



## Natural Resource Monitoring at Bighorn Canyon National Recreation Area



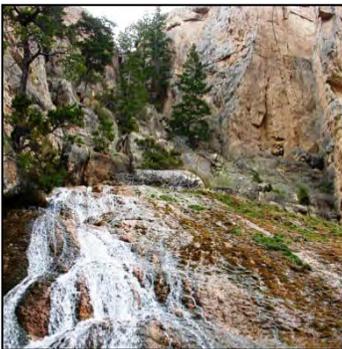
NPS photo.

### The Greater Yellowstone Network

The Greater Yellowstone Network (GRYN) comprises four national park units in Wyoming, Montana, and Idaho. The network spans the geologically and biologically diverse Greater Yellowstone Ecosystem (GYE), one of the largest relatively intact natural areas in the contiguous United States. The network includes alpine tundra, sage-steppe, riverine, wetland, geothermal, lake, juniper-mountain mahogany woodland, and high-elevation forest systems.

The GRYN is designing and implementing a long-term monitoring program to measure key indicators of ecological integrity, or “vital signs.” Multiple monitoring efforts will help inform park managers about the health of park resources and provide early detection of potential problems. The GRYN is also part of the National Park Service High Elevation Climate Change Response Monitoring Program, created in 2010 to measure changes in resources as a result of climate change. This brief describes recent activities at Bighorn Canyon National Recreation Area.

### Water Resources



Working together with park staff, the GRYN has monitored water quality in Bighorn Canyon since 2005. The goal of monitoring is to assess condition and trends in water resources relative to the Clean Water Act, human health, and ecological function. Excess inputs of nutrients such as nitrogen and phosphorus, as well as additions of silt and *Escherichia coli* (*E. coli*) bacteria into surface water systems from both natural and anthropogenic sources, threaten Bighorn Canyon’s waters. In 2005, the GRYN began monitoring the Bighorn River and the Shoshone Rivers, both 303(d) listed streams. The program was expanded in 2006 to include monitoring water chemistry of several other river/stream locations and further expanded in 2007 to include discharge and water chemistry of selected Bighorn Canyon springs. Studying and monitoring surface water quality and composition within Bighorn Canyon is essential for understanding and managing the health of the park’s stream, river and spring ecosystems.

### Upland Vegetation



Over the years, Bighorn Canyon has documented a decline in vegetation and soil health within the Pryor Mountain Wild Horse Range. The GRYN will be initiating upland vegetation monitoring this year to document the changes in vegetation and soils over time both inside and outside the horse range. The objectives of this monitoring will be to determine the status (current condition) and trends (change in condition over time) of the following in juniper-mountain mahogany-sagebrush grasslands/shrublands of Bighorn Canyon: (1) the composition and abundance (cover) of principle native plant species; (2) the composition and abundance of principal invasive plant species, including annual grasses; (3) the amount of exposed soil, a fundamental indicator of soil stability; and (4) the amount of cryptobiotic crust.

## Landscape Dynamics



The GRYN is a participant in NPScape, a landscape dynamics monitoring project. NPScape produces and delivers to parks a suite of landscape-scale data sets, maps, reports, and other products to inform resource management and planning at local, regional, and national scales. Information about changes and trends in landscape-scale indicators in and around parks can help park managers anticipate, plan for, and manage associated effects on park resources. As part of this effort, the GRYN has partnered with the Sonoran Institute to use NPScape information to focus on issues at each of the parks.

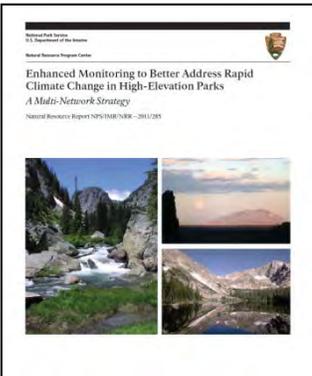
## Climate



NPS photo.

The GRYN reports annually on data harvested from selected climate stations throughout the GYE. In collaboration with other networks and the national Inventory & Monitoring Program, the GRYN is populating a database for weather-station and stream-gage data from various standard sources (Cooperative Observer Program [COOP], SNOWpack TELemetry, Remote Automated Weather Stations [RAWS], US Geological Survey). These data are carefully selected, quality-checked, and summarized in annual climate status reports for Bighorn Canyon. A report on climate data through 2009 is available as well as the GRYN is preparing the 2010 report in collaboration with the Rocky Mountain and Upper Columbia Basin networks.

## Additional Efforts



### High Elevation Climate Change Response

The Climate Change Response Monitoring Program is a multi-network effort that includes the GRYN, Rocky Mountain Network, and Upper Columbia Basin Network. As one outcome of a multidisciplinary climate-change response meeting, a 2011 planning document identified six vital signs that will receive enhanced monitoring across the networks: alpine vegetation, sagebrush-steppe, American pika, five-needle pines, climate, and phenology and snowpack (using MODIS). Funding dependent, Bighorn Canyon is scheduled to receive monitoring for sagebrush-steppe, climate, and phenology and snowpack.

### Vegetation Map

This year fieldwork will begin for a vegetation map. This is a cooperative effort between the US Geological Survey and the National Park Service to classify, describe, and map detailed vegetation communities in national parks. The Colorado Natural Heritage Program will complete Bighorn Canyon's vegetation map. This is a multi-year process that includes fieldwork, geospatial analysis, accuracy assessments, and providing a project report. To learn more about the vegetation inventory program, go to <http://science.nature.nps.gov/im/inventory/veg/index.cfm>.

### Natural Resource Condition Assessment

A Natural Resource Condition Assessment (NRCA) is underway for Bighorn Canyon. An NRCA is a compilation and synthesis of existing scientific information and expert judgement from interdisciplinary specialists to characterize park biological and physical resource conditions at appropriate scales, define threat and stress factors and their relationship to identified resources, identify critical data gaps, and suggest data collection or resource investigations to address those gaps in order to assist managers during the decision making process.

### For more information

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