



Monitoring Vegetation and Soils at Grant-Kohrs Ranch National Historic Site: 2016



Importance and Objectives

Historical mixed-grass prairie is an integral component of the natural and cultural landscape of Grant-Kohrs Ranch National Historic Site (NHS). The park is unusual in that it manages less disturbed upland prairie for grazing and irrigated pastures for hay and grazing. Currently no benchmark exists to determine if the upland prairie is in good condition. Therefore, the park and the Rocky Mountain Inventory and Monitoring Network have partnered with the USDA Natural Resources Conservation Service to determine desired conditions for upland prairie. When complete, we can compare our vegetation and soils data with these desired conditions to inform park managers' efforts to protect the integrity of the mixed-grass prairie.

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 Grant-Kohrs Ranch NHS, 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 understand conditions in the park. We summarize preliminary results here, which were similar to results from previous years of monitoring.

Vegetation

We identified 108 plant species, 36 of which were nonnative. Of these species, 85.5% of the average total foliar cover was from graminoids, 12.5% was from forbs, and 4.8% was from shrubs.

The most abundant species (based on mean relative cover) at each site (Figure 1) were

- smooth brome (*Bromus inermis*; 42.8% at 2 sites)
- analogue sedge (*Carex simulata*; 30.2% at 1 site)
- Kentucky bluegrass (*Poa pratensis*; 29.2% at 4 sites)
- quackgrass (*Elymus repens*; 23.2% at 1 site)
- cheatgrass (*Bromus tectorum*; 22.8% at 1 site)
- meadow foxtail (*Alopecurus pratensis*; 17.0% at 1 site)

All of the above species provide hay forage, except cheatgrass.

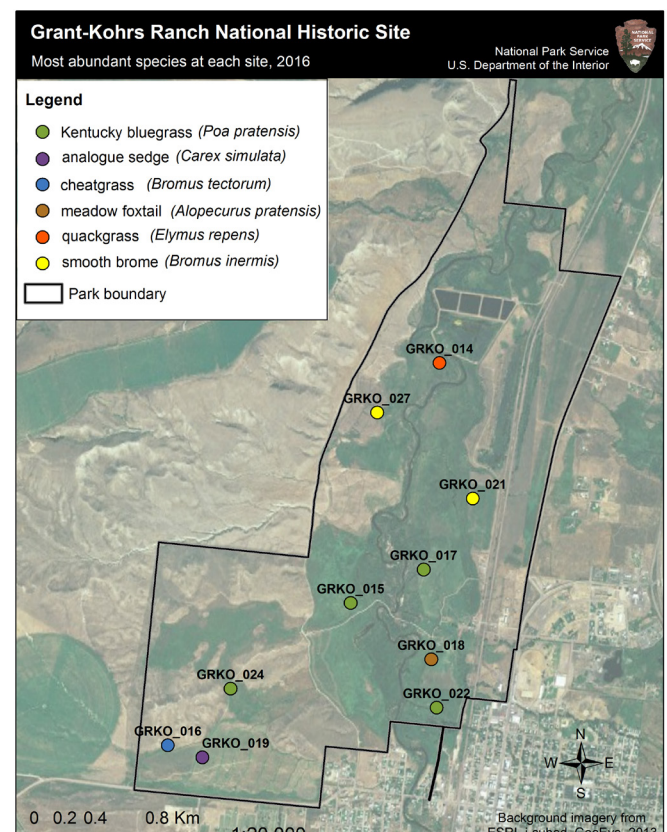


Figure 1. The most abundant species detected at each site visited in 2016.

Species found at over 66% of the plots (highest frequency) were

- quackgrass (frequency of 1.0; found at 100% of plots)
- Kentucky bluegrass (1.0)
- Baltic rush (*Juncus balticus*; 0.9)
- dandelion (*Taraxacum officinale*; 0.9)
- meadow foxtail (0.7)
- smooth brome (0.7)

Though many of these species are not native to the area (e.g., Kentucky bluegrass, quackgrass), they are managed for hay production.

We found several nonnative plant species that are on the Powell County or Montana noxious weed list: cheatgrass (considered a regulated species, not a noxious weed), Canada thistle (*Cirsium arvense*), spotted knapweed (*Centaurea stoebe*), yellow toadflax (*Linaria vulgaris*), leafy spurge (*Euphorbia esula*), field bindweed (*Convolvulus arvensis*), perennial pepperweed (*Lepidium latifolium*), and whitetop (*Cardaria draba*). We found these invasive exotic species at only a few sites and in small amounts, except for cheatgrass (Figure 2).

In fields managed for hay, we expect to see exotic species like Kentucky bluegrass and quackgrass. In upland prairie sites, we expect native bunchgrass species like needle-and-thread and thickspike wheatgrass. Though we did see native grasses in the upland sites, we also found exotic invasives, like cheatgrass. Once we define desired conditions, we can determine whether native grass cover is sufficient to maintain the health of the mixed-grass prairie or whether management action is needed.

Soil

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 5.5 (± 0.4 standard deviation) and mean subsurface soil stability was 5.0 (± 1.2), both indicating good condition. Likewise, mean cover values for litter (75.8%; $\pm 11.1\%$ standard deviation) in relation to bare ground (5.3%; $\pm 5.2\%$ standard deviation) indicate protection against erosion.

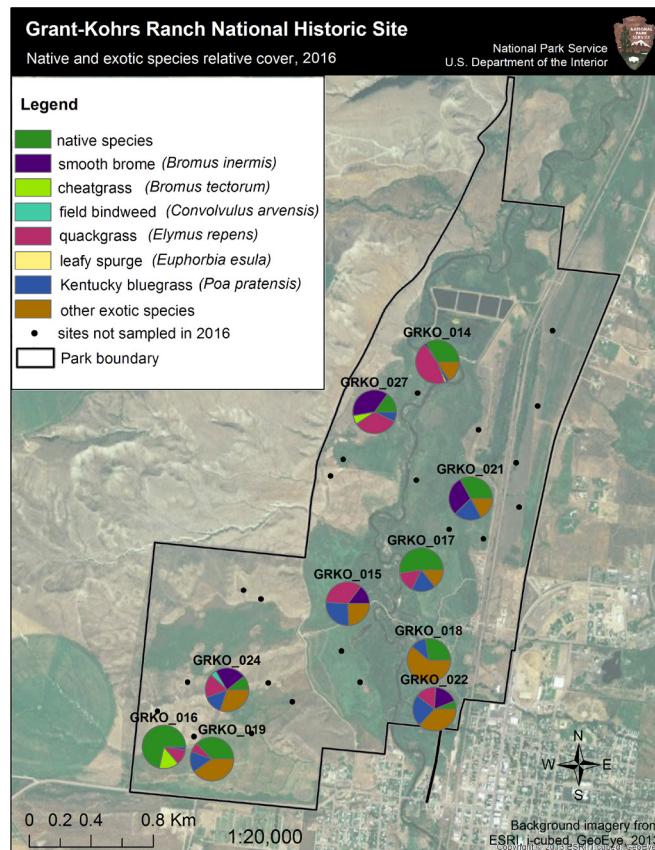


Figure 2. Relative cover of native species (green) and exotic species with cover over 1% (all other colors) at sampled sites in 2016. Invasive exotic species with less than 1% cover (not pictured) include spotted knapweed at sites 21 and 24; Canada thistle at sites 15, 17, and 22; perennial pepperweed at sites 14 and 17; yellow toadflax at site 14; and whitetop at site 14. Black dots are sites not sampled in 2016.

The Ranch

Grant-Kohrs Ranch National Historic Site is a 655 ha (1,618 acre) park in western Montana that encompasses 90 structures. Established in 1972, the park commemorates the Western cattle industry from its 1850s inception and evolution to the 20th century. It maintains an operating ranch with roughly 100 livestock animal units. The landscape is typical of a mixed-grass prairie grassland, with 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/2229598>)

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.