

Greater Yellowstone Network

RESOURCE BRIEF

National Park Service
U.S. Department of the Interior
Inventory & Monitoring Program



Upland Vegetation Monitoring at Bighorn Canyon NRA

Sagebrush and woodland communities are the most common vegetation types in Bighorn Canyon National Recreation Area (NRA), occurring on over 60% of the land within the park. These vegetation communities provide important habitat for wildlife and maintain the health and function of the watershed. Across the west, shrublands and grasslands, in particular, have been extensively modified by human development; these anthropogenic impacts also occur in Bighorn Canyon. The Greater Yellowstone Network (GRYN) has been monitoring upland vegetation in Bighorn Canyon NRA since 2011 in order to detect changes in the ecosystem that may be caused by biological invasions, altered fire regimes, and other stressors, such as climate change.

Objectives

Upland vegetation monitoring objectives focus on measuring a few key attributes that are fundamental indicators of ecosystem health, including soil/site stability, hydrologic function, and biotic integrity. Specific monitoring objectives are to:

1. Determine the status and trends in the composition and abundance of principal native plant species.
2. Determine the status and trends in composition and abundance of principal invasive plant species, including annual grasses.
3. Determine the status and trend in the amount of exposed soil, a fundamental indicator of soil stability.
4. Determine the status and trend in the amount of cryptobiotic crust, another fundamental indicator of soil stability.

Data collection is currently focused on creating a baseline understanding of vegetation in the park; once this is established, future surveys will allow the detection of trends.

Methods

The upland plant community types of interest are sagebrush (*Artemisia tridentata*), Utah juniper (*Juniperus osteosperma*), and juniper-mountain mahogany (*Cercocarpus ledifolius*). The monitoring design includes 15 permanent sampling frames located within the three target plant communities. The monitoring schedule includes a panel of sample frames monitored each year and another panel that



NPS

Field crew lays out a quadrat to measure vegetation at Bighorn Canyon National Recreation Area.

is monitored on a three-year rotating basis. In 2013, permanent photo points were established at six sample frames with each photo point including a series of four pictures, one facing each cardinal direction. Repeat photography provides interesting comparisons overtime to help visualize ecosystem changes.

Early Detection of Non-native Invasive Species

Non-native, invasive plants tend to become established in disturbed areas, due to fire, grazing, or other kinds of disturbance that breaks up the soil and disrupts the existing native vegetation. Early detection of non-native plants alerts managers of their presence so that actions can be taken (if necessary), and monitoring of non-natives over time can inform assessments of overall ecological condition. The persistence and



ALL PHOTOS: NPS

Three vegetation communities sampled (from left to right): sagebrush steppe, juniper woodlands, and juniper-mountain mahogany.

spread of non-native, invasive plants can signal stress in the ecosystem.

To date, five non-native plant species have been reported during GRYN monitoring: cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola tragus*), crested wheatgrass (*Agropyron cristatum*), halogeton (*Halogeton glomeratus*; Figure 1), and Japanese brome (*Bromus japonicus*; not shown).

Cheatgrass is a common invader of sagebrush ecosystems in this region and can severely degrade an ecosystem by altering fire frequency. It is by far the most common non-native plant encountered, although usually in small cover amounts. The one notable exception is the large amount of both cheatgrass and Russian thistle documented in a juniper woodland area where a prescribed burn occurred during the past decade.

Russian thistle and crested wheatgrass are the next most common non-native plants encountered. Crested wheat grass was found in a juniper-mountain mahogany sample frame far way from any abandoned hay field or road side. This species has a moderate ability to spread by seed, but is not known for its ability to invade undisturbed areas; therefore, it will be important to monitor this population closely.

Generally, the non-native species detected were sparse (contributing less than 5% of the vegetative cover where they were measured), and not widely distributed. Cheatgrass is the exception in that it was ubiquitous, but still in small patches. As monitoring continues, trends in the distribution and cover of these plants will be observed.

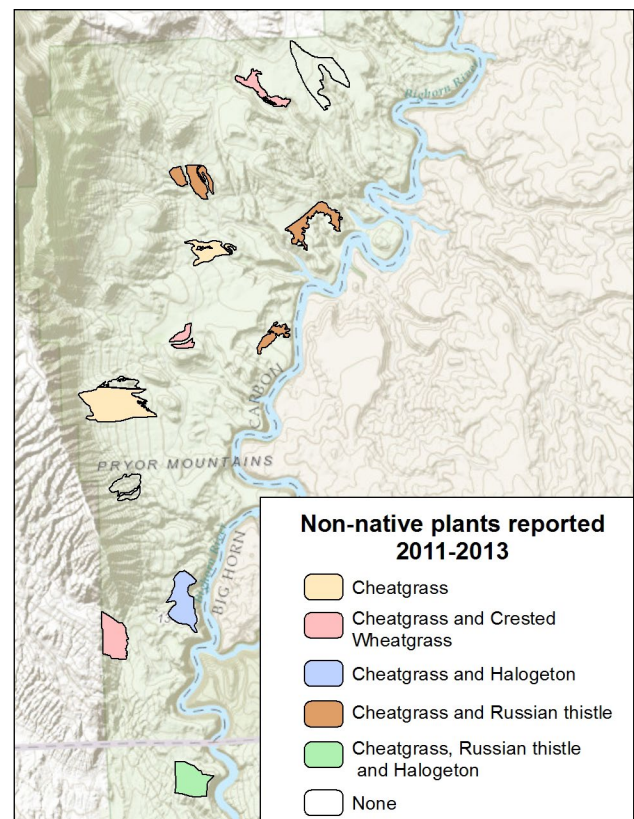


Figure 1. Map showing the location of non-native plants.

Next Steps

We are working with climate data to better understand the response of sagebrush steppe and woodland communities to short- and long-term drought. Temperature and precipitation data from DayMet and PRISM are used to calculate the climate water deficit (i.e., the evaporative demand that is not met by available water) to help determine duration and magnitude of drought stress and its effects on plants.