USGS
science for a changing world

Biological and Ecological Science for *Nevada* "The Silver State"

Nevada is rich in minerals, energy, rangelands, mountains, deserts, lakes, fish, and wildlife. Many enterprises critical to Nevada's economy are based on natural resources including solar energy, livestock production, hunting, fishing, and other outdoor recreation. Nevada is a national leader in both geothermal and solar utility-scale energy production, and invested more than $1.2 million in 2016 in solar energy development alone. Agriculture, primarily livestock production, generates more than half a billion dollars annually, and wildlife watching, hunting, and fishing contribute more than $1 billion to Nevada's economy annually.

The USGS developed methods for monitoring bird and bat fatalities specifically tailored for utility-scale solar facilities. Managers and facility operators use these methods to more accurately monitor effects to wildlife. A USGS wireless sensor network is helping identify corridors that desert tortoises use to travel among energy infrastructure.

A Renewable Energy Powerhouse

Nevada has abundant geothermal, solar, and wind resources, and is striving to become the Nation's leading renewable energy producer. The USGS is helping Nevada toward this goal by providing information about the biological needs, behavior, and movements of wildlife in relation to energy facilities and infrastructure. Energy developers and managers use this science to maximize renewable energy production while minimizing effects to Great Basin and Mojave Desert wildlife.

The Greater Sage-Grouse: Bellwether of the Sagebrush Steppe

The greater sage-grouse draws bird watchers and hunters to Nevada's sagebrush lands and serves as an ecological sentinel for the sagebrush steppe ecosystem, an iconic western landscape vulnerable to invasive grasses and wildfire. The USGS developed a population and habitat monitoring approach that measures the effectiveness of sage-grouse conservation measures and provides an early warning for population declines. The USGS also is improving the quality of sage-grouse habitat maps. These tools help managers determine where to site development, where to focus habitat restoration actions, and if conservation efforts are effective. This information helps Nevada manage sagebrush steppe for the benefit of greater sage-grouse, and for ranchers and other landowners that rely on healthy sagebrush.

The greater sage-grouse is the largest grouse in North America. In 2015, USGS research was used to determine that Federal protections were not needed. Now, USGS science is informing sage-grouse and sagebrush steppe management aimed at sustaining these natural resources for future generations.

The USGS Ecosystems Mission Area

The U.S. Geological Survey (USGS) Ecosystems Mission Area, the biological research arm of the Department of the Interior, provides science to help Nevada achieve sustainable management and conservation of its biological resources and the ecosystems that sustain these resources. This work is done within the broader mission of the USGS—to serve the Nation with science that advances understanding of our natural resources, informs land and water stewardship, and helps safeguard communities from natural and environmental hazards.

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Mountain lions were initially suspected of being the most important factor in population declines of bighorn sheep in the aptly named Sheep Range mountains. Collaborative research by the USGS and Nevada scientists showed that disease may play a more important role.

Restoring a Cultural Legacy: Nevada's Bighorn Sheep

From its earliest human inhabitants to today, bighorn sheep have been an integral part of Nevada's subsistence, culture, and identity. Because of various pressures and environmental changes, fewer than 3,000 bighorn sheep persisted in Nevada by 1970. Nevada embarked on a multi-faceted effort to restore bighorn populations, which are now estimated to number 11,700. USGS scientists are working with Nevada and others to understand predator-prey interactions with mountain lions, and the role of deadly pneumonia outbreaks in past and present declines in bighorn sheep populations.

Non-native Quagga mussels affect water-based recreation and pose a serious threat to the lake ecosystem and water intake system at Lake Mead. Nevada is using USGS science to prevent spread of these invaders to Lake Tahoe and other waters.

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Cheatgrass, a non-native invasive plant, is often called "grassoline" because of its role in the growing size, frequency, and intensity of fires in the Great Basin. The USGS is studying novel techniques to control cheatgrass that include soil bacteria and targeted grazing.

Combatting Unwanted Invaders

Cheatgrass and other non-native invasive grasses displace sagebrush plants important for grazing and wildlife, and is so flammable it creates large and frequent fires. Traditional weed control practices have had limited success, and can sometimes result in cheatgrass spreading more vigorously. USGS scientists studied why different control methods have different outcomes to help managers select treatments most likely to succeed at their specific location and site conditions. USGS is also testing a weed-suppressive bacteria that shows some promise for landscape-scale control and restoration of the Great Basin's sagebrush.

Recovering from Wildfire

Fire is a natural feature of Nevada's sagebrush landscape, but invasive non-native plants, such as cheatgrass, have changed fire fuels, resulting in more frequent and catastrophic fires. Invasive non-native plants often colonize burned areas before native plants can become established, thereby fueling an escalating cycle of fire and invasion of non-native plants. Working with Nevada, the USGS developed tools to help break the invasion-fire cycle. These tools help managers decide which habitat areas to prioritize for fire protection and which burned areas to prioritize for restoration. This research is synthesized in a handbook that Nevada's land managers use to restore habitats for species like sage-grouse, mule deer, and antelope, as well as for the ranchers and cattle that rely on sagebrush systems.

In 2016 alone, Nevada experienced more than 460 wildfires that burned more than 265,000 acres. USGS works with State and other scientists to develop techniques for rehabilitating burned areas.

Containing the Threat of Invasive Mussels

Quagga mussels have invaded Lake Mead and now pose a threat to Lake Tahoe and other lakes and rivers in Nevada. These invaders can have negative repercussions for drinking-water supplies, recreation, and native species. Overland transportation on boating and fishing equipment is the most likely means by which Quagga mussels could be introduced to Lake Tahoe and other Nevada waters. Consequently, public education is critical to preventing the spread of this damaging non-native species. The USGS Nonindigenous Aquatic Species Program provides scientific reports, distribution maps, and general information used by Nevada biologists and their partners to develop monitoring and surveillance programs, and to educate boaters, anglers, and others recreating on Nevada's lakes and rivers.

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For more information: Ecosystems Mission Area
http://www.usgs.gov/ecosystems/
http://www.usgs.gov/ask/
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