STATEMENT OF
MIKE PELLANT
GREAT BASIN RESTORATION INITIATIVE COORDINATOR
BUREAU OF LAND MANAGEMENT
U.S. DEPARTMENT OF THE INTERIOR
BEFORE THE HOUSE APPROPRIATIONS SUBCOMMITTEE ON INTERIOR, ENVIRONMENT AND RELATED AGENCIES
REGARDING CLIMATE CHANGE
April 26, 2007

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear here today to discuss the potential impacts of climate change and activities in progress to mitigate these effects on public lands in the Great Basin. I am the Coordinator for BLM's Great Basin Restoration Initiative and am responsible to coordinate restoration-related activities across a five-state area for BLM.

Background

The Great Basin is North America's largest desert, encompassing 135 million acres of land between the Rocky and Sierra Nevada Mountains in western North America. The largest land manager in the Great Basin (includes parts of Nevada, Utah, Idaho, Oregon, and California) is the U.S. Department of Interior's Bureau of Land Management with oversight of 75 million acres of public land. (I could attach a map showing the boundary of the Great Basin in the five state area). The Great Basin is characterized by aridity (over half the area receives less than 12 inches annual precipitation) and a mix of shrubs, sagebrush (*Artemisia tridentata*) being the dominant with an understory of native grasses and forbs. Today, population growth, wildfires, and invasive species are reducing the quality of native rangelands at an accelerating rate. In 1999, a consortium of organizations led by The Nature Conservancy identified the Great Basin as the third most endangered ecosystem in the United States due in large part to the dominance of exotic species. Climate change is expected to accelerate these changes and associated impacts.

The Great Basin is a land of wide, historical fluctuations in climate both on a relatively short and long time frame. Extremes in precipitation (wet years followed by multi-year extreme droughts) and temperature challenge the management of livestock, wild horses and burros, and wildlife on public lands. Given this variability in climate, public land managers have flexibility in adjusting time and amount of forage consumption and water use to sustain land health over the long term. BLM managers evaluate these situations on a local basis and have the regulatory authority to remove livestock or wild horses during extended droughts when forage production or water sources are inadequate to sustain native vegetation. The challenge is to separate the natural climatic variation that has always existed in the Great Basin from the more recent climate changes in order to modify and adapt management strategies to better adjust to the changing environment.

Climate Change in the Great Basin

Observed 20th century climate changes in the Great Basin are similar to those reported in the western U.S and include:

1) Overall warming of 0.6° to 1.1° F in the last 100 years with the probability of very warm years increased and very cold years decreased.
2) Slight increase in precipitation across parts of the Great Basin with greater variability in high and low precipitation years.
3) Decline in snowpack since around 1950 with earlier loss of snowpack.
4) Increase in CO_2 and other greenhouse gases.

Observed trends are generally consistent with climate changes predicted to occur in the Great Basin by climate change models. Global change models produce variable results that provide an expected trend but not exact results. Projections are highly dependent on the model and the greenhouse gas scenario that are used. Projections made by the Intergovernmental Panel on Climate Change and results from the United Kingdom's Hadley Centre's climate model (HadCM2), indicate that by 2100, temperatures in the Great Basin could increase by 3-4 ^{o}F in spring and fall (with a range of 1-6 ^{o}F), and by 5-6 ^{o}F in winter and summer (with a range of 2-10 ^{o}F). Precipitation is estimated to increase by 10% in summer (with a range of 5-20%), to increase by 30% (with a range of 10-50%) in fall, and to increase by 40% in winter (with a range of 20-70%). The amount of precipitation on extreme wet or snowy days in winter is likely to increase. The frequency of extreme hot days in summer would increase because of the warming trend. It is unclear how the severity of storm events might be affected.

Potential Impacts of Climate Change on Great Basin Resources and Uses

The impact of climate change on Great Basin ecosystems may be magnified compared to other ecosystems due to the aridity and lower resiliency of these lands. Rangelands in the Great Basin are always "living on the edge" given the uncertain timing and quantity of precipitation, invasive species, altered fire regimes and increasing human population pressures.

Water

Water is the lifeblood of the Great Basin given the low precipitation and high evapotranspiration over the majority of the desert. Water is needed to support an increasing population (three of the ten fastest-growing metropolitan areas in the US are in or on the edge of the Great Basin) while still meeting livestock, wildlife and fish needs. The predicted changes of less winter snow accumulation, earlier peak spring streamflows, lower summer streamflows, and elevated stream temperatures could have dramatic effects on habitats and resources available to stream fishes. Rainbow and brown trout are predicted to be restricted to higher elevations than they currently are. The geographic distribution of the Lahontan cutthroat is projected to be reduced while the bull trout, currently listed under the Endangered Species Act as "threatened" with extinction in the northern portion of the Great Basin, could potentially face even greater risks as a result of climate change.

Change in the timing and amount of streamflows, spring and seep discharges will affect a wide range of wildlife species, livestock, and wild horses and burros. Water availability from these sources could dry up earlier in the summer as a result of the early melt of the snowpack causing increased competition for water and forage in smaller portions of the landscape. Climate change and the associated impacts on the timing and quantity of water available may exacerbate conflicts over water rights between agricultural and urban interests. Proposals to transport water from the Great Basin to Las Vegas are already a contentious issue under current water storage and use.

Vegetation

Impacts to the diverse plant communities in the Great Basin may occur at the landscape as well as the local level. On a regional basis, an increase in woody vegetation encroachment into grasslands, including a significant expansion of pinyon pine and juniper into sagebrush steppe, is expected. One model predicts that much of the sagebrush in the southern Great Basin could eventually be replaced by the more xeric Mojave Desert shrubs to the south due to projected higher temperatures and less frost in this portion of the Great Basin. The increase in trees will reduce palatable forage for livestock, habitat for wildlife, understory vegetation and thus result in increased soil erosion. Loss of sagebrush will have significant impacts on wildlife species, especially sage-grouse, which are dependent on this shrub-dominated ecosystem for food and shelter.

Increased CO_2 in the atmosphere is a topic of research and has not been clearly demonstrated. However, initial results indicate increased overall plant production favoring cool season plants (spring growers) relative to warm season (summer growers) plants. This plant response would change the composition of plant communities with potential negative effects on wildlife and insect species. However, livestock and some wildlife species could benefit from this increase in forage production.

Perhaps our greatest concern is that cheatgrass and red brome, exotic cool season grasses largely responsible for increased wildfires, respond more favorably to the increased atmospheric CO_2 than do most native plants. One recent study hypothesized that the recent increase in wildfires is caused in part by cheatgrass increases stimulated by increasing CO_2 levels. This study also found that cheatgrass will become more coarse (e.g., lignin content will increase) in the future which will reduce the time that it is palatable to livestock and wildlife and cause fuel loads to accumulate due to reduced decomposition rates. Fire suppression and rehabilitation costs, and private property losses may continue to accelerate under these plant community changes projected for the Great Basin. Besides the increased cost to the American public, wildfires in the Great Basin could be more extreme, especially in areas where woody vegetation has increased fuel loads. Risks to fire fighters and the public may continue to rise as well. More severe and frequent wildfires could increase weed expansion, soil erosion, and carbon loss, especially in areas dominated by the exotic annual grasses like cheatgrass. Disruptions to livestock operations on public lands could be more common and habitat important to wildlife and wild horses and burros may continue to decline. One unknown

is the impact of climate change on the distribution of state or federal listed noxious weed species which currently cause great ecological and economic harm within the Great Basin.

What is BLM Doing To Prepare for Climate Change in the Great Basin?

Planning

Great Basin Restoration Initiative (GBRI) has assisted in preparing some draft guidance on incorporation of climate change in Great Basin Land Use Plans. The Ely, Nevada RMP in progress now includes a section on climate change.
Climate change is addressed in the "2006 Conservation Plan for Greater Sage-grouse in Idaho" as it was ranked as the ninth of 19 threats to sage-grouse and sage-grouse habitat in Idaho. Twenty conservation measures were developed to help local sage-grouse working groups address climate change as they develop conservation strategies and local projects. More emphasis on climate change will be incorporated into land use and sage-grouse plans in the future with additional Washington Office guidance and GBRI technical assistance.

Science and Monitoring

A key component of GBRI is the application of science and monitoring to improve our ability to maintain healthy landscapes and strategically restore degraded areas. Consideration of potential effects of climate change are incorporated into these restoration strategies since treatments applied today will have to be able to survive and flourish into the future to meet resource and social needs. For example, re-establishment of sagebrush in areas burned by wildfires is a high restoration priority. Sagebrush is very sensitive to the local climatic conditions in which it evolved. Since sagebrush has an expected life span of 50-100 years, it is imperative that appropriate seed sources be selected for current seeding projects to maximize the potential of the sagebrush that establishes to be adapted to survive in an altered climate in the future.

One of the most appropriate strategies to increase the resiliency of Great Basin ecosystems to future disturbances and climate change is to either maintain or restore a diverse native plant community. Native plant diversity acts as an insurance policy against future changes by including a suite of species adapted to different environmental conditions. Loss of a few species, although not desirable, will not cause the system to crash. To improve BLM's ability to restore degraded rangelands now and into the future, GBRI has sponsored a regional science and development project to increase the availability of native plants for restoration. This program, "Great Basin Native Plant Selection and Increase Project" was initiated in 1999 as part of the BLM's Native Plant Initiative and has 17 state, federal, academic and seed industry cooperators today. Native seed collections have been made from nearly 1,500 sites in the Great Basin providing the project cooperators with an extensive collection of native seed to evaluate, select and augment production of native plant seed. Having a wide variety of native seed available for purchase in the future will provide managers with the needed plant materials to re-

establish diverse native plant communities more resilient to the effects of a warmer climate with more erratic precipitation patterns.

Monitoring the potential impacts of climate change on the flora and fauna on the 75 million acres of public land in the Great Basin requires a landscape approach. GBRI is participating with the USGS on the development of a "Great Basin Integrated Landscape Monitoring Pilot Project" that will assist managers to predict effects of climate change on stressors such as invasive species and wildfires at a landscape scale. GBRI has also implemented a regional pilot project under the BLM Assessment, Inventory, and Monitoring Project in the heart of the Great Basin in the Owhyee Uplands. This project has been designed in part to provide baseline data at the landscape level to monitor plant community changes over time. This will improve BLM's ability to detect plant community changes over time and to better distinguish climate change influences from other forms of disturbance.

BLM is represented on the Executive Committee for the development of the Intermountain Regional Ecological Observatory Network (IRON), the Great Basin regional application to the National Science Foundation's National Ecological Observatory Network (NEON). NEON seeks to establish a continent-wide distribution of environmental monitoring infrastructure, including eddy flux towers, sensors for air, soil, and surface water temperatures, windspeed and direction, precipitation, and barometric pressure, photosynthetically active radiation, plant transpiration, and atmospheric composition (CO, CO_2, O^3, others). Measuring biological response to climate and climatic variation, including the spread of invasive species and infectious diseases, is central to this program. The IRON application seeks to install the monitoring infrastructure on BLM land in the Utah West Desert. IRON asks how ecosystems and their components will respond to changes in natural and human-induced climate across spatial and temporal scales and what system attributes best predict sensitivity to climatic factors. BLM scientists are participating in the design of experiments specific to land management in the Great Basin.

GBRI is representing BLM in the development of a charter for the "Great Basin Research and Management Partnership" to improve communication and research to better meet manager needs across the Great Basin. Over 200 managers, scientists, non-government organizations and private citizens met in Reno, Nevada in the winter of 2006 and identified climate change as one of the key challenges in the Great Basin where better linkages between scientists and managers would prove beneficial.

BLM is an active participant in other research that has or is producing data and analysis with application in adaptation to climate change. These efforts include the National Center for Ecological Analysis and Synthesis Nevada Conservation Area Design, the Joint Fire Science-Funded Sagebrush Steppe Treatment Evaluation Project and the USDA-funded Integrating Weed Control and Restoration for Great Basin Rangelands.

Restoration Implementation

Restoring native vegetation where conversions to exotic annual grasses or noxious weeds have taken place will provide more plant community stability under an environment affected by climate change. In addition, carbon sequestration will be facilitated in native communities compared to annual grass communities that reburn at frequent intervals. Nearly 25 million acres of public lands in the Great Basin have some cheatgrass (*Bromus tectorum*, an invasive exotic) as a component of the community.

The DOI's Healthy Lands Initiative is providing support and funds to implement restoration projects at the landscape level with multiple partners. All of the projects implemented under this Initiative will promote the maintenance or restoration of healthy native plant communities with the increased ability to survive or adapt to anticipated changes in the environment in the future. Three of the six geographic areas receiving Healthy Lands Initiative funding are in the Great Basin which provides multiple opportunities to improve or maintain land health in this important landscape.

GBRI will continue to serve as a focal point for the application of science and technology to successfully restore Great Basin rangelands. As the science and predictive ability of climate change models continues to evolve, GBRI will provide a basin-wide perspective on this issue to inform BLM managers of appropriate restoration strategies.

Summary

The Great Basin is experiencing climate change effects that are expected to increase in the future. Key indicators of climate change are changing distributions of plant and animal species in the Great Basin. Managers in the Great Basin are cognizant of some of these changes but the magnitude of the changes expected in the future probably exceed the capability of this fragile desert to adapt in full to the changes. However, BLM has a long history of adapting to current environmental changes so the mechanism is in place to adjust management to accommodate some of the projected changes. GBRI and the BLM as a whole maintain a watching brief on climate change, following discussion in the scientific community and participating in and supporting mission-relevant research. GBRI will continue to assist managers in the adaptation process by supporting the science and technology required to maintain or restore healthy plant communities. This concludes my testimony. I would be happy to answer any questions you may have.