP in the San Jacinto basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

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CivicWell (formerly Local Government Commission)

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the San Jacinto Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters
4. Identification of groundwater dependent ecosystems
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The Final GSP satisfactorily answered all seven relevant questions for this criteria. We commend the GSA for providing more specificity around engagement opportunities for stakeholders, including the formation of a Stakeholder Advisory Group during the GSP development process that will continue through the GSP's implementation.

Table 1. Stakeholder engagement questions.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not explicitly map tribal lands that are relevant to the basin. Although the Soboba Band of Luiseño Indians are described in the basin as being involved in the GSP but not residing within the Plan Area, the GSP could be improved by explicitly mapping tribal lands relevant to the basin.

Table 2 shows the GSP satisfactorily answered five of six relevant questions for this criteria. In particular, we commend the GSA for explicitly mapping DACs and domestic wells in the basin.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Final Improved**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Include a map of tribal lands relevant to the basin in the GSP.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[7] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of ISWs we found that the GSP did not include a map of ISWs and the GSP contained inconsistencies in its assessment of ISWs. While the final GSP did include some details regarding the surface water and groundwater model simulation results, there were few specifics on the data used in the model (e.g., dates, monitoring locations, screened well depths). In addition, we found the GSP text to include contradictory statements, such as stating that some areas in the basin have hydraulic connections between groundwater and surface water, but then concluding that no ISWs exist in the basin.

Table 3 shows the GSP satisfactorily answered two of the five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[7] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide depth-to-groundwater contour maps to aid in the determination of ISWs, as detailed in The Nature Conservancy's "Identifying GDEs Under SGMA: Best Practices for using the NC Dataset".[8] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs.

- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[8] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[9,10] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that while the GSP includes a map of GDEs in the basin, NC dataset polygons were improperly excluded from the GDE map because limited groundwater data were available to properly verify the NC dataset. It also remains unclear if a land surface elevation model was used to correct depth-to-groundwater data under NC dataset polygons (for technical details refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset"[8]). In addition, the GSP eliminated NC dataset polygons if Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) data did not correlate with depth-to-groundwater measurements from nearby shallow wells(<1km). This approach is incorrect for verifying whether vegetation is connected to groundwater, since a lack of a correlation does not preclude that groundwater is not providing some of the ecosystem's water needs. Recent research has found that weak correlations between NDVI and depth-to-groundwater can be attributed to multiple water sources supporting the GDE or groundwater stress not being high enough to induce a physiological response, such as reduced growth as indicated by NDVI.[11,12] Correlations between NDVI and depth-to-groundwater tend to be strongest when groundwater stress is high, and thus NDVI is not a useful approach in determining whether vegetation is reliant on groundwater. Depth-to-groundwater data is a better proxy for verifying whether vegetation or wetland features in the NC dataset are likely connected to groundwater. If depth-to-groundwater data is unavailable, we strongly recommend that NC dataset polygons be retained as potential GDEs in the basin's GDE map until data is available to prove otherwise.

Table 4 shows the GSP satisfactorily answered four of eight relevant questions for this criteria. We commend the GSA for providing an inventory of fauna and flora present in the basin, along with threatened and endangered species. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

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[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[10] Refer to Attachment B for a list of freshwater species located in the basin.

[11] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

[12] Rohde, M.M., J. Stella, D. Roberts, M.B. Singer. 2021. Groundwater dependence of riparian woodlands and the disrupting effect of anthropogenically altered streamflow. *Proceedings of the National Academy of Sciences*, doi:10.1073/pnas.2026453118. Available at: https://www.pnas.org/content/118/25/e2026453118

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map?: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Provide depth-to-groundwater contour maps, noting best practices.[8] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as “Potential GDEs” in the GSP until data gaps are reconciled in the monitoring network.

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[13]

In our review of climate change in the projected water budget, we found that the GSP does incorporate climate change using DWR change factors for 2030 and 2070. However, the GSP did not consider the 2070 wet and 2070 extremely dry climate scenarios in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the subbasin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management.

In addition, the sustainable yield is based on the historical water budget, which was augmented by several decades of imported water. It is unlikely that imported water allocations from the past will persist into the future under climate change. If the water budgets are incomplete, then there is increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not adequately include climate change projections may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems and domestic well owners.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	**No**		Yes	**No Change**

[13] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- The sustainable yield should be based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[14,15] Based on our review, we found native vegetation and managed wetlands were improperly omitted from the water budget. In response to our comments on exclusion of these water sectors from the water budget in the Draft GSP, the GSA has justified the exclusion of managed wetlands and native vegetation based on the assumption that groundwater is occurring at depths exceeding the rooting zones of vegetation identified in the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset. Since the water budget is intended to account for inputs and outputs of surface water and groundwater within the basin, the consumptive water use of all water use sectors should be included.[16]

Table 6 shows the GSP satisfactorily answered none of the relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[14] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[15] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

[16] Department of Water Resources (2018). Water Budgets Best Management Practices Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-4-Water-Budget_ay_19.pdf

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[17,18,19] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[20]

SGMA requires that the sustainable management criteria be consistent with Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
> The GSP does not mention direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor the measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
> The GSP mentions potential impacts on drinking water users in the basin when defining undesirable results, but does not provide an analysis of the direct or indirect impacts on drinking water users. The GSP vaguely states (p. 3-3): *"If these wells are active and are producing potable groundwater, domestic well users may also be impacted by groundwater elevation declines. During GSP implementation, the status of these wells will be confirmed and domestic well users that are impacted by groundwater elevation declines will have the option to connect to the appropriate potable water supplier in their area."* However, this is concerning given the absence of a drinking water well mitigation plan in the GSP. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[21,22,23] The GSP should describe direct and indirect

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[17] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[18] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[19] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[20] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

[21] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[22] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[23] Water Code §10727.4(l)

impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and depletion of interconnected surface water.

Environmental users

The GSP mentions potential impacts on GDEs in the basin when defining undesirable results, but does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of the eleven relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- The plan only sets Minimum Thresholds (MTs) and Measurable Objectives (MOs) for total dissolved solids (TDS). The GSA should set MTs and MOs for nitrates and ensure they align with drinking water standards.[24]

- When defining undesirable results for chronic lowering of groundwater levels, water quality, and depletions of interconnected surface waters, please provide more specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results occur when 'significant and unreasonable' effects on beneficial users are caused by groundwater conditions. Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin. Without defining undesirable results, the minimum thresholds cannot be determined. Potential effects on all beneficial users of groundwater in the basin need to be taken into consideration when defining undesirable results,[25] establishing minimum thresholds,[26] and the impacts to beneficial users of selected minimum thresholds must be analyzed.

- For the interconnected surface water SMC, the undesirable results should include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the basin.[27] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP (See Attachment B for a list of freshwater species in your basin). These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[6,28]

[24] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[25] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[26] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[27] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[28] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[29] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[17] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the final GSP.

In our review, we found gaps in how the GSP identified and reconciled data gaps for some beneficial users in the basin. Table 8 shows the GSP did not satisfactorily answer any of four relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around **DACs, domestic wells, and tribes** (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, NOR Tribal areas.	Not adequately cover DAC, domestic well, OR Tribal areas	Adequately distributed (<1 mi) across DAC, domestic well, AND Tribal areas	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around **DACs, domestic wells, and tribes** (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, NOR Tribal areas.	Not adequately cover DAC, domestic well, OR Tribal areas	Adequately distributed (<1 mi) across DAC, domestic well, AND Tribal areas	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around **GDEs** and **ISWs** in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate **GDE**-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that clearly overlay monitoring well locations with the locations of DACs and GDEs to clearly identify potentially impacted areas.
- Reconcile data gaps in the monitoring network by evaluating how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.

[29] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Increase the number of representative monitoring points (RMPs) across the basin for all groundwater condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMPs.

- Determine what ecological monitoring can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.

9. Identification of potential impacts to beneficial users in the Project and Management Actions?

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. We included in our evaluation a determination of whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential or possible future project.

In our review of the potential impacts to beneficial users in the Project and Management Actions section, we found that the GSP stated that projects and management actions are not necessary to achieve sustainability in the Plan Area, which has experienced rising groundwater levels and increased groundwater in storage over the past 30 years due to imported water supplies. Thus, the project and management actions proposed are not being implemented until undesirable results occur and the sustainable yield (which was incorrectly based on the historic water budget versus the projected water budget) is reached. The plan fails to meet SGMA requirements by stating that public notice will not be required for some of the identified projects and management actions.[30]

Table 9 shows the GSP satisfactorily answered none of the six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

[30] "Each Plan shall include a description of the projects and management actions that include the following: the process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken." [23 CCR §354.44(b)(1)(B))]

RECOMMENDATIONS

Because GDEs, aquatic habitats, surface water users, DACs, and shallow domestic well water users were not sufficiently identified in the GSP, please consider including the following related to potential project and management actions in the GSP:

- For GDEs and ISWs, recharge ponds, reservoirs and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[31]
- For all beneficial users, provide public notice and engagement before consideration and implementation of the three management actions and two projects identified.
- For DACs, monitor the impacts of selected management actions and projects on communities and drinking water users.
- For DACs and domestic well owners, implement a drinking water well mitigation program to avoid the significant and unreasonable loss of drinking water. This could include a combination of replacing impacted wells with new, deeper wells and/or connecting domestic users to a public water system.
- For DACs, a discussion of whether potential impacts to water quality from projects and management actions could occur.

[31] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Modesto Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Modesto Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Environmental stakeholder engagement during the GSP development process
- Identification of drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Modesto Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Modesto Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP provided the modeling analysis used to assess ISWs in the basin, which was missing from the Draft GSP. The GSP presents model nodes of the surface water as "predominantly gaining," "mixed conditions," or "predominantly losing," and concludes that all surface water in the basin is interconnected. The GSP could be improved by clearly describing the screening depths of wells used in the groundwater modeling analysis, to provide confirmation that the wells are monitoring the shallow principal aquifer.

Table 3 shows the GSP satisfactorily answered two of four relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Improved**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Not Applicable**[11]

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] Not applicable because all stream reaches in the basin are considered to be ISW.

RECOMMENDATIONS

- Describe the monitoring wells used in the modeling analysis, including their screening depths.
- To confirm and illustrate the results of the modeling analysis, overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP mapped GDEs using the Natural Communities Commonly Associated with Groundwater dataset (NC dataset).[14] The GSP used groundwater data from two dates (spring 1998 and fall 2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using additional groundwater data to determine the range of depth to groundwater around NC dataset polygons and to more completely describe groundwater conditions within the basin's GDEs. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate. Furthermore, we found it to be unclear whether GDEs in areas of data gaps were mapped and described as "potential GDEs" in the GSP. The GSP did not provide an inventory of flora and fauna in the basin or identity threatened and endangered species.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Final Improved**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Final Improved**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Final Improved**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Final Improved**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[15]
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin and note any threatened or endangered species (see Attachment B in this letter for a list of freshwater species located in the Modesto Basin).
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[15] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The GSP is not clear about whether managed wetlands exist in the basin. The GSP makes several references to wetlands, and acknowledges that many identified wetlands rely on groundwater, but does not specifically discuss managed wetlands.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Discuss and map the presence of managed wetlands in the basin. Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP provides an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, it does not provide an analysis of the impacts of the proposed measurable objectives for these sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered four of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Draft Sufficient**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users.
- Consider minimum threshold exceedances during single dry years when defining the groundwater level undesirable result across the basin.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[28] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[29]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Final Worsened**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Ensure the GSP includes specific plans to address data gaps for GDEs and ISWs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[40]

[40] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Turlock Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Turlock Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Turlock Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Turlock Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Describe active and targeted outreach to engage DACs, drinking water users, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all five relevant questions for this criteria. We thank the GSA for its comprehensive search for tribal interests in the basin, which resulted in contact with 22 tribes and found that the nearest potential tribal lands were located approximately 18 miles outside the Turlock Basin boundary.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly map and describe stream reaches as potential ISWs in areas of data gaps and uncertainty.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

RECOMMENDATIONS

- Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Reference depth-to-groundwater contour maps in the ISW section of the GSP. Show the location of groundwater wells used in the analysis.

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[14] NC dataset polygons were incorrectly removed if Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) data did not correlate with groundwater level trends. This is an incorrect method, since a lack of a relationship does not preclude that groundwater is providing some of the ecosystem's water needs. If the ecosystem is accessing groundwater, then the ecosystem should be categorized as a GDE. Furthermore, the GSP did not provide an inventory of flora and fauna present in the basin, nor identify threatened and endangered species residing within the basin.

Table 4 shows the GSP satisfactorily answered two of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that were incorrectly removed based on NDVI and NDMI trends. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Show the location of wells used in the analysis on the GDE map and depth-to-groundwater contour map.

- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources.

- Discuss data gaps for GDEs. If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin and note any threatened or endangered species (see Attachment B in this letter for a list of freshwater species located in the Turlock Basin).

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management. Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was properly included in the water budget. The GSP response to comments indicates that there are no managed wetlands present in the basin. However, the main GSP text was not changed to indicate this.

Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin *within the main text of the GSP*.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators.

Drinking Water Users

The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, while the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, it does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Consider minimum threshold exceedances during single dry years when defining the groundwater level undesirable result across the basin.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[28] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[29]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[21,33]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered all of six questions for this criteria. We appreciate the GSA for including a drinking water well mitigation program in the Draft and Final GSPs.

Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Pleasant Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Pleasant Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **insufficient,** meaning the plan has critical gaps in how beneficial users were addressed within our nine evaluation criteria. Because stakeholder engagement for the environment during the GSP development process was not described in the GSP, we believe the plan does not adequately demonstrate an equitable path to sustainability.

In general, we found the plan to have deficiencies in the following areas:

- Stakeholder engagement during the GSP development process was lacking. This rendered the GSP insufficient.
- Identification of drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Pleasant Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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Samantha Arthur
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Attachment A

Specific Comments on the Pleasant Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage DACs, drinking water users, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Engage with environmental stakeholders in the basin, which could include California Department of Fish and Wildlife or environmental NGOs.
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map the density of domestic wells or their depth (such as minimum well depth, average well depth, or depth range). All groundwater wells are mapped on one figure, instead of separately mapping wells by type. This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	**Mapped AND identified by name in text**	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	**Explicitly mentioned or mapped**	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	**Neither mapped NOR depth ranges included**	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	**Not included**		Included	**No Change**
Does the GSP identify the water source for DACs?	No mention	Only general reference	**Explicit identification**	**Final Improved**

RECOMMENDATIONS

- Provide a separate domestic well density map and include average domestic well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a map of ISWs in the basin. Furthermore, the GSP did not consider streams located in areas of data gaps as potential ISWs in the GSP. The GSP presents depth to groundwater contours, and acknowledges that there is no groundwater elevation data in the western portion of the basin. The GSP states that there are areas where interconnected surface water systems may exist on the western border, and states that no information is available to assess potential surface water-groundwater interconnection in these areas. We recommend the GSP further discuss the gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. The GSP should consider any segments with data gaps as potential ISWs and clearly marked as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered none of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- On the map of streams in the basin, clearly label reaches as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that while the GSP mapped GDEs using the NC dataset,[14] the GSP used depth-to-groundwater data from a single point in time (spring 2019) to characterize groundwater conditions supporting the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

We also found that the GSP did not provide an inventory of the flora or fauna species present in the basin's GDEs. Furthermore, the GSP did not acknowledge endangered, threatened, or special status species in the basin.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

[14] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]
- For the depth-to-groundwater contour maps, use best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- Include an inventory of the fauna and flora present within the basin's GDEs (see Attachment B of this letter for a list of freshwater species located in the Pleasant Valley Basin). Note any threatened or endangered species.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not incorporate the effects of climate change on surface water flow inputs, including imported water, for the projected water budget.

The GSP provided two sustainable yield estimates, one based on current conditions and one based on the projected water budget with climate change incorporated. The GSP did not clearly state, however, which sustainable yield estimate will be used for groundwater management in the basin.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Integrate surface water flow inputs, including imported water, in the projected water budget and incorporate climate change effects on these flows.
- State which of the sustainable yield estimates will be used for future groundwater management in the basin. We recommend that the estimate incorporating climate change be used for basin planning.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was improperly omitted in the historical, current, and projected water budgets. The response to comments of the Final GSP states that there are no managed wetlands present in the basin, but the main text of the GSP was not updated.

Table 6 shows the GSP did not satisfactorily answer the only question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin *in the main text of the GSP*.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the maximum contaminant level (MCL) trigger level.
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[39]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[39] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the White Wolf Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the White Wolf Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the White Wolf Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the White Wolf Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage DACs, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin. Furthermore, the GSP did not identify the sources of drinking water for DAC members.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.
- In the GSP text, identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). This information was added to the response to comments but not to the main text of the GSP.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not map ISWs in the basin, therefore it is unclear which reaches the GSP considers to be ISWs or potential ISWs. The GSP notes one area of possible interconnection near the Spring Fault, but disqualifies this as an ISW based on hydraulic separation from the principal pumping aquifer. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the basin's pumping is occurring in deeper principal aquifers.[11]

The GSP may have disregarded some interconnected reaches in the basin based on ephemeral flow. However, under SGMA's ISW definition,[12] ISWs include reaches that maintain a connection with the saturated zone at *any* point in time and space. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water. The GSP presents point locations of average depth groundwater over the period 2015-2019. However, averaging depth to groundwater dampens the seasonal and interannual variability of these data. In California's Mediterranean climate, groundwater interconnections with surface water can vary seasonally and interannually. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs.

Table 3 shows the GSP satisfactorily answered none of the five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] "'Principal aquifers' refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." [23 CCR §351(aa)]

[12] "'Interconnected surface water' refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." [23 CCR §351(o)]

Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[15] NC dataset polygons were incorrectly removed based on the assumption that they are supported by a shallow water bearing zone separate from the regional aquifer (i.e., categories A and S on Figure GWC-18). However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the basin's pumping is occurring in deeper principal aquifers. If there are no data to characterize groundwater conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP.

The GSP used groundwater data from one date (spring 2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using additional groundwater data to determine the range of depth to groundwater around NC dataset polygons and to more completely describe groundwater conditions within the basin's GDEs. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

[15] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[16]

- Refer to The Nature Conservancy's plant rooting depth database.[17] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[18,19]

[16] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[17] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[18] Webtool available at: https://igde-work.earthengine.app/view/sage

[19] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[20]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

The GSP states that water imports are adjusted for climate change, but there is no line for this input in the projected water budget table. For clarity, we recommend providing a separate line item for water imports to the basin in the projected water budget table.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[20] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Provide a separate line item for water imports in the projected water budget table.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[21,22] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The response to comments of the Final GSP states that there are no managed wetlands present in the basin, but the main text of the GSP was not updated.

Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin *in the main text of the GSP.*

[21] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[22] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[23,24,25] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[26]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, it does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality sustainability indicator. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[27,28,29] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

[23] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[24] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[26] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[27] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[28] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[29] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives.

For the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the basin.
- In the well impact assessment, utilize well data from older wells (>50 years old) to better represent minimum threshold impacts to wells across the basin.
- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[30]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[31]
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the maximum contaminant level (MCL) trigger level.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable

[30] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[31] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

results in the basin.[32] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[33]

- When defining undesirable results for depletion of interconnected surface water, further describe potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[34] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[23,35]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[32] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[33] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[34] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[35] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[38] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[14] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.
- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

[38] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[39,40]

[39] Webtool available at: https://igde-work.earthengine.app/view/sage

[40] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[41]

[41] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[42]

[42] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the San Luis Obispo Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the San Luis Obispo Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Environmental stakeholder engagement during the GSP development process
- Identification of DACs, drinking water wells, and tribes
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the San Luis Obispo Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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Attachment A

Specific Comments on the San Luis Obispo Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe outreach and engagement targeted specifically to environmental stakeholders.
- In the Communication and Engagement Plan, describe active and targeted outreach to engage DAC members, domestic well owners, tribes, and environmental stakeholders throughout the GSP *implementation* phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide a map or the population of San Luis Obispo, the recognized DAC in the basin, nor clearly identify the water source for San Luis Obispo. The GSP did not map tribal interests within the basin. The GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**No Change**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Provide a map of the boundaries of San Luis Obispo, the recognized DAC in the basin. Provide the population of the DAC.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.
- Include a map showing domestic well locations and average well depth across the basin.

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly present the monitoring well data (spatial and temporal) used to map interconnected stream reaches. The GSP states that the groundwater and surface water are generally connected in the San Luis Valley and generally disconnected in the Edna Valley, but groundwater data from only two wells are discussed. The plan concludes that no surface water depletion has been caused by groundwater decline in the basin. This statement is not supported by sufficient spatial and temporal data based on the location of groundwater wells and stream gauges in the basin and the frequency with which they have been sampled.

The GSP text implies that losing streams equate to disconnected streams. However, losing reaches can still be connected with the saturated zone. The regulations [23 CCR §351(o)] define ISW as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide more discussion in the GSP about the groundwater elevation data used to verify interconnected reaches. Include a map of the interpolated groundwater elevations and spatial extent of groundwater monitoring wells used to produce the map.
- On Figure 5-16 (Losing and Gaining Reaches Within the Basin), also denote interconnected and disconnected reaches within the basin. Clarify in the text that losing reaches do not equate to disconnected reaches.
- On Figure 5-16, clearly label the areas with data gaps. While the GSP identifies data gaps in the text, we recommend that the GSP considers any segments with data gaps as potential ISWs and clearly marks them as such on maps provided in the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[12] NC dataset polygons were incorrectly removed based on groundwater levels that were greater than 30 feet in 2019, a single point in time. This is a technically incorrect approach since groundwater levels fluctuate over seasonal and interannual time scales due to California's Mediterranean climate and intensifying flood and drought events due to climate change. Justifying the removal of NC dataset polygons solely based on this criterion does not acknowledge that groundwater levels temporally vary and the fact that many plant species within GDEs can access groundwater depths beyond 30-feet or have adapted water stress strategies to deal with intermittent periods of deep groundwater levels. Using this methodology disregards groundwater fluctuations and may result in the omission of ecosystems that are groundwater dependent.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	**GDE map provided, but based on unclear or incorrect data/methods**	GDE map included with best available data	**No Change**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

[12] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Develop and describe a systematic approach for analyzing the basin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained, removed, or added to/from the NC dataset (include the removal reason if polygons are not considered potential GDEs, or include the data source if polygons are added). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[13]

- Clarify the use of depth thresholds in the GDE analysis. Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[13]

- Provide depth-to-groundwater contour maps, noting best practices.[13] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

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[13] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were properly included in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered both of the questions for this criteria. The GSP could be further improved by separating natural from managed wetlands in water budget tables.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- An overall 'wetlands' category is included in surface and groundwater budget tables. We recommend separating natural from managed wetlands in the water budget tables.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the impacts of the proposed measurable objectives. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels (in addition to describing impacts to drinking water users).
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- In Table 8-3, state explicitly what value the minimum thresholds listed are based on (e.g., primary or secondary maximum contaminant level).
- Select lower values for groundwater quality measurable objectives.
- Include SMC for all constituents of concern within the basin. Ensure they align with federal, state or local drinking water standards.[28]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results[29] in the basin. Defining undesirable results is the crucial first step before the minimum thresholds[30] can be determined.
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when defining minimum

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

thresholds in the basin[31]. The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[11] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) for all groundwater condition indicators across the basin and at appropriate depths. Prioritize proximity to DACs and drinking water users when identifying new RMSs.
- Determine what biological monitoring can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. The GSP

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

states (p. 5-29): “Additional field reconnaissance is necessary to verify the existence and extent of these potential GDEs and may be considered as part of the monitoring effort for future planning efforts.” No further detail, however, is provided.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy’s new tool, “SAGE: Shallow Groundwater Estimation Tool”, which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	**Yes**	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	**No**	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	**Yes**	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	**No**	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	**No**	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	**Vague description or listed as potential project**	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include plans for a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation.

Refer to “Framework for a Drinking Water Well Impact Mitigation Program” for specific recommendations on how to implement a drinking water well mitigation program.[38]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the “Multi-Benefit Recharge Project Methodology Guidance Document.”[39]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[39] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Upper San Luis Rey Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Upper San Luis Rey Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Upper San Luis Rey Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Upper San Luis Rey Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Public Involvement Plan, describe active and targeted outreach to engage DACs, drinking water users, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not identify the water sources for DACs in the basin. In addition, the GSP did not provide a domestic well density map or provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Final Improved**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).
- Provide a domestic well density map and include average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP presented inconsistent conclusions for the analysis. The ISW section of the GSP (3.3.4.4) considered the surface water in areas with a depth to groundwater of 50 feet or less to be interconnected, but Chapter 4 (Sustainable Management Criteria) states that depletion of interconnected surface water is not considered applicable to the basin. Furthermore, the shallow principal aquifer is not acknowledged in the ISW section of the GSP.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Worsened**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Discuss the shallow principal aquifer relative to ISW in the basin. Clarify conclusions about ISW in the basin and ensure that different sections of the GSP are consistent with one another.

- For depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not clearly describe groundwater data in the main GSP text, including the locations of wells and screening depths of wells, to ensure that the wells are monitoring the shallow principal aquifer. Furthermore, the GSP did not correct depth-to-groundwater measurements under GDEs for land surface elevations.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations that would further improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Show the location of wells used in the analysis on depth-to-groundwater contour maps. Discuss screening depths of the wells in the GSP text. For depth-to-groundwater contour maps, note best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, the GSP did not incorporate climate change into surface water flow inputs of the projected water budget. The GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered three of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Final Worsened**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs of the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation was improperly omitted in the water budget. The Final GSP was updated to state that there are no managed wetlands within the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[25] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Set minimum thresholds and measurable objectives that are protective of drinking water users.
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[27] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[28]

[25] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[27] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[28] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[29] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[18,30]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[29] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[30] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- In Section 5.5, further describe biological monitoring along the San Luis Rey River that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Additional studies of GDEs and groundwater - surface water interactions are briefly discussed in Chapter 6 (Projects and Management Actions), but very few details are provided.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered none of the six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the San Pasqual Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the San Pasqual Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan could be improved in the following areas:

- Identification of drinking water wells and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of drinking water users and environmental users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the San Pasqual Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
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Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the San Pasqual Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all of the five relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, further describe active and targeted outreach to engage domestic well owners and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map tribal lands or tribal interests. The GSP did not provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered one of three relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Not Applicable**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Not Applicable**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Not Applicable**

RECOMMENDATIONS

- Include a map of individual domestic well locations and a table of well data showing screen depths.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide detailed information on the data used in the modeling analysis, such as the location and spatial resolution of groundwater wells nor the temporal resolution of groundwater elevation data (e.g., number of years and seasonality). The GSP does not clearly discuss data gaps for ISWs, nor designate areas of data gaps as potential ISWs.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

- On the map of streams in the basin, label reaches with interconnected (gaining/losing) or disconnected status. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

- To confirm and illustrate the results of the groundwater model, overlay the figure of stream surface water depletion with depth-to-groundwater contour maps to illustrate the groundwater depths and groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

- Describe data gaps for the ISW analysis. Discuss and reconcile these data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP used depth-to-groundwater data from one point in time (2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using additional groundwater data to determine the range of depth to groundwater around NC dataset polygons and to more completely describe groundwater conditions within the basin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate. Furthermore, the GSP did not clearly discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	**GDE map provided, but based on unclear or incorrect data/methods**	GDE map included with best available data	**No Change**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	**Clearly mapped AND described**	**Draft Sufficient**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- Further discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP incorporates climate change into the projected water budget using RCP 8.5 and the HadGEM2-ES Global Climate Model, which is something we support. To improve, the GSP should consider extreme climate scenarios in the projected water budget. While HadGEM2-ES may better represent warm and dry conditions for California, other models may capture other statistics relevant for your basin and may reveal valuable information to account for uncertainty. While extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Consider integrating a wet scenario into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation was improperly omitted in the historical, current, and projected water budgets. The GSP does not state whether there are managed wetlands present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only question for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Drinking Water Users

The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

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[18] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[19] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[20] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[21] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

[22] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[23] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

Table 7 shows the GSP satisfactorily answered two of eight relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Not Applicable**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Further describe the impact of passing the minimum threshold for domestic well owners. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for total dissolved solids (TDS) and nitrate on domestic water users.
- When defining undesirable results for chronic lowering of groundwater levels, water quality, and depletions of interconnected surface waters, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[25] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[26]
- For the interconnected surface water SMC, the undesirable results should include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the basin.[27] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[18,28]
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[29,30]

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[25] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[26] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[27] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[28] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[29] Webtool available at: https://igde-work.earthengine.app/view/sage

[30] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[31] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Final Improved**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Final Improved**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to drinking water users when identifying new RMSs.
- Include plans to reconcile data gaps for GDEs and ISWs in the GSP now, instead of leaving this for a future project to be implemented when a groundwater level trigger is reached. Evaluate how the gathered data will be used to identify and map GDEs and ISWs.

[31] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered three of five relevant questions for this criteria. We thank the GSA for including reference to "Framework for a Drinking Water Well Impact Mitigation Program" in the Final GSP to guide GSA outreach activities and potential corrective actions.[34] We encourage the GSA to include further details for the drinking water well mitigation program in the Final GSP. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Not Applicable**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Final Improved**

[34] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

RECOMMENDATIONS

- For GDEs and ISWs, recharge ponds, reservoirs and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[35]

- For domestic well owners, include further discussion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[34]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[35] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Santa Clara River Valley East Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Santa Clara River Valley East Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and tribal stakeholder engagement during the GSP development process
- Identification of DACs and tribes
- Identification of GDEs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users
- Project and management actions will only be implemented once undesirable results are observed, because the GSP states that the basin is not in overdraft.

Our specific comments related to the GSP in the Santa Clara River Valley East Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Santa Clara River Valley East Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Communications & Engagement Plan that describes active and targeted outreach to engage DACs, domestic well owners, and environmental stakeholders during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that while the GSP identified the Fernandeño Tataviam Band of Mission Indians, it did not map tribal lands or tribal interests. The GSP did not provide the population of each identified DAC in the basin.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Final Improved**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

Table 3 shows the GSP satisfactorily answered all five questions for this criteria.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Draft Sufficient**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP mapped GDEs using the NC dataset and other sources,[12] however some features were improperly disregarded. NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or in floodplains due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including flood flows or shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land or in floodplains can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on this factor.

The GSP used modeled groundwater depths in the dry season (September) during a wet year (2011) to characterize groundwater conditions supporting the basin's GDEs. We recommend using additional groundwater data to determine the range of depth to groundwater around NC dataset polygons and to more completely describe groundwater conditions within the basin's GDEs. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

Table 4 shows the GSP satisfactorily answered two of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

[12] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[13]
- Provide depth-to-groundwater contour maps, noting best practices.[13] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[13] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, we found that the GSP did not incorporate climate change into the imported water inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate imported water inputs that are adjusted for climate change to the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The response to comments of the Final GSP states that there are no managed wetlands present in the basin, but the main text of the GSP was not updated.

Table 6 shows the GSP satisfactorily answered the only question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin *in the main text of the GSP*.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP mentions but does not fully analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation, water quality, and depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of the eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of reaching or passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[26]
- Set minimum thresholds and measurable objectives for water quality constituents within the basin including naturally occurring constituents that can be exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates, alterations in fish spawning/rearing/migration) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]
- When establishing SMC for the basin, please consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs should include "impacts on groundwater dependent ecosystems".

[26] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of surface and groundwater as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[11] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs and drinking water users when identifying new RMSs.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The GSP states that the basin is not in overdraft, and states that the proposed projects and management actions may be implemented if minimum thresholds are crossed or undesirable results experienced. However, we are concerned that none of the projects and management actions give quantified estimated benefits and are not designed to proactively improve or maintain sustainability, but instead will be implemented only when undesirable results are observed.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[37]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- The GSP discusses managed aquifer recharge projects. Note that recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[38]

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the East Bay Plain Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the East Bay Plain Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and tribal stakeholder engagement during the GSP development process
- Identification of DACs and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Incorporation of climate change into the GSP's projected water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the East Bay Plain Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
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Attachment A

Specific Comments on the East Bay Plain Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage DAC members and domestic well owners throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each DAC in the basin, nor map tribal lands in the basin.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Consult with tribal representatives to identify and map any potential tribal interests within the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not present a map of ISWs in the basin to illustrate the conclusions of the ISW analysis. The "Surface Water/Groundwater Interaction" section of the GSP discusses depth-to-groundwater contours for one date, spring 2015. However, using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. The use of data from one point in time does not reflect the temporal (seasonal and interannual) variability inherent in California's climate.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[13] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or due to the presence of surface water supplies. However, this removal criteria is flawed since GDEs can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields or surface water supplies. Furthermore, we found it to be unclear whether GDEs in areas of data gaps were mapped and described as "potential GDEs" in the GSP.

The GSP used groundwater data from two dates (fall 2014 and spring 2015) to characterize groundwater conditions supporting the basin's GDEs. We recommend using additional groundwater data to determine the range of depth to groundwater around NC dataset polygons and to more completely describe groundwater conditions within the basin's GDEs. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

Table 4 shows the GSP satisfactorily answered two of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that were incorrectly removed based on proximity to irrigated land or surface water supplies. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.
- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[14,15]

[14] Webtool available at: https://igde-work.earthengine.app/view/sage

[15] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16]

In our review of climate change in the projected water budget, we found that the GSP claims to incorporate climate change into the projected water budget using DWR change factors or other sources. Such values, however, are not shown within the GSP and it does not seem to have considered multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The rationale for such a decision is based on climate change projection showing a wetter future for this region. While we agree that climate change projections for this region trend towards a slightly wetter future, we agree that a more conservative approach is to use drier scenarios from the historical trends. The GSP would benefit from clearly and transparently incorporating the results from the climate change analysis, including the extremely wet and dry scenarios provided by DWR, into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered one of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**No Change**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Show the calculations for the projected water budget with climate change, including extreme wet and dry scenarios, and integrate the data into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[17,18] Based on our review, we found native vegetation was improperly omitted in the historical, current, and projected water budgets. The GSP does not state whether there are managed wetlands present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[17] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[18] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[19,20,21] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[22]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not fully analyze the direct or indirect impacts on drinking water users when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicator, but does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[23,24,25] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[19] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[20] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[21] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[22] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[23] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[24] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, but does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality nor depletion of surface water sustainability indicators. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[26] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted or exacerbated by groundwater use and/or management.
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the maximum contaminant level (MCL) trigger level.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]

[26] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[19,31]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. The GSP scored a "Yes" for the third question in the table because the GSP included biological surveys as a new monitoring project and management action. While this PMA is related to GDEs, there were no other PMAs that identified benefits or impacts to other beneficial users such as DACs and drinking water users. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to

"Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[37]

- Identify benefits or impacts of potential Projects and Management Actions to other beneficial users, such as drinking water users and DACs.
- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.
- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[38]
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[37] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[38] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 25, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Santa Margarita Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Santa Margarita Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and tribal stakeholder engagement during the GSP development process
- Identification of drinking water wells
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of identification of ISWs in the basin by providing a thorough, comprehensive evaluation.

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Santa Margarita Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Santa Margarita Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of seven questions for this criteria. In particular, we commend the GSA for including environmental organizations in the Surface Water Technical Advisory Board to aid in sustainable management criteria development. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, further describes active and targeted outreach to engage DACs, domestic well owners, environmental stakeholders, and tribal stakeholders during the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Describe efforts to consult and engage with tribes within the basin. Refer to the DWR guidance entitled *Engagement with Tribal Governments* for specifics on how to consult with tribes.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] DWR Guidance Document for Engagement with Tribal Governments https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Include a map showing well depth (such as minimum well depth, average well depth, or depth range) across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

Based on our review, we found the GSP presents a thorough, comprehensive evaluation of ISWs in the basin. The GSP presents the spatial and temporal distribution of interconnected surface water. To analyze ISWs in the basin, the GSP uses accretion studies and comparisons between stream bed elevations and 30 years of proximal monitoring wells data. Findings from these studies and observations were combined with model-simulated groundwater elevations to produce the final ISW map presented. The Final GSP was further improved with further discussion of data gaps for ISWs, and more clearly labeling the reaches with data gaps as potentially connected reaches.

Table 3 shows the GSP satisfactorily answered all of the five questions for this criteria.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

The GSP used the Natural Communities Commonly Associated with Groundwater dataset (NC dataset) as a starting point. In addition, several known springs, seeps, or other groundwater-dependent wetlands were identified as likely GDEs. We appreciate the GSA starting with the NC dataset and using additional sources to identify other GDEs in the basin. Further information was added to the Final GSP to describe data gaps and to clarify that all features in the NC dataset were retained as potential GDEs in the GSP.

Table 4 shows the GSP satisfactorily answered five of seven relevant questions for this criteria. Recommendations that would further improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Final Improved**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Not Applicable**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Further describe the temporal and spatial groundwater data used in the groundwater model.
- As more data is gathered and depth-to-groundwater contour maps are prepared in the future, refer to The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset".[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- For more information on shallow groundwater in the basin refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[12] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider the 2070 wet and 2070 extremely dry climate scenarios in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management. We also found that the GSP did not adjust imported water for climate change and incorporate it into the surface water flow inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Final Improved**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate extreme wet and dry scenarios into the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Integrate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation was improperly omitted in the water budget. The GSP response to comments states that native vegetation is included in the 'evapotranspiration by vegetation' term of the water budget. However, *native* vegetation evapotranspiration should be included as a separate line item in the water budget, not lumped with a larger evapotranspiration term. The GSP response to comments indicates that there are no managed wetlands present in the basin. However, the main GSP text was not changed to indicate this.

Table 6 shows the GSP did not satisfactorily answer the one relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation. If native vegetation is included as one of the land use types in the numerical model, specifically state this in the GSP and provide a separate line item in water budget tables.
- State whether or not there are managed wetlands in the basin *within the main text of the GSP*.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not mention direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor the measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions potential impacts on drinking water users in the basin when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, but does not consider drinking water users when establishing water quality and groundwater elevation measurable objectives. The lack of full analysis is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

Environmental Users

The GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The minimum thresholds for depletion of surface water are based on historical conditions, which are considered to be sufficient to support GDEs and priority species. However, the GSP does not provide an analysis of the impacts of these proposed minimum thresholds. Furthermore, the GSP does not mention environmental users when discussing measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered four of eleven questions for this criteria. We appreciate the GSA providing more details of the direct and indirect impacts on DACs in the minimum thresholds section. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds on DACs.
- For the interconnected surface water SMC, the undesirable results should include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the basin.[26] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[18,27]
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[26] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[27] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[28,29]

[28] Webtool available at: https://igde-work.earthengine.app/view/sage

[29] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[30] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[17] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. In particular, we appreciate the GSA including GDE-related biological monitoring in the monitoring network. The GSP states that this will include use of the Nature Conservancy's GDE Pulse tool and field assessments that will take place twice a year to include photo monitoring and site observations of GDEs. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Final Improved**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

[30] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Increase the number of RMSs in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to domestic wells, GDEs, and ISWs when identifying new RMSs.

- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify shallow domestic well users that are vulnerable to undesirable results.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The GSP acknowledges that GSA-approved projects and management activities might impact beneficial users of groundwater and lists the ways in which some beneficial users could be impacted, depending on the approved project. However, there is very little discussion of the manner in which drinking water users and DACs may be benefitted or impacted from identified projects and management actions. Therefore, potential project and management actions may not protect these beneficial users.

Table 9 shows the GSP satisfactorily answered one of the six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- Recharge ponds, reservoirs and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[33]

- For DACs and domestic well owners, include discussion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[34]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts. Impacts to supply wells are discussed, but not to DACs and domestic well owners.

[33] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

[34] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Santa Rosa Plain Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Santa Rosa Plain Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Santa Rosa Plain Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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Attachment A

Specific Comments on the Santa Rosa Plain Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered five of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Community Engagement Plan, describe active and targeted outreach to engage DACs and domestic well owners throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]
- Provide more information on the role of the Advisory Committee during the GSP implementation process.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of each identified DAC in the basin. The GSP did not provide a domestic well density map nor provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a separate domestic well density map for the basin.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP may have disregarded some interconnected reaches in the basin. Under SGMA's ISW definition,[10] ISWs include reaches that maintain a connection with the saturated zone at *any* point in time and space. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water. Furthermore, the GSP did not consider losing streams in the ISW assessment. This is problematic because stream segments that are interconnected (losing or gaining) for any percentage of time should be considered an ISW.

While the Final GSP added discussion of data gaps for ISWs, the GSP did not consider segments with data gaps as potential ISWs and mark them as such on maps provided in the GSP.

Table 3 shows the GSP satisfactorily answered two of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] "'Interconnected surface water' refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." [23 CCR §351(o)]

RECOMMENDATIONS

- Consider stream reaches with connection for any percentage of time as interconnected. On the map of streams in the basin, clearly labeled reaches as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset,"[11] to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not fully describe the groundwater data used to characterize groundwater conditions supporting the basin's GDEs. The GSP response to our comments states that all available groundwater level data from 2005 to 2020 were used to evaluate areas with depth to water shallower than 30 feet, and references Appendix 4-C. However, we did not find a clear description of data in this appendix or the main text of the GSP. Furthermore, the GSP did not clearly discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.

Table 4 shows the GSP satisfactorily answered six of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Discuss available shallow groundwater data. Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around Veg Map derived potential GDE polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to best practices for using local groundwater data to verify whether polygons in the Veg Map derived potential GDE map are supported by groundwater in an aquifer.[11]

- Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used if these species are present in the basin. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons are connected to groundwater.

- Further discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP incorporates climate change into the projected water budget using RCP 8.5 and the HadGEM2-ES Global Climate Model, which is something we support. To improve, the GSP should consider extreme climate scenarios in the projected water budget. While HadGEM2-ES may better represent warm and dry conditions for California, other models may capture other statistics relevant for your basin and may reveal valuable information to account for uncertainty. While extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not incorporate climate change into the imported water inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered four of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Consider other GCM projections to account for uncertainty beyond median statistics.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the historical, current, and projected water budgets. The water budget includes a separate item for evapotranspiration, but combines crop, native vegetation, and riparian evapotranspiration into one term. The GSP response to comments states that managed wetlands within the basin do not likely rely on groundwater, and states that this area of uncertainty will be evaluated during GSP implementation.

Table 6 shows the GSP satisfactorily answered neither of the two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP mentions but does not analyze the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicator, it does not provide an analysis of the impacts of the proposed minimum thresholds for the water quality sustainability indicator. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP mentions but does not analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the depletion of surface water sustainability indicator, but does not provide an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation nor water quality sustainability indicators. The GSP does not provide an analysis of the impacts of the proposed measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted by groundwater use and/or management. Ensure they align with drinking water standards.[28] According to the state's anti-degradation policy,[29] high water quality should be protected and is only allowed to worsen beyond the MCL if a finding is made that it is in the best interest of the people of the State of California. No analysis has been done and no such finding has been made. Furthermore, exceedances of the MCL constitute a violation of the state's water quality law and are not permitted.
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] Anti-degradation Policy https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/1968/rs68_016.pdf

results in the basin.[30] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[31]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[32] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,33]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[30] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[31] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[32] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[33] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[36] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations (specifying whether they are shallow or deep wells) with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, and GDEs when identifying new RMSs.

[36] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[37,38]

[37] Webtool available at: https://igde-work.earthengine.app/view/sage

[38] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[39]

[39] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document".[40]

[40] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Santa Ynez River Valley Basin - Western Management Area Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Santa Ynez River Valley Basin - Western Management Area. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to eachGSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Environmental stakeholder engagement during the GSP development process
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Santa Ynez River Valley Basin - Western Management Area along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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Attachment A

Specific Comments on the Santa Ynez River Valley Basin - Western Management Area Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Public Outreach and Engagement Plan that describes active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Include plans to directly engage the DAC population for inclusion on the GSA advisory committee instead of having DACs represented by the City of Lompoc.
- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[9]

[8] Dobbin, K., J. Clary, L. Firestone, J. Christian-Smith. 2015. Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] DWR's Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all of the five relevant questions for this criteria. In particular, we appreciate the GSA for providing more details about the DAC population within the basin in the Final GSP.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[10]
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Improved**

[10] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[11] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

The Final GSP includes a new Appendix (1d-B) entitled "Legal Status of Santa Ynez River Alluvium Upstream of the Lompoc Plain," which presents the reasoning behind the GSA's assertion that the water within the Santa Ynez River Alluvium (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is underflow of the river flowing in a known and definite channel, and therefore under the jurisdiction of and regulated by the State Water Resources Control Board and not groundwater as defined by SGMA. After reviewing this information, we stand by the position that we stated in our comments to the GSA on the Draft GSP and do not believe that the GSA has presented sufficient evidence to establish the shallow aquifer as underflow of the Santa Ynez River. We found Appendix 1d-B insufficient because the State Water Resources Control Board has not issued a determination that the Santa Ynez River Alluvium is "underflow", and has even referred to it as an "alluvial groundwater basin" in Order WR 2019-0148.[12] Note that within the reach of the Santa Ynez River in question (downstream of Lake Cachuma and upstream of the Lompoc Narrows), the river *"flows over recent river channel deposits and the younger alluvium that range in width from a few hundred feet to about one mile and in thickness from 40 to 85 feet"* (Appendix 1d-B p. 3), a large area both in width and depth. We are concerned that the GSP is grossly extrapolating the existence of "underflow" in the shallow alluvium across the section of the Santa Ynez River Alluvium (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) from a limited number of "underflow" points of diversions within the basin (yet outside the WMA) that are actually managed by SWRCB (Figure 1).

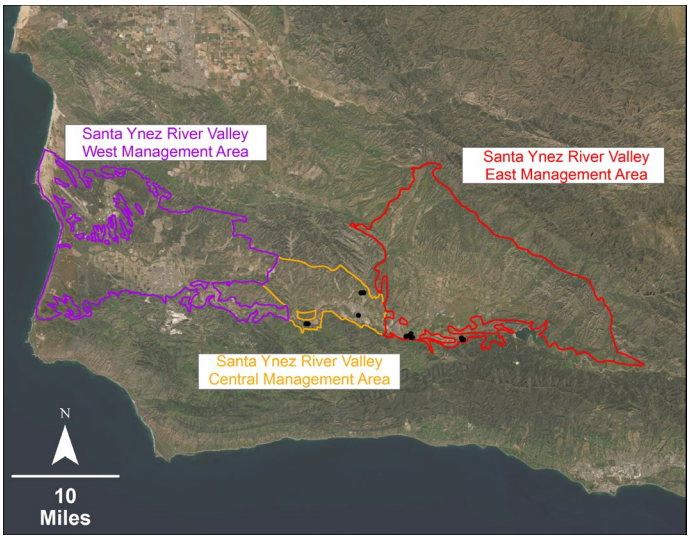

Figure 1. Points of Diversion (black circles) classified as "Santa Ynez River Underflow" within the Central Management Area (CMA; orange) and Eastern Management Area (EMA; red). No "underflow" points of diversion were located in the Western Management Area (WMA; purple). Data Source: eWRIMS.

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[12] Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/cachuma/docs/wro2019_0148_withagreement_final.pdf

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

- On the updated map of interconnected surface waters (Figure 2b.6-1), distinguish between gaining and losing reaches. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Further substantiate the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as “underflow” by the SWRCB or revise the GSP by removing the assertion that the shallow aquifer in this area is "underflow”.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California’s climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not properly categorize GDEs from the NC dataset.[15] In the GSP, GDEs from the NC dataset were classified as GDEs affected by the principal aquifer (Category A = 2,256 acres), GDEs within the surface water underflow upstream of the Lompoc Narrows (Category B = 1,701 acres), or GDEs greater than 30 feet above the water table and unlikely to be affected by management of the principal aquifers (Category C = 1,704 acres). For Category B GDEs, refer to the ISW section of this letter for our position regarding the Santa Ynez River Alluvium. For Category C GDEs, the groundwater data underlying these GDEs may not represent sufficient temporal variability, as it is unclear what data is used and if the data represent multiple water year types (e.g., wet, average, dry) and thus the temporal variability inherent in California's mediterranean climate. While the final GDE map shows GDEs from all three categories, the GSP does not retain Category B and C GDEs for consideration in the monitoring network design, in the development of sustainable management criteria, or for the selection of projects and management actions.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	**GDE map provided, but based on unclear or incorrect data/methods**	GDE map included with best available data	**No Change**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	**Unclear**	Yes	**No Change**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

[15] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Final Improved**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs Under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[16]

- Refer to The Nature Conservancy's plant rooting depth database.[17] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Further substantiate or remove the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as "underflow" by the SWRCB. For example, include a map and description of extraction points and whether they source "underflow" or "groundwater" from the shallow alluvium.

- For more information on shallow groundwater conditions in the basin refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[18,19]

[16] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[17] Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[18] Webtool available at: https://igde-work.earthengine.app/view/sage

[19] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[20]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider the 2070 wet and 2070 extremely dry climate scenarios in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		**Yes**	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[20] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[21,22] Based on our review, we found native vegetation was properly included in the water budget. Per our recommendation, the Final GSP was updated to state that there are no managed wetlands within the basin.

Table 6 shows the GSP satisfactorily answered the one relevant question for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

[21] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[22] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[23,24,25] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[26]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[27,28,29] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[23] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[24] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[26] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[27] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[28] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[29] Water Code §10727.4(l)

Environmental Users

The GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results for depletion of interconnected surface waters. However, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria.Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[30]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Provide a table in the GSP that compares WQOs to MCLs for all COCs. Ensure that the most protective value is chosen for the minimum threshold.
- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact on GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the WMA.[31] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[32]
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[30] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[31] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[32] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[17] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify which beneficial users are not adequately being monitored spatially and at depth.
- Increase the number of representative monitoring sites in the shallow aquifer across the WMA as needed to adequately monitor all groundwater condition indicators across the WMA and at appropriate depths for *all* beneficial users. Prioritize proximity to

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

DACs, domestic wells, GDEs, and ISWs when identifying new representative monitoring sites

- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.
- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the WMA.
- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The GSP lists a PMA entitled "Drought Mitigation by Pumping Optimization and Deepen Existing Wells," but the GSP states that it is not a current commitment that the GSA plans to implement. We recommend including specific plans to implement a drinking water well impact mitigation program since the sustainable management criteria section of the GSP outlines that a significant percentage of domestic wells will be impacted at minimum thresholds.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. We appreciate that the GSA included a discussion in the Final GSP that some projects will be designed as multiple-benefit projects including elements to support wildlife and aquatic species. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Santa Ynez River Valley - Central Management Area Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Santa Ynez River Valley Basin - Central Management Area. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to eachGSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Environmental stakeholder engagement during the GSP development process
- Identification of GDEs
- Identification of ISWs
- Consideration of drinking water users and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Santa Ynez River Valley Basin - Central Management Area along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Water Policy Analyst
Clean Water Action/Clean Water Fund

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Bilingual Senior Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
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Attachment A

Specific Comments on the Santa Ynez River Valley Basin - Central Management Area Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered one of three relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Include a more detailed and robust Public Outreach and Engagement Plan that describes active and targeted outreach to engage domestic well owners and environmental stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribal beneficial users in the basin within the GSP.[9]

[8] Dobbin, K., J. Clary, L. Firestone, J. Christian-Smith. 2015. Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] DWR's Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all of the two relevant questions for this criteria. In particular, we commend the GSA for providing comprehensive information on the location and depth of domestic wells in the CMA.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Not Applicable**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Not Applicable**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Not Applicable**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

The Final GSP includes a new Appendix (1d-B) entitled "Legal Status of Santa Ynez River Alluvium Upstream of the Lompoc Plain," which presents the reasoning behind the GSA's assertion that the water within the Santa Ynez River Alluvium (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is underflow of the river flowing in a known and definite channel, and therefore under the jurisdiction of and regulated by the State Water Resources Control Board and not groundwater as defined by SGMA. After reviewing this information, we stand by the position that we stated in our comments to the GSA on the Draft GSP and do not believe that the GSA has presented sufficient evidence to establish the shallow aquifer as underflow of the Santa Ynez River. We found Appendix 1d-B insufficient because the State Water Resources Control Board has not issued a determination that the Santa Ynez River Alluvium is "underflow", and has even referred to it as an "alluvial groundwater basin" in Order WR 2019-0148.[11] Note that within the reach of the Santa Ynez River in question (downstream of Lake Cachuma and upstream of the Lompoc Narrows), the river *"flows over recent river channel deposits and the younger alluvium that range in width from a few hundred feet to about one mile and in thickness from 40 to 85 feet"* (Appendix 1d-B p. 3), a large area both in width and depth. We are concerned that the GSP is grossly extrapolating the existence of "underflow" in the shallow alluvium across the section of the Santa Ynez River Alluvium (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) from a limited number of "underflow" points of diversions within the basin that are actually managed by SWRCB (Figure 1).

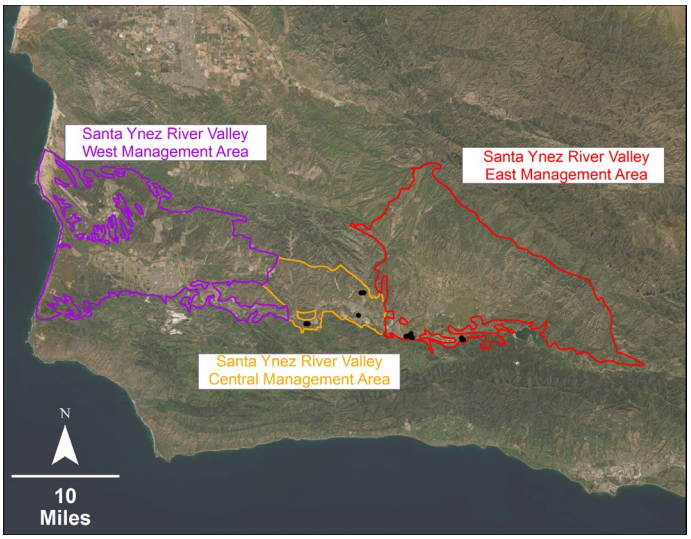

Figure 1. Points of Diversion (black circles) classified as "Santa Ynez River Underflow" within the Central Management Area (CMA; orange) and Eastern Management Area (EMA; red). No "underflow" points of diversion were located in the Western Management Area (WMA; purple). Data Source: eWRIMS.

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/cachuma/docs/wro2019_0148_withagreement_final.pdf

Table 3 shows the GSP satisfactorily answered none of five questions for this criteria. We appreciate the GSA including more details on ISWs in the basin, but think the GSP could be significantly improved by including ISWs dismissed in the GSP due to the shallow alluvium being considered underflow. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Improved**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

RECOMMENDATIONS

- On the updated map of interconnected surface waters (Figure 2b.6-3), distinguish between gaining and losing reaches. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Further substantiate or remove the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as "underflow" by the SWRCB.
- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs Under SGMA: Best Practices for using the NC Dataset",[12] to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

[12] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[15] NC dataset polygons were incorrectly disregarded if depth to groundwater has historically exceeded the 30-foot depth identified by the Nature Conservancy as representative of groundwater conditions that may sustain common phreatophytes and wetland ecosystems. However, sufficient description of the groundwater data used for the 30-foot threshold analysis is not provided in the GSP text. Furthermore, NC dataset polygons were incorrectly disregarded from riparian areas of the Santa Ynez River if identified as being "underflow" and managed by the SWRCB. However, as stated above under the ISW section of this letter, the GSP has failed to substantiate the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as "underflow" by the SWRCB.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. In particular, we appreciate the GSA for adding an inventory of fauna, flora, and threatened and endangered species in the Final GSP. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Final Improved**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**No Change**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

[15] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Final Improved**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to The Nature Conservancy's "Identifying GDEs Under SGMA: Best Practices for using the NC Dataset" for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[16]

- Refer to The Nature Conservancy's plant rooting depth database.[17] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Provide depth-to-groundwater contour maps, noting best practices.[13] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Further substantiate or remove the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as "underflow" by the SWRCB. For example, include a map and description of extraction points and whether they source "underflow" or "groundwater" from the shallow alluvium.

[16] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

[17] The Nature Conservancy. Rooting Depth Database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

- For more information on shallow groundwater conditions in the basin refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[18,19]

[18] Webtool available at: https://igde-work.earthengine.app/view/sage

[19] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[20]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider the 2070 wet and 2070 extremely dry climate scenarios in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.

[20] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[21,22] Based on our review, we found native vegetation was properly included in the water budget. Per our recommendation, the Final GSP was updated to state that there are no managed wetlands within the basin.

Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria. We appreciate the GSA for including the groundwater demands of native vegetation in the historical, current and projected water budgets.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

[21] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[22] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[23,24,25] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[26]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include "impacts on groundwater dependent ecosystems" and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[27,28,29] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results for depletion of interconnected surface waters. However, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

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[23] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[24] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[25] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[26] "The Department shall consider the state policy regarding the human right to water when implementing these regulations." [23 CCR §350.4(g)]

[27] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[28] "The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[29] Water Code §10727.4(l)

Table 7 shows the GSP satisfactorily answered none of eight relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Not Applicable**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Not Applicable**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.

- Describe direct and indirect impacts on drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[30]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users.

- Provide a table in the GSP that compares WQOs to MCLs for all COCs. Ensure that the most protective value is chosen for the minimum threshold.

- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact on GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the CMA.[31] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[32]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the CMA are reached.[33] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[23,34]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater

[30] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[31] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[32] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[33] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[34] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[37] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[17] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	**Not adequately cover DAC, domestic well, tribal areas, OR GDEs.**	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	**Not adequately cover DAC, domestic well, tribal areas, OR GDEs.**	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	**Yes**	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	**No**	Vague description	Yes	**No Change**

RECOMMENDATIONS

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

[37] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide maps that overlay current and proposed monitoring well locations with the locations of domestic wells, GDEs, and ISWs to clearly identify which beneficial users are not adequately being monitored spatially and at depth.

- Increase the number of representative monitoring sites in the shallow aquifer across the CMA as needed to adequately monitor all groundwater condition indicators across the CMA and at appropriate depths for *all* beneficial users. Prioritize proximity to domestic wells, GDEs, and ISWs when identifying new RMSs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the CMA.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[38,39]

[38] Webtool available at: https://igde-work.earthengine.app/view/sage

[39] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The GSP lists a PMA entitled "Drought Mitigation by Pumping Optimization and Deepen Existing Wells," but the GSP states that it is not a current commitment that the GSA plans to implement. We strongly recommend including specific plans to implement a drinking water well impact mitigation program since the sustainable management criteria section of the GSP outlines that a significant percentage of domestic wells will be impacted at minimum thresholds.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[40]

- For domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

[40] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Santa Ynez River Valley - Eastern Management Area Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Santa Ynez River Valley Basin - Eastern Management Area (EMA). Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and environmental stakeholder engagement during the GSP development process
- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of tribal engagement by including a tribal representative from the Santa Ynez Band of Chumash on the EMA Citizens Advisory Group and providing further details in the Final GSP on plans for continued tribal engagement during the GSP implementation phase.

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Santa Ynez River Valley Basin - Eastern Management Area basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Santa Ynez River Valley - Eastern Management Area Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map or provide the population of DACs in the EMA, nor identify the water source for DACs in the basin. While the Draft GSP did recognize DACs in the EMA, the Final GSP states (p. 2-43): *"However, recent data indicates that there are no disadvantaged communities present within the EMA, although there are disadvantaged communities within other management areas in the Basin."* Since the GSP does not include specifics on the recent data, we are only able to rely upon DWR's DAC mapping tool. The GSP needs to include more details of the recent data used to exclude the identification of DACs in the basin, and explain why that data differs from the DWR DAC mapping tool.

The GSP did not provide depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Worsened**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**Final Worsened**

RECOMMENDATIONS

- Include more details of the recent data used to exclude the identification of DACs in the basin, and explain why that data differs from the DWR DAC mapping tool.[9]
- Include a map showing domestic well locations and average well depth across the EMA.

[9] The DWR DAC mapping tool is available online at: https://gis.water.ca.gov/app/dacs/.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

The Final GSP includes a new Appendix (K) entitled "Legal Status of Santa Ynez River Alluvium Upstream of the Lompoc Plain," which presents the reasoning behind the GSA's assertion that the water within the Santa Ynez River Alluvium (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is underflow of the river flowing in a known and definite channel, and therefore under the jurisdiction of and regulated by the State Water Resources Control Board and not groundwater as defined by SGMA. After reviewing this information, we stand by the position that we stated in our comments to the GSA on the Draft GSP and do not believe that the GSA has presented sufficient evidence to establish the shallow aquifer as underflow of the Santa Ynez River. We found Appendix K insufficient because the State Water Resources Control Board has not issued a determination that the Santa Ynez River Alluvium is "underflow", and has even referred to it as an "alluvial groundwater basin" in Order WR 2019-0148.[11] Note that within the reach of the Santa Ynez River in question (downstream of Lake Cachuma and upstream of the Lompoc Narrows), the river *"flows over recent river channel deposits and the younger alluvium that range in width from a few hundred feet to about one mile and in thickness from 40 to 85 feet"* (Appendix K p. 3), a large area both in width and depth. We are concerned that the GSP is grossly extrapolating the existence of "underflow" in the shallow alluvium across the section of the Santa Ynez River Alluvium (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) from a limited number of "underflow" points of diversions within the basin that are actually managed by SWRCB (Figure 1).

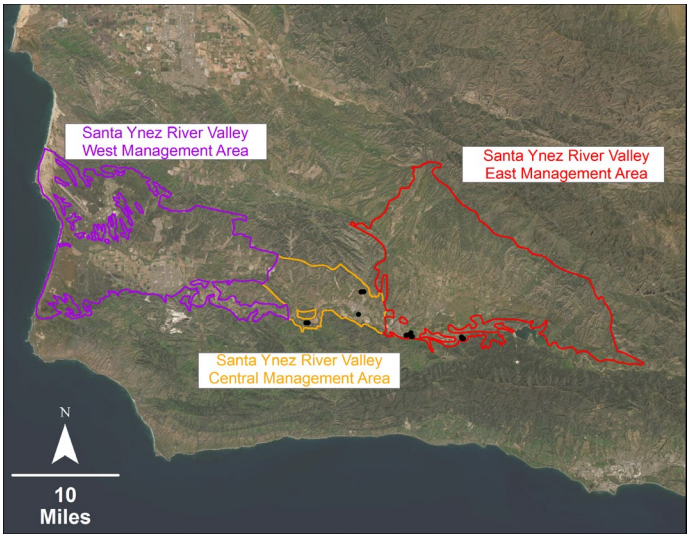

Figure 1. Points of Diversion (black circles) classified as "Santa Ynez River Underflow" within the Central Management Area (CMA; orange) and Eastern Management Area (EMA; red). No "underflow" points of diversion were located in the Western Management Area (WMA; purple). Data Source: eWRIMS.

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/cachuma/docs/wro2019_0148_withagreement_final.pdf

Table 3 shows the GSP satisfactorily answered none of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Improved**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the EMA, with reaches clearly labeled as interconnected or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs Under SGMA: Best Practices for using the NC Dataset",[12] to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[12] Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

- Further substantiate the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as “underflow” by the SWRCB, or revise the GSP by removing the assertion that the shallow aquifer in this area is "underflow.”

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[15] NC dataset polygons were incorrectly disregarded based on the assumption that they are supported by the shallow, perched water table. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the EMA's pumping is occurring in deeper principal aquifers.[16] Furthermore, NC dataset polygons were incorrectly disregarded from riparian areas of the Santa Ynez River if identified as being "underflow" and managed by the SWRCB. However, as stated above under the ISW section of this letter, the GSP has failed to substantiate the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as "underflow" by the SWRCB.

Contoured groundwater elevation data for spring 2015 were used to determine areas where the NC Dataset polygons were within 30 feet to groundwater. We recommend using groundwater data from multiple seasons and water year types to determine the range of depth to groundwater around NC dataset polygons. Within Section 3.2.6.1.1 (Potential GDE Vegetation Classifications), the GSP states that the maximum rooting depth of valley oak (*Quercus lobata*) is 80 feet. However, this deeper rooting depth was not used when verifying whether valley oak polygons from the NC Dataset are supported by groundwater.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

[15] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

[16] "'Principal aquifers' refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." [23 CCR §351(aa)]

Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	**No**	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**No Change**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	**Clearly mapped AND described**	**Draft Sufficient**

RECOMMENDATIONS

- Further substantiate or remove the assertion that the shallow aquifer (located downstream of Lake Cachuma and upstream of the Lompoc Narrows) is classified and managed as "underflow" by the SWRCB.
- Re-evaluate the EMA's GDEs noting the incorrect removal criteria listed above. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[12] If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- Provide depth-to-groundwater contour maps, noting best practices.[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.
- Refer to The Nature Conservancy's plant rooting depth database.[17] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

[17] Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[18,19]

[18] Webtool available at: https://igde-work.earthengine.app/view/sage

[19] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[20]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider the 2070 wet and 2070 extremely dry climate scenarios in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

We also found that the GSP did not adjust imported water for climate change and incorporate it into the surface water flow inputs of the projected water budget. Furthermore, the GSP does not provide a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered three of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	**Unclear**	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	**No**		Yes	**No Change**

[20] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.
- Estimate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[21,22] Based on our review, we found native vegetation was properly included in the water budget. The Draft and Final GSPs state that there are no managed wetlands within the basin. Table 6 shows the GSP satisfactorily answered the one relevant question for this criteria.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

[21] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[22] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[23,24,25] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[26]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation and water quality sustainability indicators, but does not provide an analysis of measurable objectives for either sustainability indicator. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[27,28,29] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[23] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[24] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[25] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[26] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[27] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[28] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[29] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP mentions but does not analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation, water quality, and depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[30]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- In Table 5-3 (Water Quality Standards for Selected Constituents of Concern), compare WQOs, MCLs, and ambient (prior to January 2015) water quality concentrations. Ensure that the most protective value is chosen for the minimum threshold.
- Set minimum thresholds and measurable objectives for all water quality constituents within the EMA. Ensure they align with drinking water standards.[31]
- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact on GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the EMA.[32] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[33]
- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when

[30] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[31] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[32] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[33] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

minimum thresholds in the EMA are reached.[34] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on both environmental beneficial users of groundwater and surface water as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[23,35]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[34] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[35] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[38] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[14] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, tribes, and GDEs to clearly identify potentially impacted areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the EMA as needed to adequately monitor shallow groundwater elevations supporting beneficial users such as GDEs and shallow domestic wells.

[38] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide specific plans, such as locations and a timeline, to fill the data gaps in the GDE monitoring network. Evaluate how the gathered data will be used to identify and map GDEs.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[39,40]

[39] Webtool available at: https://igde-work.earthengine.app/view/sage

[40] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

The proposed projects and management actions that would improve the water supply, GDE habitats, or provide benefits to DACs within the EMA are currently classified as Group 2 or 3 projects, and the GSA does not have specific plans to develop these projects. Therefore, potential project and management actions may not protect beneficial users during the GSP implementation phase. We recommend including specific plans to implement a drinking water well impact mitigation program since the SMC section of the GSP outlines that up to 39% of domestic wells will be impacted at minimum thresholds.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[41]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- The GSP discusses the Group 3 Project: Distributed Stormwater Managed Aquifer Recharge (DSW-MAR). Note that recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[42]

[41] Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[42] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Scott River Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Scott River Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC engagement during the GSP development process
- Identification of DACs, drinking water wells, and tribes
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Scott River Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
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Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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Samantha Arthur
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E.J. Remson
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The Nature Conservancy

Melissa M. Rohde
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The Nature Conservancy

Attachment A

Specific Comments on the Scott River Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered five of seven questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage DAC members and domestic well owners throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin. The GSP did not provide the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of six questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Provide the population of each DAC in the basin.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly identify data gaps for interconnected surface waters in the basin.

Table 3 shows the GSP satisfactorily answered three of four relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Improved**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Not Applicable**[10]

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[10] Not applicable because all stream reaches in the basin are considered to be ISW.

RECOMMENDATIONS

- Overlay the stream reaches shown on the ISW map with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

- Describe data gaps for the ISW analysis in the ISW section, in addition to the discussion in Appendix 3-A (Data Gap Assessment). Discuss and reconcile these data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[11] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[12,13] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not provide detail about the spatial and temporal groundwater data used in the depth-to-groundwater analysis for characterizing the groundwater conditions supporting the basin's GDEs. The GSP did not clearly show if polygons were retained as "potential GDEs" in the GSP where sufficient data were not available to describe groundwater conditions.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Final Improved**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	**Yes**	**Draft Sufficient**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	**Unclear**	Yes	**Final Improved**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	**Data gaps described clearly**	**Final Improved**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	**No map OR vague description**	Clearly mapped AND described	**No Change**

[12] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[13] Refer to Attachment B for a list of freshwater species located in the basin.

RECOMMENDATIONS

- Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11] If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.

- Provide depth-to-groundwater contour maps, noting best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- Refer to The Nature Conservancy's plant rooting depth database.[14] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30 feet threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[14] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did not calculate a sustainable yield based on the projected water budget with climate change incorporated. The GSP instead states that the sustainable yield will vary over time as new project and management actions are added.

Table 5 shows the GSP satisfactorily answered five of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Final Improved**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Final Improved**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Final Improved**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

RECOMMENDATIONS

- Estimate sustainable yield based on the projected water budget with climate change incorporated, to inform the basis for development of projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was improperly omitted in the water budget. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the basin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation program in the GSP.

Drinking Water Users

The GSP mentions but does not analyze the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. The GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives.

For the groundwater elevation and water quality sustainability indicators, the GSP provides an analysis of the direct or indirect impacts on GDEs when defining undesirable results. However, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for benzene. Ensure they align with drinking water standards.[28]
- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[28] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[13] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Increase the number of representative monitoring sites (RMSs) across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to GDEs and drinking water users when identifying new RMSs.
- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Ukiah Valley Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Ukiah Valley Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of DACs
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation and managed wetlands in the water budget
- Consideration of DACs and drinking water users during the establishment of the sustainable management criteria
- Lack of firm plans for a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of stakeholder engagement by including DAC, tribal, and environmental stakeholders on the GSA Advisory Committee.

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Ukiah Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Ukiah Valley Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all seven questions for this criteria. We appreciate the GSA for including DAC, tribal, and environmental stakeholders on the GSA Advisory Committee. Recommendations that would further improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Continue to improve the Communication and Engagement Plan to describe active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not identify the water source for DACs.

Table 2 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATION

- Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly describe the monitoring well data, including well location and screen depth, used to map interconnected stream reaches. In addition, the GSP lacks description of gaining and losing reaches.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**No Change**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Improved**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Draft Sufficient**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Provide more discussion in the GSP about the groundwater elevation data and streambed elevation data used to verify interconnected reaches. Include a map of the interpolated groundwater elevations and spatial extent of groundwater monitoring wells used to produce the map. Discuss screening depth of monitoring wells and ensure they are monitoring the shallow principal aquifer.

- Identify gaining and losing reaches on the ISW map (Figure 2.56).

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10,11] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[12] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields. Furthermore, the GSP did not use multiple water year types (e.g., wet, average, dry) of groundwater level data to characterize groundwater conditions supporting the basin's GDEs.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**No Change**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**Draft Sufficient**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Refer to Attachment B for a list of freshwater species located in the basin.

[12] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Final Improved**

RECOMMENDATIONS

- Further discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[10]
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons and to verify whether polygons in the NC Dataset are supported by groundwater.
- Use a baseline period (we recommend 10 years from 2005 to 2015) to characterize groundwater conditions over multiple water year types.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, it is unclear whether the GSP incorporated climate change into key inputs (e.g., precipitation, evaporation, and surface water flow) of the projected water budget. The GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered one of six relevant questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into precipitation, evaporation, and surface water flow inputs of the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation and managed wetlands were improperly omitted in the water budget.

Table 6 shows the GSP satisfactorily answered neither of the two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATION

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP provides an analysis of the direct or indirect impacts on DACs when defining undesirable results. However, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation sustainability indicators, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds and measurable objectives for the water quality sustainability indicator. This is particularly concerning given the absence of firm plans for a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

Environmental Users

The GSP provides an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP provides an analysis of the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation, water quality, and depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered five of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Draft Sufficient**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Draft Sufficient**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[25]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for the naturally occurring constituents of concern in the basin (i.e., iron, manganese, boron). Ensure they align with drinking water standards.[26]
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[27,28]

[25] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[26] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[27] Webtool available at: https://igde-work.earthengine.app/view/sage

[28] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[29] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[11] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that helped us evaluate the questions in Table 8 when reviewing the Final GSP.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**Draft Sufficient**

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, tribes, and GDEs to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) across the basin for all groundwater condition indicators. Prioritize proximity to GDEs and drinking water users when identifying new RMSs.

[29] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[30,31]

[30] Webtool available at: https://igde-work.earthengine.app/view/sage

[31] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Final Improved**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, further discuss a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[32]

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

[32] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Yucaipa Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Yucaipa Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Environmental stakeholder engagement during the GSP development process
- Identification of drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Yucaipa Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Bilingual Senior Climate and Water Scientist
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The Nature Conservancy

Attachment A

Specific Comments on the Yucaipa Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered two of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Public Outreach and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Engage with environmental stakeholders in the basin, which could include California Department of Fish and Wildlife or environmental NGOs.
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered four of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable[7]**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Final Improved**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Final Improved**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Final Improved**

RECOMMENDATIONS

- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide sufficient evidence to support the conclusions regarding which reaches in the basin are interconnected or disconnected to groundwater. The Final GSP added more detail about the groundwater elevation data and stream flow data used in the modeling analysis, and further discussed temporal variability of the data used to calibrate the model. The Final GSP added a map and labeled stream segments that are considered ISW or potential ISWs. However, it seems the plan does not consider the majority of surface water to be interconnected, even though the groundwater data discussed in the ISW section of the GSP is shallow enough to support ISWs. For example, along the western portion of San Timoteo Creek, the plan does not conclude the creek is interconnected even though groundwater depths range from 14 to 21 feet. Please note that it is common practice to utilize a threshold of 50 feet below groundwater surface to indicate a disconnected stream reach.[11,12]

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations that would improve the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Final Improved**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] Jasechko, S. et al. 2021. Widespread potential loss of streamflow into underlying aquifers across the USA. Nature, 591: 391-395. doi: https://doi.org/10.1038/s41586-021-03311-x

[12] The Nature Conservancy. 2021. ICONS Tool. Available at: https://icons.codefornature.org/

RECOMMENDATIONS

- Use a screening depth of 50 feet to determine which stream reaches in the basin are potentially interconnected with groundwater.
- Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[13] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

[13] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[14,15] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[16] NC dataset polygons were incorrectly removed if Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) data did not correlate with groundwater level trends. This is an incorrect method, since a lack of a relationship does not preclude that groundwater is providing some of the ecosystem's water needs. NDVI and NDMI data are best utilized in conjunction with groundwater level data to assess how vegetation may be responding to groundwater changes. If the ecosystem is accessing groundwater and the vegetation is not stressed, then NDVI and NDMI will not change. Thus, it is better practice to use groundwater levels to verify the NC dataset than to use NDVI and NDMI trends. NC dataset polygons were also incorrectly removed in areas where previous site investigations indicated that the habitats were sustained by surface water. However, this removal criteria is flawed since GDEs can rely on multiple water sources – including surface water and groundwater – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to these additional water sources.

Furthermore, the GSP did not provide a complete inventory of flora and fauna present in the basin, nor identify threatened and endangered species residing within the basin.

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**No Change**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**

[14] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[15] Refer to Attachment B for a list of freshwater species located in the basin.

[16] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	**Yes**	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	**Data gaps described clearly**	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	**No map OR vague description**	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that were incorrectly removed based on NDVI and NDMI trends or proximity to surface water. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[13]
- Provide depth-to-groundwater contour maps, noting best practices.[13] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin and note any threatened or endangered species (see Attachment B in this letter for a list of freshwater species located in the Yucaipa Basin).
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[17,18]

[17] Webtool available at: https://igde-work.earthengine.app/view/sage

[18] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[19]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

The GSP did not clearly describe how climate change was incorporated into imported water inputs of the projected water budget. Furthermore, the GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated.

Table 5 shows the GSP satisfactorily answered three of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**No Change**

[19] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Integrate climate change into imported water inputs for the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[20,21] Based on our review, we found native vegetation was improperly omitted in the historical, current, and projected water budgets. The Final GSP was updated to state that there are no managed wetlands in the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Final Improved**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.

[20] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[21] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[22,23,24] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[25]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation program in the GSP.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation program in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[26,27,28] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[22] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[23] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[25] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[26] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[27] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[28] Water Code §10727.4(l)

Environmental Users

For the depletion of interconnected surface water sustainability indicator, the GSP provides an analysis of the direct or indirect impacts on terrestrial GDEs when defining undesirable results, but does not provide an analysis of the direct or indirect impacts on beneficial users of surface water. The GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

For the groundwater elevation and water quality sustainability indicators, the GSP does not provide an analysis of the direct or indirect impacts on GDEs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives.

Table 7 shows the GSP satisfactorily answered none of the eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant	Analyzed and described	**No Change**

		sustainability indicators		
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Establish water quality SMC. Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[29] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[30]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."
- Evaluate impacts on GDEs when establishing SMC for chronic lowering of groundwater levels. When defining undesirable results, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be

[29] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[30] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

considered when defining undesirable results in the basin.[31] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[32]

- Establish SMC for depletion of interconnected surface water. When defining undesirable results, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[33] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[22,34]

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[31] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[32] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[33] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[34] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[37] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[15] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Final Improved**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[37] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[38,39]

[38] Webtool available at: https://igde-work.earthengine.app/view/sage

[39] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[40]

[40] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[41]

[41] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 23, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Temescal Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Temescal Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- Identification of DACs and drinking water wells
- Identification of GDEs
- Identification of ISWs
- Inclusion of managed wetlands in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a drinking water well impact mitigation program
- Representative monitoring well locations relative to key beneficial users

Our specific comments related to the GSP in the Temescal Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Temescal Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

[7] Tribal data according to SGMA Data Viewer tribal lands - https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. Non-federally or state recognized tribal interests may exist in the basin.

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Final Improved**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Not Applicable**[7]
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Outreach and Stakeholder Involvement Communications Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[8]
- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[9]

[8] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[9] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not provide the population of DACs in the basin. The GSP did not map the depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered three of five relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Not Applicable**[7]
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

RECOMMENDATIONS

- Provide the population of each identified DAC.
- Include a map showing domestic well locations and average well depth across the basin.

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[10] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not clearly document the data used to verify interconnection of surface water to groundwater. The GSP appears to dismiss the shallow alluvial aquifer as a secondary aquifer because of limited production. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the basin's pumping is occurring in deeper principal aquifers.[11]

The Final GSP added labels denoting 'mostly interconnected' and 'disconnected' reaches, but did not denote gaining and losing reaches or label areas of data gaps as potential ISWs.

Table 3 shows the GSP satisfactorily answered one of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**No Change**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**No Change**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**Final Improved**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

[11] "'Principal aquifers' refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." [23 CCR §351(aa)]

RECOMMENDATIONS

- On the map of stream reaches in the basin, further label the interconnected reaches as either gaining or losing. Consider any segments with data gaps as potential ISWs and clearly mark them as such.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.
- Provide depth-to-groundwater contour maps using the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" to aid in the determination of ISWs.[12] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

[12] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[13,14] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP did not clearly label the maps of the basin's GDEs to show the source of data (i.e., the NC dataset, aerial photographs, field verification).

The Final GSP includes further discussion of the areas of data gaps. However, an area noted as having data gaps in the Draft GSP (GDEs around Temescal Wash after it enters the basin) was disregarded in the Final GSP as being supported by the perched aquifer. If areas of shallow or perched groundwater are discounted as supporting GDEs, the GSP should provide more supporting evidence of 1) vertical groundwater gradients between the perched system and deeper principal aquifers, and 2) whether perched groundwater is providing significant or economic quantities of water to streams, wells (e.g., domestic wells), and ecosystems (e.g., GDEs).

Table 4 shows the GSP satisfactorily answered three of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	**Incorporated, but unclear spatial or temporal data**	Clearly incorporated and described	**Final Worsened**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	**Yes**	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**Final Worsened**

[13] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[14] Refer to Attachment B for a list of freshwater species located in the basin.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Provide a comprehensive set of maps for the basin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained, removed, or added to/from the NC dataset (include the removal reason if polygons are not considered potential GDEs, or include the data source if polygons are added). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[11]

- Provide depth-to-groundwater contour maps from multiple seasons and water year types (e.g., wet, dry, average, drought), noting best practices.[11] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[15,16]

[15] Webtool available at: https://igde-work.earthengine.app/view/sage

[16] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or selecting more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Furthermore, the GSP did not clearly describe how climate change was incorporated into the precipitation and imported water inputs of the projected water budget.

Table 5 shows the GSP satisfactorily answered three of six relevant questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	**Yes**	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	**No**	Somewhat	Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	**Unclear**	Yes	**No Change**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	**Yes**	**Final Improved**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	**Unclear**	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		**Yes**	**Draft Sufficient**

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Integrate climate change into precipitation and imported water inputs for the projected water budget.
- Incorporate climate change scenarios into projects and management actions.

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[18,19] Based on our review, we found native vegetation was properly included in the historical, current, and projected water budgets. The Final GSP identifies the Prado Wetlands as managed wetlands, but does not include their water demands in the historical, current, and projected water budgets.

Table 6 shows the GSP satisfactorily answered one of two questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for native vegetation in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for managed wetlands in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands.

[18] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[19] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[20,21,22] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[23]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

Drinking Water Users

The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[24,25,26] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[20] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[21] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[22] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[23] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[24] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[25] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[26] Water Code §10727.4(l)

Environmental Users

The GSP mentions but does not fully analyze the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP mentions but does not fully analyze the impacts of the proposed minimum thresholds and measurable objectives for the groundwater elevation, water quality, and depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered none of the eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**No Change**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[27] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.
- Set minimum thresholds that do not allow water quality to degrade to levels at or above the maximum contaminant level trigger level.
- Evaluate impacts on GDEs when establishing SMC for chronic lowering of groundwater levels. When defining undesirable results, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.[29] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[30]

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[27] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

- Re-evaluate the extent of ISWs in the basin. When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[31] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[20,32]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[33,34]

[31] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[32] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[33] Webtool available at: https://igde-work.earthengine.app/view/sage

[34] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[35] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[14] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered one of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[35] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[36,37]

[36] Webtool available at: https://igde-work.earthengine.app/view/sage

[37] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the environment?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or GDE habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as GDEs, drinking water users, tribes, DACs?	No	Vague description	Yes	**No Change**
Does the GSP include any recharge projects with explicit benefits to DACs?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of drinking water?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[38]

[38] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

April 16, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Upper Ventura River Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Upper Ventura River Basin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan to have deficiencies in the following areas:

- DAC and tribal stakeholder engagement during the GSP development process
- Identification of DACs, drinking water wells, and tribes
- Identification of GDEs
- Identification of ISWs
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Lack of a well mitigation program to prevent unreasonable drinking water loss
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of outreach to environmental stakeholders in the basin, which includes representation of environmental stakeholders on the GSA's Board of Directors.

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Our specific comments related to the GSP in the Upper Ventura River Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A GSP Specific Comments
Attachment B Freshwater species located in the basin
Attachment C Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Roger Dickinson
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CivicWell (formerly Local Government Commission)

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Upper Ventura River Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered three of seven questions for this criteria. We appreciate the GSA for detailing outreach to environmental stakeholders in the basin, which includes representation of environmental stakeholders on the GSA's Board of Directors. Recommendations that would improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**No Change**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- In the Stakeholder Engagement Plan, describe active and targeted consultation with DAC and tribal stakeholders within the basin during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.[7]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[8]

[7] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca8c136dbe60157dd5664/1597810892937/SGMA_Stakeholder_Engagement_White_Paper.pdf

[8] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of DACs, domestic wells, and tribes, we found that the GSP did not map or identify tribal lands in the basin. The GSP states that the basin lies within the traditional tribal territory of the Chumash, and states that portions of the Barbareno-Ventureno Band of Mission Indians are located within the basin, but does not further identify these areas.

Furthermore, the GSP does not provide the population in each DAC or identify the water sources for DACs. The GSP does not provide the density or depth of domestic wells (such as minimum well depth, average well depth, or depth range). This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the basin.

Table 2 shows the GSP satisfactorily answered one of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each **DAC** by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Final Improved**
Are **tribal lands** identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**No Change**
Does the GSP describe the size of the population in each **DAC**?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**No Change**
Does the GSP map minimum well depth, or depth range of **domestic wells**?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**No Change**
Does the GSP map the density of **domestic wells** in the basin?	Not included		Included	**No Change**
Does the GSP identify the water source for **DACs**?	No mention	Only general reference	Explicit identification	**No Change**

RECOMMENDATIONS

- Consult with tribal representatives to identify and map any potential tribal interests within the basin.
- Include a map showing domestic well locations and average well depth across the basin.
- Provide the population of the identified DAC of Casitas Springs. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[9] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not provide a clear summary of the locations of groundwater wells and their screen depths used in the analysis, or description of temporal (seasonal and interannual) variability of the data used to calibrate the model. This information should be provided in the GSP to support the conclusions presented.

Table 3 shows the GSP satisfactorily answered three of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Draft Sufficient**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Draft Sufficient**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Draft Sufficient**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**No Change**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[9] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Describe the legend labels used on Figure 3.2-11 in the GSP text to make clear which stream segments are retained as ISWs or potential ISWs in the GSP.
- Further describe the groundwater elevation data and stream flow data used in the ISW analysis. Ensure depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) are used to determine the range of depth and capture the variability in environmental conditions inherent in California's climate.
- Overlay the stream reaches shown on Figure 3.2-11 with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset".[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.
- Describe data gaps for the ISW analysis in the ISW section, in addition to the discussion in Sections 3.1.4 (Data Gaps and Uncertainty). On Figure 3.2-11, include reaches with data gaps as potential ISWs.

[10] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[11,12] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[13] NC dataset polygons were incorrectly removed based on the assumption that they are supported by the shallow, perched water table. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers,[14] even if the majority of the basin's pumping is occurring in deeper principal aquifers. If there are no data to characterize groundwater conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP. Furthermore, NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields.

Table 4 shows the GSP satisfactorily answered five of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	Includes flora, fauna AND threatened or endangered species	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	GDE map included with best available data	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	Clearly incorporated and described	**No Change**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	No	Unclear	Yes	**No Change**

[11] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[12] Refer to Attachment B for a list of freshwater species located in the basin.

[13] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

[14] "'Principal aquifers' refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." [23 CCR §351(aa)]

Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	Yes	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	No	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	Data gaps described vaguely	Data gaps described clearly	**Draft Sufficient**
In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**Draft Sufficient**

RECOMMENDATIONS

- Refer to The Nature Conservancy's plant rooting depth database.[15] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Provide depth-to-groundwater contour maps, noting best practices.[10] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[16,17]

[15] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[16] Webtool available at: https://igde-work.earthengine.app/view/sage

[17] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[18]

In our review of climate change in the projected water budget, we found that the GSP did incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the GSP did not consider multiple climate scenarios (such as the 2070 wet and 2070 extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is only suggested by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

Table 5 shows the GSP satisfactorily answered five of six questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No		Yes	**No Change**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

[18] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[19,20] Based on our review, we found native vegetation was properly included in the water budget. The GSP response to comments indicates that there are no managed wetlands present in the basin. However, the main GSP text was not changed to indicate this. Table 6 shows the GSP satisfactorily answered the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- State whether or not there are managed wetlands in the basin *within the main text of the GSP*.

[19] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[20] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[21,22,23] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[24]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

> Disadvantaged Communities (DACs)
>
> The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.
>
> Drinking Water Users
>
> The GSP does not provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators. This is particularly concerning given the absence of a drinking water well mitigation plan in the GSP.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[25,26,27] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[21] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[22] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[23] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[24] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[25] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[26] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[27] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators.

Table 7 shows the GSP satisfactorily answered one of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on **domestic drinking wells** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on **DACs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP analyze direct and indirect impacts on **GDEs** when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **drinking water users (e.g., domestic wells, municipal water suppliers)**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on **DACs**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on **GDEs or environmental beneficial users of surface water**?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**Final Worsened**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider **drinking water users** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **DACs** when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider **GDEs** when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

		indicators		

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[28]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Reevaluate the minimum thresholds for impacts to GDEs for the chronic lowering of groundwater level SMC. Set minimum thresholds to levels that avoid 'significant and unreasonable' effects on beneficial users. Potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin. Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29,30]
- Establish preliminary SMC for depletion of interconnected surface water for the Confluence Aquatic Habitat Area, instead of waiting for the five-year GSP update.
- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[31,32]

[28] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[29] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[30] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[31] Webtool available at: https://igde-work.earthengine.app/view/sage

[32] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[33] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur.[12] Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment C) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found gaps in how the GSP identified and reconciled data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered two of four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**Draft Sufficient**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

[33] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Provide maps that overlay monitoring well locations with the locations of DACs and domestic wells to clearly identify potentially impacted areas. Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin for the groundwater quality condition indicator. Prioritize proximity to DACs and drinking water users when identifying new RMSs.

- Further describe the biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[34,35]

[34] Webtool available at: https://igde-work.earthengine.app/view/sage

[35] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the project had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered two of six questions for this criteria. We appreciate that the GSA included additional projects that benefit GDE and aquatic habitats. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**No Change**

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to "Framework for a Drinking Water Well Impact Mitigation Program" for specific recommendations on how to implement a drinking water well mitigation program.[36]

- Include a discussion of whether potential impacts to water quality from projects and management actions could occur, impact drinking water users, and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[37]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[36] Framework for a Drinking Water Well Impact Mitigation Program. Available at: https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/5f3ca9389712b732279e5296/1597811008129/Well_Mitigation_English.pdf

[37] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

April 30, 2022

Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
California Department of Water Resources
Sacramento, California
Submitted via SGMA GSP Portal

Re: Comments on the Big Valley (Lake County) Groundwater Sustainability Plan

Dear Deputy Director Gosselin,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Groundwater Sustainability Plan (GSP) for the Big Valley Basin in Lake County. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of climate change. Our review focuses on how well drinking water users, disadvantaged communities, tribes, environment, stakeholder involvement, and climate change were addressed in the GSP.[1] Collectively, these issues are true indicators of sustainability. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, including domestic well owners, environmental users, surface water users, state and federal government, California Native American tribes, and

[1] Our organizations are non-tribal NGOs that are providing a review of the identification of federally and state recognized tribes (Data source: SGMA Data viewer) or other tribal interests identified within the GSP. We recognize that there are likely tribal interests that we are not able to detect through mapped lands and stated interests in the GSP. The lack of detection of tribal interests in our analysis should not be taken as evidence for a lack of tribal interests in a basin, but rather that our method could not identify tribal interests. We recommended during our review of draft GSPs that the GSA utilize the DWR's "Engagement with Tribal Governments" Guidance Document to comprehensively address these important beneficial users in their GSP.

disadvantaged communities (DACs).[2,3] As stakeholders, we reviewed all the draft and final versions of the 2022 GSPs. We appreciate that some basins have consulted us directly via focus groups, workshops, and working groups. Recognizing that GSPs are complicated and resource intensive to develop, we provided technical and policy relevant feedback on each of the 2022 draft GSPs directly to each GSA with the goal of supporting the improvement of GSPs prior to the submission of the final GSP to the California Department of Water Resources (DWR).

Our organizations evaluated the GSPs based on the following nine criteria:

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Projects and Management Actions

Our reviews did not assess the quality of the data provided in the GSP, but analyzed whether data were provided, what data sources were cited, how information about beneficial users of groundwater were used to develop the plan, and whether or not the GSP included plans to reconcile existing data gaps. In our review of the final GSPs, we have specifically looked to see whether the GSA responded to our comments on the draft GSP and whether corresponding edits were made in the final plan.[4]

Based on our evaluation, we found this plan to be **incomplete,** meaning that we found gaps in how beneficial users were addressed within our nine evaluation criteria. Based on this, we recommend that this plan be found incomplete and the GSA be given up to 180 days to address the missing components.

In general, we found the plan could be improved in the following areas:

- Identification of GDEs
- Identification of ISWs
- Inclusion of native vegetation in the water budget
- Consideration of DACs, drinking water users, and environmental users during the establishment of the sustainable management criteria
- Representative monitoring well locations relative to key beneficial users

We were pleased to find that the plan provided a good example of the incorporation of extreme climate in the projected water budget.

Our specific comments related to the GSP in the Big Valley Basin along with detailed recommendations are provided in **Attachment A.** Please refer to the enclosed list of attachments for additional technical recommendations:

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[2] "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" [Water Code 10723.2]

[3] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (4) Whether the interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have been considered." [23 CCR § 355.4(b)(4)]

[4] "When evaluating whether a Plan is likely to achieve the sustainability goal for the basin, the Department shall consider the following: [...] (10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan." [23 CCR § 355.4(b)(10)]

Attachment A GSP Specific Comments
Attachment B Maps of representative monitoring sites in relation to key beneficial users

The success of SGMA - the sustainable management of groundwater for current and future social, economic, and environmental benefits - depends on the inclusion of *all* beneficial users in the development and implementation of GSPs. The degree to which key beneficial users are included in GSPs is a critical indicator of whether a plan is indeed on the path to sustainability. Sustainably managing our groundwater resources is critical to the long-term resilience of California's communities, economy, and environment.

We appreciate the opportunity to comment and are available to respond to any questions you might have.

Best Regards,

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Attachment A

Specific Comments on the Big Valley (Lake County) Basin Final Groundwater Sustainability Plan

This attachment contains our findings for nine criteria used for the evaluation of the basin's draft and final GSP. Here, each of the nine criteria are separated into separate sections and contain a short description of our evaluation criteria and observations.

1. Stakeholder engagement
2. Identification of DACs, domestic wells, and tribes
3. Identification of interconnected surface waters (ISWs)
4. Identification of groundwater dependent ecosystems (GDEs)
5. Incorporation of climate change in the water budget
6. Inclusion of ecosystems in the water budget
7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria (SMC)
8. Identification and reconciliation of data gaps
9. Identification of potential impacts to beneficial users in the Project and Management Actions

A table containing the original evaluation questions for each of the nine criteria are also included under the corresponding section. Within the table, there are a range of three possible answers based on how well the GSP satisfactorily answered the question. In the last column to the right of the table, we also indicate whether or not we saw improvements from the draft GSP for the corresponding question in the final GSP.

1. Stakeholder engagement

The SGMA statute requires that the GSP Notice and Communication chapter identify how stakeholders were actively engaged in the SGMA process.[5] Stakeholder engagement is critical for the GSAs to fully understand the specific interests and water demands of all beneficial users, and to support the identification and consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. To evaluate this, we used the International Association of Public Participation (IAP2) spectrum of public participation referenced in DWR's "Stakeholder Communication and Engagement" guidance document.[6] To differentiate between engagement processes for various stakeholders, we considered participation activities that fell under the inform, consult, involve, collaborate, or empower categories. A "Yes" score was given to plans where GSAs proactively identified and targeted outreach to stakeholders to invite stakeholder perspectives into the GSP development process, such as through working groups, advisory committees and GSA board seats. While a "Somewhat" score was given to plans where GSAs had public meetings, email notifications list and public comment process. A "No" score was given to plans where the GSAs failed to identify and engage stakeholders.

However, it is important to note here that it is nearly impossible through reading the plans to decipher whether stakeholder voices are being heard and empowered via these processes. To assess actual engagement, local stakeholders would need to be directly consulted to share their feedback, which was not possible for us to assess during our evaluation of the 2022 GSPs. The expectation is that robust stakeholder engagement includes active and targeted outreach to ensure that stakeholder concerns are consistently understood and stakeholder feedback is incorporated in the decision making process. Because our evaluation of stakeholder engagement across the 2022 GSPs is limited to what is presented in the GSP text, it is possible that despite stakeholders being represented on a GSA board or advisory group that stakeholder feedback was not fully considered and incorporated into the GSP. When stakeholders are considered and empowered in the GSP development process, we would expect to see stakeholder interests adequately reflected throughout the plan.

Table 1 provides a list of questions we used to evaluate how stakeholder engagement was documented in the GSP for key stakeholders, such as DACs, tribes, and the environment. The GSP satisfactorily answered all seven questions for this criteria. Recommendations that would further improve the Final GSP are listed below.

Table 1. Questions used to evaluate stakeholder engagement in the GSP.

Does the GSP engage stakeholders?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP document how DAC stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how tribal stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP document how environmental stakeholders were given opportunities to engage in the GSP development process?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to DACs during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**

[5] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[6] California Department of Water Resources. 2018. Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Assistance-and-Engagement/Files/Guidance-Doc-for-GSP---Stakeholder-Communication-and-Engagement.pdf

Does the Stakeholder Communication and Engagement Plan or GSP include outreach to tribes during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the Stakeholder Communication and Engagement Plan or GSP include outreach to environmental stakeholders during GSP implementation?	Little to no mention or details of engagement	Inform OR consult	Involve, collaborate, OR empower	**Draft Sufficient**
Does the GSP include a Stakeholder Communication and Engagement Plan?	Not Included		Included	**Draft Sufficient**

RECOMMENDATIONS

- Continue to utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the basin.[7]

[7] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

2. Identification of DACs, domestic wells, and tribes

The consideration of beneficial uses and users in GSP development is contingent upon adequate identification of *all* beneficial users, including DACs, domestic wells, and tribes.[1,2] Table 2 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

Table 2 shows the GSP satisfactorily answered all six questions for this criteria. We thank the GSA for its comprehensive identification of these beneficial users in the GSP.

Table 2. Questions used to evaluate the identification of DACs, domestic wells, and tribes in the GSP.

Does the GSP identify DACs, domestic wells, and tribes?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP identify each DAC by name and location on a map?	Neither mapped NOR identified by name in text	Mapped OR identified by name in text	Mapped AND identified by name in text	**Draft Sufficient**
Are tribal lands identified and mapped in the basin?	Neither mapped NOR identified in text	Mapped OR identified in text	Mapped AND identified in text	**Draft Sufficient**
Does the GSP describe the size of the population in each DAC?	Not included	Vaguely mentioned or mapped	Explicitly mentioned or mapped	**Draft Sufficient**
Does the GSP map minimum well depth, or depth range of domestic wells?	Neither mapped NOR depth ranges included	Map OR depth ranges included	Map AND depth ranges included	**Draft Sufficient**
Does the GSP map the density of domestic wells in the basin?	Not included		Included	**Draft Sufficient**
Does the GSP identify the water source for DACs?	No mention	Only general reference	Explicit identification	**Draft Sufficient**

3. Identification of interconnected surface waters

SGMA requires that the GSP identify ISWs in the basin, including estimates of the quantity and timing of depletions.[8] Table 3 provides a list of questions we used to evaluate how well ISWs were identified in the GSP. The complete analysis of ISWs requires mapping of gaining and losing reaches and assessing the temporal variability in stream depletions to account for the inherent variability within California's Mediterranean climate. Since this relies upon seasonal and multiple water years of data, the GSP should discuss the spatial and temporal gaps in data needed to adequately characterize the interaction between groundwater and surface water within the basin. In the absence of data, the GSP should not exclude any segments with data gaps from the ISW map and instead consider and map them explicitly as potential ISWs until data gaps are reconciled. The absence of evidence is not the evidence of absence.

In our review of the identification of interconnected surface waters, we found that the GSP did not map areas of data gaps as potential ISWs. The GSP could be further improved by presenting depth-to-groundwater contour maps that correct for land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape.

Table 3 shows the GSP satisfactorily answered four of five questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 3. Questions used to evaluate the identification of ISWs in the GSP.

Does the GSP identify interconnected surface water (ISW)?	No	Somewhat	Yes	Draft vs. Final GSP
Are gaining and losing reaches adequately assessed spatially and temporally?	No ISW map	ISW map with single water year data; unclear methods	ISW map with multiple water year data; clear methods	**Final Improved**
Are the conclusions of ISWs consistent with the assessment?	Vague and contradictory with analysis OR No evidence to support conclusion.	Lacking some detail and evidence	Coherent with analysis and available data	**Final Improved**
Are all shallow principal aquifers acknowledged in defining ISW?	Not acknowledged	Not explicitly or adequately acknowledged	Acknowledged	**Final Improved**
Were data gaps identified when mapping ISWs?	Not identified	Vague description	Clear identification	**Draft Sufficient**
In the case of data gaps and uncertainty, were streams mapped and described as potential ISWs in the GSP?	Not described NOR mapped	Vague description OR no map	Clearly described AND mapped temporarily and spatially	**No Change**

[8] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [...] (f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(f)]

RECOMMENDATIONS

- Overlay the basin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.

- For the depth-to-groundwater contour maps, use the best practices presented in The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset."[9] Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

- Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP. Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

[9] The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset." Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_NCdataset_BestPracticesGuide_2019.pdf

4. Identification of groundwater dependent ecosystems

SGMA requires that GDEs be identified in the GSP.[10] Table 4 provides a list of questions we used to evaluate how these beneficial users were identified in the GSP. These elements are critical for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support their consideration in the development of sustainable management criteria and selection of projects and management actions.

In our review of the identification of GDEs, we found that the GSP improperly disregarded some mapped features in the NC dataset.[11] NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields or due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal or spatial scales. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to surface water supplies.

Table 4 shows the GSP satisfactorily answered four of eight questions for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 4. Questions used to evaluate the identification of GDEs in the GSP.

Does the GSP identify groundwater dependent ecosystems (GDEs)?	No	Somewhat	Yes	Draft vs. Final GSP
Is there an inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species or habitat types in the basin's GDEs? Please indicate in the notes if threatened and endangered species are identified in the GSP.	No description of flora NOR fauna in GDEs	Some details lacking on flora, fauna OR threatened or endangered species	**Includes flora, fauna AND threatened or endangered species**	**Draft Sufficient**
Were GDEs in the basin identified (mapped) and described in the GSP using best available data (e.g., NC dataset, localized VegMap data)?	No GDE map	GDE map provided, but based on unclear or incorrect data/methods	**GDE map included with best available data**	**Draft Sufficient**
Was depth-to-groundwater data from the underlying principal aquifer used to verify the NC dataset?	Not incorporated	Incorporated, but unclear spatial or temporal data	**Clearly incorporated and described**	**Draft Sufficient**
Did the GSP avoid using any of the following criteria when deciding whether or not to remove NC dataset polygons from the final GDE map: 1) presence of surface water, 2) distance from agricultural fields, 3) shallow principal aquifer was not considered main pumping aquifer, 4) groundwater connection only some percentage of the time, 5) other?	**No**	Unclear	Yes	**No Change**
Were multiple water year types (e.g., wet, average, dry) of groundwater level data used to characterize groundwater conditions in the GDEs?	No	Unclear	**Yes**	**Draft Sufficient**
Were depth-to-groundwater measurements under GDEs corrected for land surface elevations?	**No**	Unclear	Yes	**No Change**
Were data gaps identified when mapping GDEs?	Data gaps not identified	**Data gaps described vaguely**	Data gaps described clearly	**No Change**

[10] "Each plan shall provide a description of current and historic groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes [... (g)] Identification of GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information." [23 CCR § 354.16(g)]

[11] Department of Water Resources. 2018. Natural Communities Commonly Associated with Groundwater dataset (NC Dataset). Available at: https://gis.water.ca.gov/app/NCDatasetViewer/.

In the case of data gaps and uncertainty, were potential GDEs mapped and described in the GSP?	Not mapped NOR described	No map OR vague description	Clearly mapped AND described	**No Change**

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that are adjacent to irrigated fields or surface water supplies. Refer to best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.[9]
- Refer to The Nature Conservancy's plant rooting depth database.[12] Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used if these species are present in the basin. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons are connected to groundwater.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- For more information on shallow groundwater conditions in the basin, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater and determine groundwater level trends for every polygon within the NC Dataset.[13,14]

[12] The Nature Conservancy's plant rooting depth database. Available at: https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

[13] Webtool available at: https://igde-work.earthengine.app/view/sage

[14] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

5. Incorporation of climate change in the water budget

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15]

In our review of climate change in the projected water budget, we found that the GSP did not clearly indicate how it addressed imported water, which is currently included in the "Non-Routed Delivery" column, in the water budget tables.

Table 5 shows the GSP satisfactorily answered five of six questions for this criteria. We appreciate the GSA for incorporating an extreme climate scenario using RCP 8.5 in the projected water budget. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 5. Questions used to evaluate whether the GSP accounted for climate change.

Does the GSP account for climate change in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP incorporate climate change into the projected water budget using DWR change factors or other source?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP consider multiple climate scenarios (e.g., the 2070 wet and 2070 extremely dry) scenarios in the projected water budget?	No		Yes	**Draft Sufficient**
Does the GSP incorporate climate change into precipitation inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into evapotranspiration inputs for the projected water budget?	No	Unclear	Yes	**Draft Sufficient**
Does the GSP incorporate climate change into surface water flow inputs (e.g., imported water, streamflow) for the projected water budget?	No	Unclear	Yes	**No Change**
Does the GSP incorporate climate change into sea level inputs for the projected water budget?	No	Unclear	Yes	**Not Applicable**
Does the GSP calculate a sustainable yield based on the projected water budget with climate change incorporated?	No		Yes	**Draft Sufficient**

RECOMMENDATIONS

- Include imported water, which is currently included in the "Non-Routed Delivery" column, as its own line item in the water budget tables.
- Incorporate climate change scenarios into projects and management actions.

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

6. Inclusion of ecosystems in the water budget

Native vegetation and managed wetlands are water use sectors that are required to be included into the water budget.[16,17] Based on our review, we found native vegetation was improperly omitted in the water budget. The Final GSP was updated to state that there are no managed wetlands within the basin.

Table 6 shows the GSP did not satisfactorily answer the only relevant question for this criteria. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 6. Questions used to evaluate whether the GSP accounted for ecosystems in the water budget.

Does the GSP account for ecosystems in the water budget?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include water demands for **native vegetation** in the historic, current, and projected water budgets?	No	Vague description	Yes	**No Change**
Does the GSP include water demands for **managed wetlands** in the historic, current, and projected water budgets?	No	Vague description	Yes	**Not Applicable**

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.

[16] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[17] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

7. Consideration of impacts to DACs, drinking water users, and environmental users in the sustainable management criteria?

The consideration of potential impacts on *all* beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[18,19,20] Table 7 provides a list of questions we used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP. Adequate consideration of potential impacts on these beneficial users is contingent upon adequate identification and engagement of the appropriate stakeholders, and is essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.[21]

SGMA requires that the sustainable management criteria be consistent with the Human Right to Water policy and avoid significant and unreasonable impacts on drinking water users. The GSP should describe direct and indirect impacts on DACs and drinking water users when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels and degraded water quality.

Disadvantaged Communities (DACs)

The GSP does not provide an analysis of the direct or indirect impacts on DACs when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation nor water quality sustainability indicators.

Drinking Water Users

The GSP does provide an analysis of the direct or indirect impacts on drinking water users when defining undesirable results. While the GSP provides an analysis of the impacts of the proposed minimum thresholds for the groundwater elevation sustainability indicators, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the water quality sustainability indicator.

SGMA specifically requires that GSPs include “impacts on groundwater dependent ecosystems” and to assess whether surface water depletions caused by groundwater use are having an adverse impact on beneficial users of surface water and groundwater.[22,23,24] The GSP should describe direct and indirect impacts on GDEs and instream habitats within ISWs when defining undesirable results and minimum thresholds for chronic lowering of groundwater levels, degraded water quality, and depletion of interconnected surface water.

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[18] “The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.” [23 CCR §354.26(b)(3)]

[19] “The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[20] “The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference.” [23 CCR §354.28(b)(5)]

[21] “The Department shall consider the state policy regarding the human right to water when implementing these regulations.” [23 CCR §350.4(g)]

[22] “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.” [23 CCR §354.28(c)(6)]

[23] “The description of minimum thresholds shall include the following: [...] (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.” [23 CCR §354.28(b)(4)]

[24] Water Code §10727.4(l)

Environmental Users

The GSP does not provide an analysis of the direct or indirect impacts on GDEs and environmental beneficial users of surface water when defining undesirable results. In addition, the GSP does not provide an analysis of the impacts of the proposed minimum thresholds nor measurable objectives for the groundwater elevation, water quality, nor depletion of surface water sustainability indicators. This is particularly concerning since the GSP has acknowledged depletions of interconnected surface waters, which may compromise spawning and migration for Clear Lake hitch (*Lavinia exilicauda chi*)[25] - a threatened species under the California Endangered Species Act and culturally important to the Xa-Ben-Na-Po Band of Pomo people.

Table 7 shows the GSP satisfactorily answered two of eleven questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 7. Questions used to evaluate the consideration of DACs, drinking water users, and environmental users in the sustainable management criteria of the GSP.

Does the GSP consider impacts to DACs, drinking water users, and GDEs in the sustainable management criteria?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP analyze direct or indirect impacts on domestic drinking wells when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on DACs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**Final Improved**
Does the GSP analyze direct and indirect impacts on GDEs when defining Undesirable Results?	No mention	Mentioned, but not well analyzed	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on drinking water users (e.g., domestic wells, municipal water suppliers)?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP evaluate the cumulative or indirect impacts of proposed groundwater elevation and water quality minimum thresholds on DACs?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**Final Improved**
Does the GSP evaluate the cumulative or indirect impacts of proposed minimum thresholds for groundwater elevations and ISW on GDEs or environmental beneficial users of surface water?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP establish Water Quality minimum thresholds and measurable objectives for the identified constituents/contaminants identified in the plan area?	No	Only for some constituents of concern	Yes	**No Change**
Are Water Quality minimum thresholds based on or within the Maximum Contaminant levels (MCLs)?	No	Only for some constituents of concern	Yes	**Draft Sufficient**
Does the GSP consider drinking water users when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability	Analyzed and described	**No Change**

[25] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

		indicators		
Does the GSP consider DACs when establishing water quality and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**
Does the GSP consider GDEs when establishing ISW and groundwater elevation measurable objectives?	No mention	Mentioned, but not well analyzed for all relevant sustainability indicators	Analyzed and described	**No Change**

RECOMMENDATIONS

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.
- Consider minimum threshold exceedances for single representative monitoring site (RMS) wells when defining the groundwater level undesirable result across the basin, instead of exceedances at two out of six RMS wells.
- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality.[26] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[27]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.
- Set minimum thresholds and measurable objectives for all water quality constituents within the basin that are impacted or exacerbated by groundwater use and/or management.
- Evaluate impacts on GDEs when establishing SMC for chronic lowering of groundwater levels. When defining undesirable results, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be

[26] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[27] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

considered when defining undesirable results in the basin.[28] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[29]

- Work with local tribal representatives to ensure Sustainable Management Criteria consider and protect the Clear Lake hitch from depletions of surface water.

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the basin are reached.[30] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[18,31]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- To identify beneficial users in the basin that may be at risk to groundwater level declines, refer to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[32,33]

[28] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[29] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[30] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[31] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[32] Webtool available at: https://igde-work.earthengine.app/view/sage

[33] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

8. Identification and reconciliation of data gaps

Adaptive Management is at the core of SGMA. SGMA also requires that impacts to beneficial uses or users of groundwater be monitored.[34] Beneficial users may remain unprotected by the GSP without adequate monitoring. When data gaps are not identified, particularly in shallow aquifers, impacts disproportionately threaten GDEs, aquatic habitats, and shallow domestic well water users. In addition to monitoring wells, biological monitoring is an important component to ensure impacts to GDEs do not occur. Table 8 provides a list of questions we used to evaluate whether the GSP identified data gaps in the monitoring network and made plans to reconcile them. In many cases, GSPs did not provide adequate mapping to clearly convey whether current and proposed monitoring well locations sufficiently monitored groundwater conditions for key beneficial users. For this reason, we created a set of maps (provided in Attachment B) that we included in the draft GSP comment letters to help us evaluate the questions in Table 8.

In our review, we found that the GSP did not identify and reconcile data gaps for some beneficial users in the basin. Table 8 shows the GSP satisfactorily answered none of the four questions for this criteria. Recommendations from our Draft GSP comment letter that have not been fully addressed in the Final GSP are listed below.

Table 8. Questions used to evaluate whether the GSP identified data gaps and made plans to reconcile them.

Does the GSP identify and reconcile data gaps?	No	Somewhat	Yes	Draft vs. Final GSP
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent water quality conditions around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites)?	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Do the Representative Monitoring Sites (RMS) in the monitoring network adequately represent shallow groundwater elevations around DACs, domestic wells, tribes, and GDEs (in the case of data gaps, evaluate proposed monitoring sites).	Not present within DAC, domestic well, tribal areas, NOR GDEs.	Not adequately cover DAC, domestic well, tribal areas, OR GDEs.	Adequately distributed (<1 mi) across DAC, domestic well, tribal areas, AND GDEs.	**No Change**
Does the GSP include a plan to identify and fill shallow monitoring well data gaps around GDEs and ISWs in the monitoring network?	No	Vague description	Yes	**No Change**
Does the GSP include any plans to incorporate GDE-related biological monitoring into the monitoring network?	No	Vague description	Yes	**No Change**

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas. Include a shallow well in the southeast grid of the basin to monitor impacts to beneficial users.
- Increase the number of representative monitoring sites (RMSs) in the shallow aquifer across the basin as needed to map ISWs and adequately monitor all groundwater condition indicators across the basin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.

[34] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.

- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin.

- Prioritize the installation of new wells around beneficial uses most susceptible to groundwater decline by referring to The Nature Conservancy's new tool, "SAGE: Shallow Groundwater Estimation Tool", which uses machine learning and 35 years of satellite data to predict depth to groundwater for each polygon within the NC Dataset.[35,36]

[35] Webtool available at: https://igde-work.earthengine.app/view/sage

[36] Rohde, M.M., T. Biswas, I.W. Housman, L.S. Campbell, K.R. Klausmeyer, J.K. Howard. 2021. A machine learning approach to predict groundwater levels in California reveals ecosystems at risk. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.784499. Available at: https://www.frontiersin.org/articles/10.3389/feart.2021.784499/full

9. Identification of potential impacts to beneficial users in the Project and Management Actions

Project and Management Actions are essential for ensuring the basin stays within or achieves its sustainable yield and avoids undesirable results for *all* beneficial users in the basin. Therefore, it is important that the GSP identifies benefits or impacts of project and management actions to key beneficial users. Table 9 provides a list of questions we used to evaluate whether benefits and potential impacts to beneficial users were identified in the GSP's Project and Management Actions. While not all projects and management actions are applicable to every basin, the GSP should include benefits and evaluate impacts to vulnerable beneficial users in all planned projects and management actions, and include a drinking water well mitigation program to protect drinking water. We assessed whether or not the projects had specific plans (such as a timeline and funding) in place during the GSP planning horizon, or whether it was described as a potential future project.

Table 9 shows the GSP satisfactorily answered four of six questions for this criteria. We appreciate the GSA for further describing specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Recommendations from our Draft GSP comment letter that have not been addressed in the Final GSP are listed below.

Table 9. Questions used to evaluate whether potential impacts to beneficial users were identified in the GSP's Project and Management Actions.

Does the GSP identify potential impacts to beneficial users in the Project and Management Actions?	No	Somewhat	Yes	Draft vs. Final GSP
Does the GSP include any recharge projects with explicit benefits to the **environment**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include any habitat or stream restoration or invasive species removal projects (e.g., to improve water supply in the basin or **GDE** habitats)?	No	Vague description or listed as potential project	Yes	**Draft Sufficient**
Does the GSP identify benefits or impacts of identified projects and management actions to key beneficial users such as **GDEs**, **drinking water users**, **tribes, DACs**?	No	Vague description	Yes	**Draft Sufficient**
Does the GSP include any recharge projects with explicit benefits to **DACs**?	No	Vague description or listed as potential project	Yes	**No Change**
Does the GSP include a drinking water well mitigation program to avoid significant and unreasonable loss of **drinking water**?	No	Vague description or listed as potential project	Yes	**Final Improved**
Does the GSP identify potential impacts to water quality from Projects and Management Actions?	No	Vague description or listed as potential project	Yes	**Final Improved**

RECOMMENDATIONS

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.