



## Study Examines Impacts of Climate Change on Wildlife in the Northern Rocky Mountains.

### Background:

The ecology of hoofed big-game species in the northern Rocky Mountains, known as ungulates, is strongly influenced by climate. Climate change impacts summer precipitation, winter snow pack, and the timing of spring green-up, all of which control animal physiology, demography, diet, habitat selection, and predator prey interactions. However, the degree of response to these impacts from animals such as elk, moose, mule deer, and pronghorn antelope is uncertain.

In the northern Rocky Mountains, ungulates are managed by state and federal agencies and funding of management programs are supported by the sale of hunting licenses and other tourism related activities such as fishing licenses and camp ground fees. Thus, impacts of climate change can not only directly impact ungulate species, but also the ability of managers to promote conservation through hunting and tourism; a direct hit on the economies of many western states.

### Project:

The USGS Northern Rocky Mountain Science Center (NOROCK) and their collaborators from the Wyoming Cooperative Fish and Wildlife Unit at the University of Wyoming, USGS Earth Resources Observation and Science (EROS) Data Center, Penn State University, and Humboldt State University, will study how global climate change may impact ungulate species. The study is funded by a new USGS initiative on Global Climate Change and Wildlife Science.

Researchers will examine how climate change induced events such as decreased snow pack, early spring conditions, and increased drought may alter species migration routes and population numbers, influence disease prevalence such as brucellosis in feed grounds, and impact abundance of vegetation such as aspen.

The long term goal of the project is to provide the tools for natural resource managers to facilitate a better, science-based understanding of how climate change can impact various ungulate species within the region.

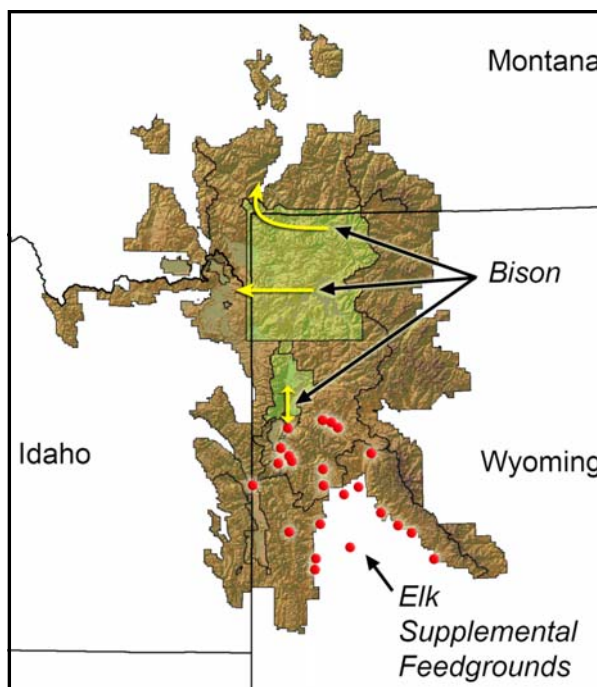


Figure 1. Study area illustrating supplemental feed grounds (red dots) and bison migratory routes (yellow arrows).

Key research questions that will be examined include:

1. What is the influence of climatic variation (snow pack and plant productivity) on Rocky Mountain ungulate population dynamics, recruitment, and human harvest (hunting)?
2. How does climate influence elk migration patterns, and how do migration patterns influence elk aggregation on feed grounds and their transmission and maintenance of brucellosis?
3. How does climate influence elk foraging decisions during winter and the impact of elk grazing on the regeneration of aspen, a declining deciduous component of the Greater Yellowstone Ecosystem (GYE) forests?

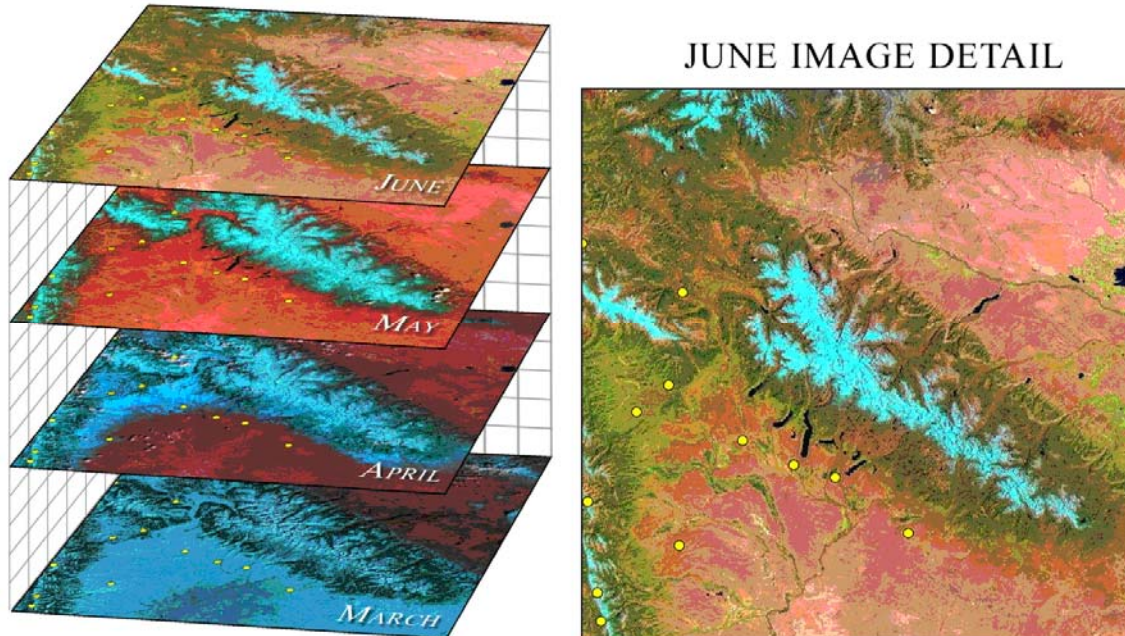
The study will also integrate current technology such as remote sensing data from satellites with new findings about animal migration patterns and disease dynamics (Figure 2).

Outputs of the project include datasets and models which will be made available to federal, state, tribal, and local government agencies, as well as to scientist at universities and non-governmental organizations and useful for other researchers and wildlife managers. By developing these types of tools, researchers can assist managers in predicting potential climate change induced impacts on various ungulate species throughout the Rocky Mountains and the interior western United States.

**For more information contact:**

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**Figure 2.** Satellite image of the study area over time shows the distribution of snowcover (blue), vegetation (green), and winter soil moisture (red). Elk feedgrounds are represented by yellow circles.

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The Northern Rocky Mountain Science Center is located in Bozeman, Montana and includes three field stations in Montana and one duty station in Wyoming. For more information on NOROCK's research, please visit <http://nrmsc.usgs.gov> or contact the Center Director: Jeff Kershner 406-994-5304 or [jkershner@usgs.gov](mailto:jkershner@usgs.gov)

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