

STRATEGY 6

Include consideration of GDEs in permitting, guidance and large-scale planning documents to identify and prioritize areas for protection and management of GDEs

Why this strategy is needed

Groundwater-dependent plant communities cover at least 10% of Nevada, and many of Nevada's endemic species rely on GDEs (Saito et al. 2020). Nevada has >25,000 documented springs, and most of its rivers, streams and lakes are groundwater-dependent (Saito et al. 2020), with almost 90% of springs and >70% of rivers and streams in areas unguulates are expected to access (Saito et al. 2022a). Furthermore, all of Nevada is projected to be more droughty in the future, so all of Nevada's GDEs are likely to encounter less water availability from precipitation in future decades (Saito et al. 2022a), increasing the importance of groundwater as a buffer for less reliable surface water. Protection tools like conservation easements and land acquisitions should consider groundwatersheds (i.e., contributing areas of shallow local groundwater flow to a protected area or feature of interest) because human actions in these areas can impact distribution, availability or quality of groundwater for GDEs (Huggins et al. 2023). To prioritize effective GDE conservation, management perspectives are needed that consider conserving ecosystem function while reducing stresses on species such as non-native species and habitat loss (Lawler 2009; Mawdsley et al. 2009). Adaptive management should balance multiple uses (e.g., mining, geothermal, and solar) while conserving GDEs. Land management blueprints like the BLM's Resource Management Plans establish goals and objectives to guide land resource management actions (Federal Register 2016) and can incorporate consideration of GDEs during the planning assessment phase (50 CFR 1610.4; Smyth 2014). Permits and guidance documents for more localized applications of management and protection can include direction for incorporating best management practices and restoration approaches that improve GDE resiliency to disturbances.

Examples of actions associated with this strategy

- Incorporate a [Smart-from-the-Start approach](#) to managing GDEs facing pressures from renewable energy development, mining, water use, and urbanization
- Include [Nevada iGDE database](#) in BLM GIS layers and GIS layers used by field- and state-level staff engaged in planning projects
- Use the Nevada iGDE database to prioritize management and conservation of GDEs (e.g., land acquisition, easements, land exchanges, permitting, travel management, etc.)
- Prepare programmatic environmental impact statements/assessments (EISs/EAs) to specify actions that can conserve or improve resiliency for GDEs
- Incorporate best management practices (e.g., for grazing, non-native species, etc.) in permit issuances and renewals that help sustain GDEs

- Prepare guidance for design criteria to sustain or minimize impacts to GDEs

Challenges and considerations

Plans provide important guidance but are not compulsory. Staffing and funding to prepare guidance and planning documents are needed, and permitting staff need to be aware of approaches for reducing impacts to GDEs and mapping resources on GDEs. Adding another thing to consider in planning documents could make the approval process more difficult, which might not be popular. Adaptive management would likely be appropriate in updated permits, guidance, and plans, but can require substantial coordination between stakeholders on an ongoing basis and challenging commitments to long-term monitoring. Successful implementation of other strategies could help management approaches be more effective at protecting GDEs: policy changes could strengthen consideration of GDEs in planning; increased monitoring and science could inform management and adaptive approaches; education and outreach could help decision makers and permitting and field staff be aware of this strategy. A broader Programmatic EIS focused on GDEs would be a valuable way to look at cumulative impacts to GDEs from a variety of land uses. We note that the iGDE database is best as a guiding document; additional work to better describe specific recommendations for certain GDEs is needed.

Qualitative assessment of the effectiveness of Strategy 6's ability to reduce the impacts of each GDE stressor and threat.

STRESSOR RISK	EFFECTIVENESS
S1: Groundwater pumping status	<i>Somewhat Likely</i>
S2: Declining groundwater level trends	<i>Somewhat Likely</i>
S3: Current climate	
S4: Ungulate impacts	<i>Highly Likely</i>
S5: Non-native species presence	<i>Somewhat Likely</i>
S6: Surface diversions	<i>Somewhat Likely</i>
S7: Urbanization	
THREAT RISK	EFFECTIVENESS
T1: Appropriation status	<i>Highly Likely</i>
T2: Potential withdrawal proximity to GDEs	<i>Highly Likely</i>
T3: Future climate	<i>Somewhat Likely</i>
T4: Non-native species spread	<i>Highly Likely</i>
T5: Future urbanization	<i>Highly Likely</i>