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Biological Science in the Great Basin

The Great Basin is an expanse of desert and high mountains situated between the Rocky Mountains and the Sierra Nevada of the western United States. The most explicit description of the Great Basin is that area in the West where surface waters drain inland. In other words, the Great Basin is comprised of many separate drainage areas – each with no outlet. What at first glance may appear as only a barren landscape, the Great Basin upon closer inspection reveals island mountains, sagebrush seas, and intermittent aquatic habitats, all teeming with an incredible number and variety of plants and animals. Biologists at the USGS are studying many different species and ecosystems in the Great Basin in order to provide information about this landscape for policy and land-management decision-making. The following stories represent a few of the many projects the USGS is conducting in the Great Basin.

Range-Wide Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats

Declining numbers of greater sage-grouse over the past three decades across most of their range, accompanied by increasing habitat degradation and loss, represent major conservation and management challenges. Eight petitions have been filed for listing of the greater sage-grouse under the Endangered Species Act since 1999. The USGS partnered with western state wildlife agencies to produce a Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats to unravel the complex group of factors contributing to sage grouse declines across the species' range. Agencies, private organizations, and landowners throughout the west can now use this assessment to understand which factors are detrimental to sage-grouse in their local area, state, or region. The assessment provides the best scientific information to date and was one of the primary tools used for status determination by the U.S. Fish and Wildlife Service. The document is also currently being used as a framework to develop conservation strategies throughout the West. The results of the assessment and a host of other pertinent information (maps, tables, figures, and documents) are available on the internet portal called SageMap (http://sagemap.wr.usgs.gov), which has been particularly successful in providing information about sage grouse and their habitats since its inception in 2001. At a more local level, USGS scientists in California are studying the habitat use and migratory patterns of an isolated greater sage-grouse population in Mono County. Information gathered will be incorporated into a species conservation plan to help improve population management and guide future land-use decisions in this region.

Biological Science Capabilities

- *Aquatic and riparian ecology*
- *Contaminants*
- *Fire ecology*
- *Invasive species*
- *Landscape ecology*
- *Migratory birds*
- *Rangeland ecology*
- *Restoration*
- *Wetland ecology*
- *Wildlife biology*

Rangeland Health Assessments

On a bright day with patchy clouds in the sky, 30 participants from federal agencies, non-profit organizations, and private industry gather in eastern Oregon to participate in a rangeland health training session offered jointly by the USGS and the Bureau of Land Management. Rangelands are natural ecosystems where the native vegetation consists predominantly of shrubs,

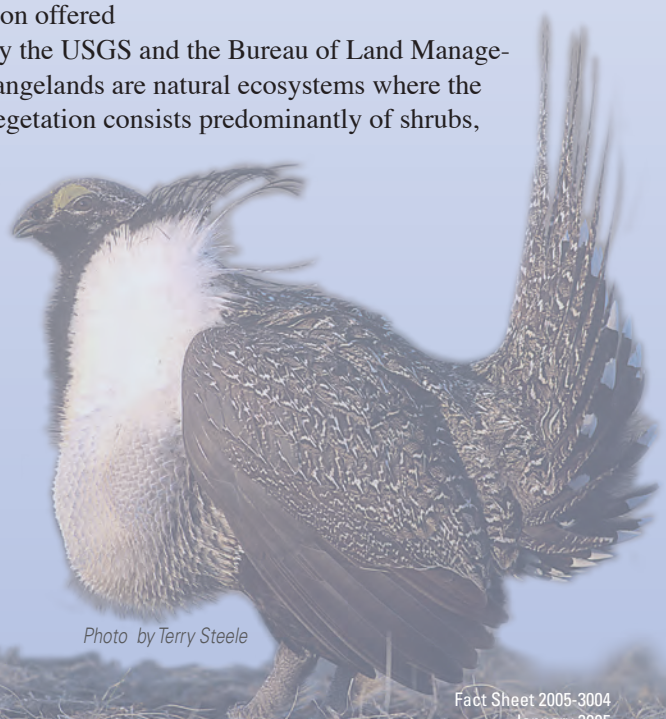

Photo by Terry Steele

grasses, and herbaceous plants. Landowners, land managers, and extension specialists must assess the health of rangelands in order to know where to focus management efforts. In a collaborative effort, the USGS, Bureau of Land Management, U.S. Department of Agriculture (USDA) Agricultural Research Service, and USDA Natural Resources Conservation Service have jointly developed a system in which 17 indicators are used to gauge three attributes of rangeland health. A qualitative, observational procedure provides an assessment of the functional status of these indicators. This quick technique helps interpret rangeland health by providing an understanding about each attribute.

Restoring Cheated Shrublands

As the sun sets over eastern Oregon and southwestern Idaho, hot air from a shadeless day lingers over the expansive grassland. A vast landscape once covered by native shrubs, grasses, and herbaceous plants is now largely a monoculture of an exotic and invasive annual grass called cheatgrass. Cheatgrass has invaded and "cheated" native plants out of essential water and nutrients. It has created fuel loads that perpetuate fires on a nearly annual basis, threatening human communities, wildlife, and traditional ranching practices. USGS scientists are investigating techniques for removing cheatgrass and restoring native shrub and grass species in an effort to preserve the valuable lands that so many people, plants, and animals call home.

Imperiled Fishes Grace Sacred Waters

Pyramid Lake holds special traditional and cultural values to the Northern Paiute Indians of Nevada. The endangered cui-ui, a favorite fish of the Northern Paiutes, is endemic to Pyramid Lake. Although affected by past practices and changing environmental conditions, unlike the Lahontan cutthroat trout that became locally extinct in Pyramid Lake during the 1940s, cui-ui can live upwards of 50 years, and this incredible longevity has allowed the species to survive. USGS scientists involved in species recovery planning have deciphered the cui-ui's complex life cycle and migrational pattern to assist managers in their attempts to link critical lake and river habitats to conserve the species. Current USGS studies are focused on improving stream flows and nursery conditions for young cui-ui's in order to preserve the species and its subsistence role in Native American lifestyles.

Contaminants Impacting Wildlife in the Great Basin

Mining is important in many portions of the Great Basin, and wildlife may be adversely affected by either present mining operations or wastes associated with historic mining. Perhaps the most serious historic mining contamination in the Great Basin is associated with the Comstock Lode. From 1859 to 1890, mercury was used to extract gold and silver from the ore using mills located along the Carson River to take advantage of waterpower. An estimated 7,500 tons of mercury were lost down the Carson River. Much of the river is now an EPA Superfund site. USGS researchers are conducting studies to evaluate effects of the mercury on black-crowned night-herons, snowy egrets, and double-crested cormorants, because mercury concentrations in the birds are among the highest reported in the world. USGS biologists have investigated current mining practices, where cyanide at gold mines in Nevada killed a large number of migratory birds from the mid-1980s through the early 1990s. USGS biologists documented the exposure of wildlife to cyanide, described wildlife reactions to cyanide solutions, and discussed procedures for eliminating wildlife loss from cyanide poisoning. Since then, substantial progress has been made at reducing wildlife loss.

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