



## The Northern Rocky Mountain Science Center (*NoRock*)

### Science in Wyoming

#### Background

The Northern Rocky Mountain Science Center conducts scientific research in support of natural resource management in the Northern Rocky Mountains of Wyoming, Montana and Idaho. We produce and disseminate

scientific information needed for decision-making in collaboration with Federal, state, and local land management agencies, Native American tribes, Montana universities, and non-government organizations. Our Center is based at Montana State University Bozeman with field stations at West Glacier and Missoula, Montana, and Jackson, Wyoming. The delivery of useful information to managers of natural resources, the scientific community, and the public is the cornerstone of the Center mission.

#### Center Science Capabilities

Amphibian ecology	Invasive species ecology
Aquatic ecology and fisheries	Plant ecology
Climate change research	Wildlife biology and ecology
Ecosystem modeling and decision support	Wildlife disease and ecology
Fire ecology	Wetland ecology

#### The Great Bears



Predators such as Grizzly bears and black bears are icons of the rugged American West, and yet remain misunderstood and are often feared by the general public. Grizzly bear populations in the continental United States were listed as "threatened" under the Endangered Species Act in 1975. *NoRock* scientists have been studying grizzly bear populations in the Greater Yellowstone ecosystem for over 30 years. Scientists have used radio collars to track grizzly bear movements, monitored habitats and key foods, and most recently have developed non-invasive hair snaring techniques to genetically identify individual bears. This work has been done under the guidance of the Interagency Grizzly Bear Committee (IGBC), which includes representatives from Wyoming, Montana, and Idaho, and various federal agencies. USGS scientists, in

collaboration with Wyoming Game and Fish, have provided valuable scientific information in support of the recovery and de-listing efforts undertaken by management agencies in the state of Wyoming. Science conducted by the Interagency Grizzly Bear Study Team has provided the foundation for the current de-listing proposed for the Greater Yellowstone.

#### Canaries in the Mine: Amphibians and Reptiles

Amphibians and reptiles may provide insights into general ecosystem health due to their close association with various habitats and sensitivity to different environmental stresses. As part of the global biodiversity crisis, amphibian declines have been documented in many places, including Wyoming, and often in relatively undisturbed habitats. Although habitat destruction and alteration are major causes of declines, other stressors are known to contribute to amphibian declines, including disease, climate change, introduced species or a variety of these and other factors acting in combination. *NoRock* scientists, working under the USGS Amphibian Research and Monitoring Initiative (ARMI) monitor amphibian populations in Grand Teton and Yellowstone National Parks and other areas of Wyoming to understand the severity and scope of declines and work with DOI and state management agencies to develop strategies to halt or reverse declines.



#### Conservation of Key Species: Research on Sage Grouse Habitat in Wyoming

The Upper Snake River Basin Sage-Grouse Working Group recognizes that no active management can be attempted to improve habitat without information on the current status of potential habitat, particularly winter habitat, which is theorized to be the limiting factor for Jackson area sage-grouse. An inventory and monitoring system for habitat quality, combined with a classification of potential winter habitat from remotely sensed data provides critical information to evaluate habitat needs. For example, questions regarding interactions between habitat and snow (depth and density) would be served by baseline

information on plant species composition (native and non-native) and structure (e.g., aerial cover, height, bare ground). These initial data in turn can be correlated with spatial data (e.g., maps and remotely sensed information) to develop maps of important vegetation and critical habitat. On-going analyses show that, during a moderate snow year, sage-brush protruding through the snow can be identified on Landsat imagery with > 70% accuracy, but sage-grouse observation locations do not overlap all areas with potentially exposed sage-brush. This project was funded by the Upper Snake River Basin Sage-grouse Working Group.

## Big Game Species and Wildlife Disease

Large, free-roaming animals such as deer, elk and antelope are an important part of the Wyoming landscape and provide thousands of people with the opportunity for recreational viewing and hunting. In the Rocky Mountain West, these activities generate nearly \$5 billion dollars and thousands of jobs related to the outdoor recreation industry. Energy development and associated land management activities have led to changes in the landscape affecting critical wildlife habitats and populations. At the same time there has been an emergence, or resurgence, of parasites that move between livestock, wildlife, and/or humans. Almost 75% of all emerging human infectious diseases like Brucellosis and chronic wasting disease can spread between different species and many livestock disease issues are associated with repeated introductions from wildlife. *NoRock*



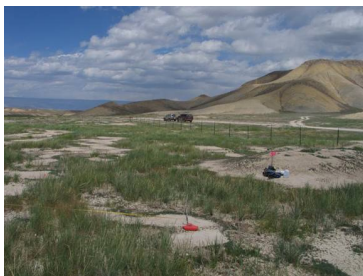
scientists collaborate with a number of partners in Wyoming including Wyoming Game and Fish, BLM, the US Fish and Wildlife Service, the US Forest Service, and Yellowstone National Park. Together, they are working on the ecology of important big game species such as pronghorn antelope, elk, and mule deer, researching some of the most pressing wildlife management and health issues in the state.

## Science for Decision-Making: The Upper Snake River below Jackson Lake

The Snake River hosts world class fishing and its riparian corridor supports abundant wildlife that depends on this system for all or part of their life cycle. The Snake River is also a working river, providing irrigation water stored in Jackson Lake for downstream agriculture, as well as recreational boating and fishing. Although located within Grand Teton National Park, the hydrology of the Snake River is partly determined by releases from Jackson Lake Dam. The Bureau of Reclamation (BOR) manages the dam and releases water primarily to meet agricultural needs, and to a lesser extent the needs of recreational river use. Management of instream flows from Jackson Lake dam has the potential to affect the riparian plant community, associated wildlife, and fisheries. USGS researchers are working with scientists from the University of Wyoming, Montana State University, and Utah State University to understand the physical and ecological characteristics of the river and riparian areas, develop models of the effects of flow regulation on various aspects of the river, and provide decision support tools to managers. A unique partnership provides oversight for the science including Grand Teton Park, Wyoming Game and Fish, the Bureau of Reclamation, Teton Conservation District and non-governmental groups.



## Invaders from Outside: The Potential Role of Energy Development in the Spread of Non-native Plant Species in Wyoming



This interdisciplinary investigation of land surface change and biologic, geologic and hydrologic effects of coalbed methane (CBM) development is providing resource managers, land owners, and developers with information to improve the management of land and water impacted by CBM development with funding from the USGS Central Region. The addition of water (a by-product of gas extraction) to the land surface combined with surface disturbance associated with development provides ideal conditions for non-native plant species. Restoration efforts need to be guided by data from inventory and monitoring of pre- and post-disturbance sites. Annual variation in weather (precipitation and temperature) likely have strong effects on vegetation reclamation success, and large scale measures of greenness (NDVI) could be used to bracket expectations of success (natives) and focus control efforts on the non-native invaders.