



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

### Science in Montana

#### Background

The Northern Rocky Mountain Science Center conducts scientific research in support of natural resource management in the Northern Rocky Mountains of Montana, Wyoming, 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 one of the key elements of the Center mission.

#### Center Science Capabilities

Amphibian ecology

Aquatic ecology and fisheries

Climate change research

Ecosystem modeling and decision support

Fire ecology

Invasive species

Plant ecology

Wildlife biology and ecology

Wildlife disease and 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 and for over a decade in the Northern Continental Divide Ecosystem (NCDE). 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 and to estimate population size in the Northern Continental Divide ecosystem. This work has been done under the guidance of the Interagency

Grizzly Bear Committee (IGBC), which includes representatives from Montana, Idaho and Wyoming, and various federal agencies. USGS scientists, in collaboration with faculty from Montana State and the University of Montana, have provided valuable scientific information in support of the recovery and de-listing efforts undertaken by management agencies. Science conducted by the Interagency Grizzly Bear Study Team, led by USGS scientists, has provided the foundation for the current de-listing proposed for Greater Yellowstone. Similarly, science provided by the USGS Northern Divide group will provide a credible, defensible population size that is the initial population benchmark for future de-listing of grizzlies in the NCDE.

#### Our Changing Climate

Americans are more aware than ever before that global climate changes are taking place. What do these changes mean for our national parks and western mountains? Mountain ecosystems in the western U.S. and the Northern Rockies in particular are highly sensitive to climate change. In fact, the higher elevations of the Northern Rockies have experienced three times the global average temperature increase over the past century. These same ecosystems provide up to 85% of the water humans depend on as well as a host of other ecosystem services such as snow-based recreation, timber, unique flora and fauna, and critical habitat for rare and endangered species. What will be the effects of continued climate change on mountain resources and our National Parks? How should managers monitor and react to climate change? The Northern Rocky Mountain Science Center has been monitoring, conducting research, and modeling ecosystem responses to climatic variability since 1991, first at Glacier National Park, but eventually throughout the western U.S. in collaboration with other scientists. Coordination with scientists at Montana State University, the University of Montana, and scientists around the world has led to mountain research networks to expand our understanding of how mountain ecosystems respond to climate change.

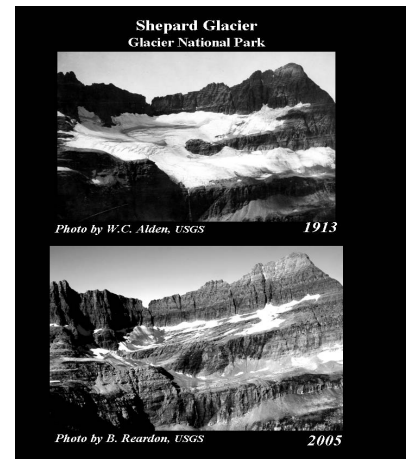


Photo by W.C. Alden, USGS

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Photo by B. Reardon, USGS

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## 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 Montana, 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 to understand the severity and scope of declines. We also work with Department of the Interior and state management agencies developing strategies to halt or reverse declines.

## Big Game Species and Wildlife Disease

Large, free-roaming animals such as deer, elk, and antelope are an important part of the Montana landscape and provide thousands of Montanans 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. Today, human population growth and associated land management activities have led to accelerated rates of land development and recreational use, affecting critical wildlife habitats and the populations dependent on them. 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 are transmissible to humans and many livestock disease issues are associated with repeated introductions from wildlife species. *NoRock* scientists collaborate with a number of partners in Montana including Montana Fish, Wildlife and Parks, Montana State University, the University of Montana, and Glacier and Yellowstone National Parks. Together, we are working on the ecology of important big game species such as pronghorn antelope, bighorn sheep, and bison, and some of the most pressing wildlife health issues around the Greater Yellowstone Ecosystem.



## Wetlands in Montana: A Scarce Resource in an Arid Landscape



Wetland research in Montana is inevitably tied to water issues, agricultural practices, grazing, and other land management effects. Waterfowl and migratory birds, native fishes, and groundwater change are influenced by public land management and agricultural programs. There is increasing pressure on Montana's wetlands from urbanization and the demand for renewable energy from biofuels that come from Montana's agricultural sector. Lands that were once under the Conservation Reserve Program may now undergo conversion back to agricultural production that is becoming more profitable for many farmers and ranchers. Wetland processes, especially related to hydrology and geomorphology, are not always well understood and can be a limiting factor to on-the-ground restoration and management. Our research is geared towards helping agriculture and natural

resource managers effectively solve issues related to the management of wetlands across the state and particularly in eastern Montana.

## The Conservation of Native trout and Grayling in Montana

Native trout in Montana provide world-class recreational and economic opportunities for Montanans. Populations of the state's Westslope and Yellowstone cutthroat, bull trout, and grayling have declined throughout the past century as a consequence of habitat degradation, disease, and nonnative species introductions. Although management actions have improved their prospects in some areas, recent introductions of nonnative species (e.g., lake trout, New Zealand mud snail, and whirling disease), and 7 years of drought in Montana have caused increased concern about numerous populations. Scientists at *NoRock*, in collaboration with researchers at Montana State, study the ecology of native trout and grayling, explore methods to control non-native trout, and work with managers to develop management and restoration strategies for these important native species that are part of Montana's heritage.

