Natural Resource Monitoring at Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway

The Greater Yellowstone Network (GRYN)

The GRYN provides inventory and long-term monitoring information for a carefully selected subset of natural resources in Bighorn Canyon National Recreation Area, Grand Teton and Yellowstone National Parks, and the John D. Rockefeller, Jr. Memorial Parkway. GRYN supports monitoring by park staff in sagebrush-steppe ecosystems, and helped develop and test a comprehensive landbird monitoring effort from 2005 through 2008. This brief summarizes the ongoing monitoring efforts in GRTE and JODR.

About Grand Teton National Park and the John D. Rockefeller, Jr. Memorial Parkway

Located in northwestern Wyoming, Grand Teton National Park and the John D. Rockefeller, Jr. Memorial Parkway have a combined area of 333,700 acres within the Greater Yellowstone Ecosystem. The elevation ranges from 6,400 feet on the sagebrush-dominated valley floor to 13,770 feet on the windswept granite summit of the Grand Teton.

While the Teton Range dominates the landscape, it is the interplay of mountains, faults, glaciers, forests, rivers, lakes, wetlands, and geologic features that create the overall grandeur of Grand Teton National Park. The John D. Rockefeller, Jr. Memorial Parkway connects Grand Teton and Yellowstone national parks.

Water Resources

Working together with park staff, the GRYN has monitored water quality in Grand Teton since 2006. The goal of monitoring is to assess condition and trends in water resources relative to the Clean Water Act, human health, and ecological function. All of the waters in Grand Teton have been classified as Outstanding Natural Resource Waters by the Environmental Protection Agency (EPA) and the State of Wyoming, and no degradation of these waters is allowed.

Water chemistry and nutrients in park waters vary in response to natural differences in geology and precipitation regimes and constituents like iron will occasionally exceed State of Wyoming Water Quality criteria due to these natural, rather than anthropogenic factors. Alpine lakes in Grand Teton have been found to be potentially sensitive to the atmospheric deposition of sulfur and nitrogen compounds.

Amphibians

Wetlands and amphibians are among the most sensitive natural resources to climate change. In Grand Teton, amphibians depend on limited shallow wetland habitat. The GRYN has been monitoring four native amphibian species—Columbia spotted frog (*Rana luteiventris*), boreal chorus frog (*Pseudacris triseriatamaculata*), tiger salamander (*Ambystoma tigrinum melanostictum*), and boreal toad (*Bufo boreas boreas*)—since 2005. A recent multi-year analysis of amphibian breeding across Grand Teton and Yellowstone national parks indicated that only four monitored watersheds (out of 31 watersheds) contained all four native amphibian species. One of these watersheds occurred in Grand Teton within the Snake River Valley. In this catchment, beaver are also present and their activities may contribute to habitat conditions that support multiple species of amphibians.

Whitebark Pine

Whitebark pine (*Pinus albicaulis*) occurs at high elevations and in subalpine communities in the Pacific Northwest and Northern Rocky Mountains. It is a key component in the upper ranges of these ecosystems where it provides a variety of ecological roles, including regulating snowpack and providing high-energy food sources to birds and mammals. Currently, whitebark pine is impacted by multiple ecological disturbances. White pine blister rust (*Cronartium ribicola*), mountain pine beetle (*Dendroctonus ponderosae*), wildfires, and climate change all pose significant threats to the persistence of healthy whitebark pine populations on the landscape. In 2004, an interagency whitebark pine long-term monitoring program was established to detect and monitor changes in the health and status of whitebark pine populations across the Greater Yellowstone Ecosystem (GYE). Grand Teton staff conduct annual monitoring of whitebark pine as well to inform managers of the state of whitebark pine in GRTE.

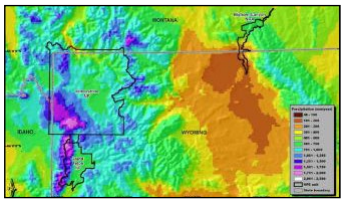
Substantial declines in whitebark pine populations have been documented throughout its range. White pine blister rust infection and mountain pine beetle infestation remains widespread and variable across the ecosystem. Blister rust infection in Grand Teton has ranged between 34-60% annually since 2007 and in 2013 was 37%. This is higher than the estimated 20-30% of whitebark pine infected with blister rust across the GYE at the end of 2011. Recent data indicate that the annual rate of whitebark pine mortality in response to mountain pine beetle has decreased compared to the past several years.

Land Use

A change in housing density and associated roads can fragment the landscape, decrease the size of the functional ecosystem, reduce connectivity among native habitat patches, isolate species in small patches, and increase the contrast in vegetation structure and function along park boundaries. Such changes outside park boundaries can have major implications to structural and functional ecosystem properties including fire frequency, species distributions, water quality, air quality, habitat fragmentation, soil erosion, and introduction of exotic species.

Approximately 67% of the land within the GYE is public land managed by federal agencies. The USDA Forest Service manages nearly 50% of the area while the National Park Service manages roughly 10%. Private lands make up about 30% of the area with the remainder of the lands under tribal, state, or local management. Population in the GYE was sparse at the turn of the 20th century, but has been steadily increasing. From 1990 to 2010, the population of the 34 counties in and surrounding the GYE grew by nearly 35% to over 930,000 residents.

Climate



Climate exerts strong controls over almost all physical and ecological processes and is a major determinant in the distribution of vegetation and animal habitats. Higher temperatures can exacerbate drought conditions and fire activity, which stress plant communities and make them more susceptible to insects and disease.

The climate of Yellowstone and Grand Teton national parks is characterized by cold, snowy winters and warm, mostly dry summers. The mountainous topography of the GYE produces a complex climate that is largely dominated by two large-scale precipitation regimes. Grand Teton and southern Yellowstone generally have the greatest precipitation during the winter months as snow, and are among the wettest regions in the GYE.

Temperatures in the Upper Yellowstone and Snake River have increased 1.6°F to 1.2°F, respectively, in the last century. Temperatures have risen steadily since the 1980s, and 2012 was the warmest annual average temperature on record. To learn more, climate data are easily accessible through the climate analyzer website at: www.climateanalyzer.org.

For more information

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