



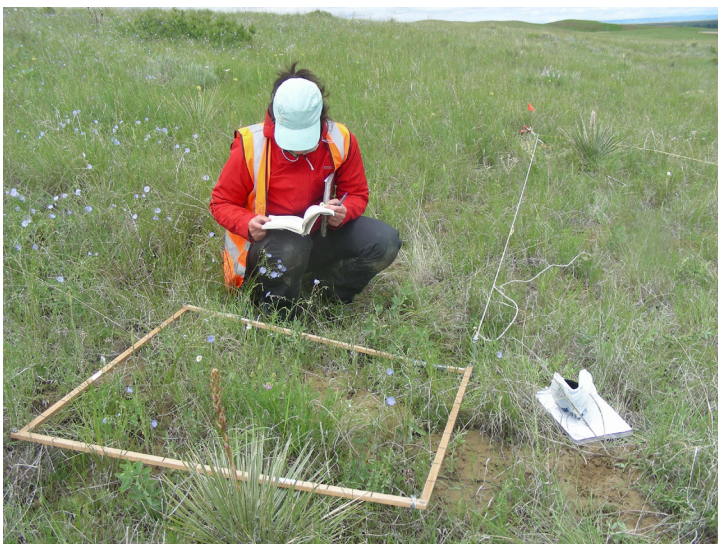
Monitoring Vegetation and Soils at Little Bighorn Battlefield National Monument: 2016



Importance and Objectives

Historical mixed-grass prairie is an integral component of the natural and cultural landscape of Little Bighorn Battlefield National Monument (NM). However, invasive species like cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*) are threatening this habitat in the monument as well as impacting native plant communities across the Great Plains. The Rocky Mountain Inventory and Monitoring Network monitors vegetation and soils in the monument in order to detect change in the health of its grasslands. We can provide park managers with the information needed to protect the ecological integrity of mixed-grass prairie in the face of this threat.

The specific objectives of our vegetation and soils monitoring program are to quantify status and trend in 1) vegetation structure, species composition, and biodiversity, 2) abundance of invasive/exotic plants, and 3) soil condition in Rocky Mountain Network parks.



2016 Monitoring Effort

At Little Bighorn Battlefield NM, we monitored soil and vegetation at 10 sites in early June 2016. Methods follow our protocol (see *More Information*), which uses a random sampling design to monitor sites within 3 ecological site and soil types to allow us to understand conditions in the park. We present a short summary of preliminary results here, which were similar to results from previous years of monitoring.

We identified 105 plant species, 29 of which were nonnative. Of these species, 70.0% of the total foliar cover was from graminoids, 25.0% was from forbs, and 5.1% was from shrubs. The most abundant species (based on average cover) were

- western wheatgrass (*Pascopyrum smithii*; 16.9% mean relative cover)
- smooth brome (*Bromus inermis*; 13.5%) – an invasive exotic species
- Japanese brome (13.2%) – an invasive exotic species
- bluebunch wheatgrass (*Pseudoroegneria spicata*; 12.5%)

Species found at every plot (frequency of 1.0) were

- Japanese brome – an invasive exotic species
- western wheatgrass
- pale madwort (*Alyssum alyssoides*) – an invasive exotic species
- yellow salsify (*Tragopogon dubius*) – an invasive exotic species
- Kentucky bluegrass (*Poa pratensis*) – an invasive exotic species

The detection of nonnative cheatgrass and Japanese brome is concerning and both species should be closely watched to ensure the preservation of native plant communities. The park's involvement in the Annual Brome Adaptive Management Project (with 6 other national park units in the Northern Great Plains) should provide guidelines for effective management of these species. Of all nonnative plant species found,

only cheatgrass is on the Montana noxious weed list as a regulated species. Cheatgrass cover ranged from 1.9% at site 5 to 21.4% at site 9, with a total average cover of 7.5% (6.6% standard deviation) (Figure 1).

Erosion was not a concern at the sites visited in 2016. We determine this by measuring soil aggregate stability (the ability of soil particles to adhere to each other) and the percent cover of litter and bare ground. Our measure of soil stability ranges from 1 to 6, with lower values indicating lower stability (see protocol for full description). Mean surface soil stability was 4.7 (± 0.8 standard deviation) and mean subsurface soil stability was 4.4 (± 0.7), both indicating good condition. Likewise, mean cover values for litter (83.9%; $\pm 9.4\%$ standard deviation) in relation to bare ground (9.3%; $\pm 8.6\%$ standard deviation) indicate protection against erosion. Our detection of cheatgrass, however, is notable because sites dominated by cheatgrass tend to have high bare ground cover and low soil stability, making them prone to erosion. This could cause important challenges in preserving both the cultural artifacts and landscape of the monument in the future.

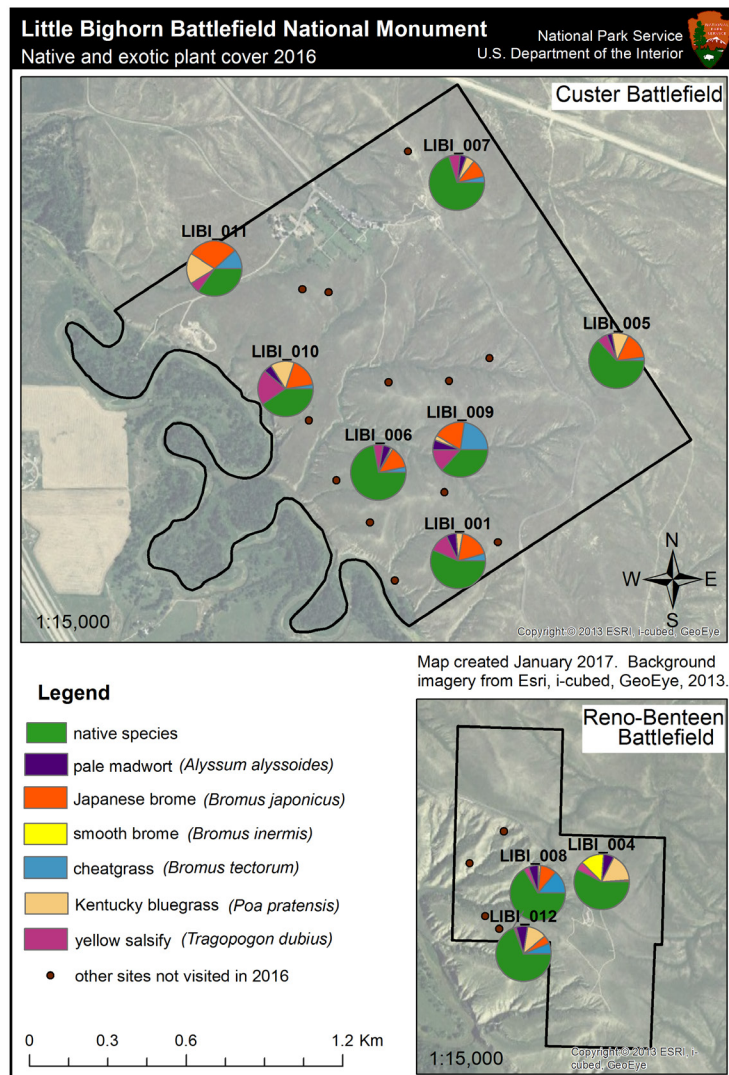


Figure 1. Relative cover of native species (green) and exotic species with cover over 5% (all other colors) at sampled sites in 2016.



A 1 m² vegetation cover plot at site #11 is dominated by cheatgrass.



The Battlefield

Little Bighorn Battlefield NM is a 310 hectare (765 acre) park located within the boundaries of the Crow Indian Reservation in Montana. The site of the Battle of the Little Bighorn has been protected since 1879, three years after the battle. The Reno-Benteen Battlefield land has been protected since 1926. At 915–1000 m in elevation (3000–3400 ft), the landscape is typical of a mixed-grass prairie grassland with woody and herbaceous vegetation in the ravines, riparian plants along the floodplains, and both tall and short grasses in the uplands.

More Information

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Data download via the natural resource information portal
(<https://irma.nps.gov/DataStore/Reference/Profile/2229262>)

2010–2014 Pilot Report
(<https://irma.nps.gov/DataStore/Reference/Profile/2229597>)

Protocol (<https://irma.nps.gov/DataStore/Reference/Profile/2170699>)

About ROMN

The Rocky Mountain Network is 1 of 32 vital signs monitoring networks across the National Park Service. It monitors status and trends in upland vegetation and soils, wetlands, streams, alpine vegetation, and other systems at 6 parks throughout Montana and Colorado.