

# Conserving Groundwater Dependent Ecosystems

Providing resources to managers to help design place-based solutions to conserve Nevada's groundwater dependent ecosystems.

## The importance of groundwater

Though it's largely out of sight, groundwater is critical for biodiversity, providing drinking water, growing food and other needs for a healthy planet. Nearly one-third of all freshwater on the planet is groundwater, with most of the rest in glaciers and ice caps.

## Statewide mapping of stressors and threats

In consultation with managers and scientists, we identified five themes of stressors and threats to Nevada's groundwater dependent ecosystems (GDEs):

1. groundwater withdrawals
2. climate
3. ungulates
4. non-native species
5. additional impacts due to human development

Each theme had associated stressor and threat risk factors, with each risk factor rated on a scale of 0.0 (lowest risk) to 1.0 (high risk).

We developed maps for each of these risks using the best available state-wide data to help managers and interested parties both understand where GDEs were most at risk and design management interventions that might be helpful (forthcoming; not included here).

This assessment does not replace the need for field surveys or focused local and regional studies to understand and assess impacts.

## Groundwater dependent ecosystems (GDEs): Why we care



There are at least **25,000 springs** in Nevada, and probably more! Springs support many species that exist nowhere else in the world, like the Devils Hole pupfish.

**Wetlands cover more than 2.9 million acres in Nevada.** Wet meadows are wetland types that are important for sage-grouse chick rearing.



**Phreatophytes** (plant communities that draw groundwater through their roots) make up more than 5.3 million acres of the Silver State. **Black greasewood** is

naturally fire resistant and is by far the most extensive GDE in Nevada, covering an area more than twice the size of Rhode Island. **Nevada's iconic aspen stands** create spectacular fall colors and provide important habitat for mule deer and are also in this category.

There are nearly **1.5 million acres of GDE lakes and playas** in Nevada. Lakes and playas are important stopovers for migrating shorebirds, including the snowy plover.



**12,000 miles of GDE rivers and streams** are in Nevada. These rivers and streams support critical riparian areas and many aquatic organisms.

# GDE Stressors and Threats

## Groundwater withdrawals



### Issues

Groundwater withdrawals can lead to declining groundwater levels that can reduce flow to springs, rivers and lakes.

Declining groundwater levels can also detach water from vegetation.

Reduced access to water harms native plants and animals.

### Key Takeaways

**39% of wells** analyzed had significantly falling groundwater level trends.

More than 70% of wetlands, phreatophyte communities, and lakes and playas are at high risk for potential groundwater withdrawals.

## Climate



### Issues

Climate affects evapotranspiration and recharge, which changes the availability of groundwater to GDEs.

GDEs provide ecological stability if they are resilient to climate.

### Key Takeaways

**>10,000 springs and >3,700 miles of rivers and streams** are at high risk for climate stresses.

In the future, **all of Nevada** is projected to have more "droughty" conditions, which means that all Nevada GDEs will have less water available from the atmosphere in the future. GDEs in southern Nevada are at especially high risk.

## Ungulates



### Issues

Overuse by ungulates (cattle, sheep, horses, burros and elk) can change vegetation, bank stability, water temperature and water quality.

### Key Takeaway

While good management of ungulate use can be compatible with sustainable GDEs, the assessment shows that almost **90% of springs** and more than **70% of rivers and streams** are in these areas.

## Non-native species



### Issues

Invasive aquatic species can displace natural species and affect natural foodwebs.

Non-native plants can affect the local water balance as well as soil, nutrient, and light dynamics.

Introductions of non-native species can be human-caused by being stuck on surfaces like boots, shoes and boats, or they are released intentionally.

### Key Takeaway

**More than 60% of lakes and playas** are at high risk from the presence of non-native species.

## Other human development



### Issues

Urbanization can disturb GDEs, cover up areas that would naturally provide recharge for groundwater and alter local air temperature patterns.

Surface water diversions at springs, rivers and streams alter interactions between surface water and groundwater. This reduces water availability to springsnails, native fish and amphibians.

### Key Takeaways

**More than 60% of phreatophyte communities** and groundwater-dependent lakes and playas are at high risk for the surface water points of diversion stressor risk factor.

**Over 100,000 acres of lakes and playas** are at moderate to high risk because of relatively high housing density.

**What's next: We will use these data to work with stakeholders to consider strategies for managing or restoring Nevada's groundwater dependent ecosystems.**

### Resources

1. Report available at <https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/nevada/water/Pages/database-collaboration.aspx>. 2. Data available at <https://heritage.nv.gov/programs/wetland-program>. 3. Water level trend tool: <https://arcg.is/1eCXLO>.