Rocky Mountain Network
INFORMATION BRIEF

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Inventory & Monitoring Division

Checking Little Bighorn Battlefield's Vital Signs

Rocky Mountain Network Science in the Monument

National parks are the guardians of unique American natural and cultural history. But perhaps more than ever before, parks exist in a rapidly changing landscape. Development, replacement of native species by invasive exotics, air and water pollution, increasing visitor use, and climate change all impact the natural web of life. This leads park managers to ask:

How healthy are parks? How are they changing?

In answer, the National Park Service clustered parks into 32 Inventory and Monitoring Networks. In 2007 at Little Bighorn Battlefield and nearby parks, a small team of scientists with the Rocky Mountain Network began monitoring natural resources, called "vital signs," that can serve as red flags if conditions deteriorate. Our team supports park managers' efforts to make ***science-based decisions***.

What do we monitor at Little Bighorn Battlefield National Monument?

Stream Ecological Integrity

The Little Bighorn River winds its way along the edge of Little Bighorn Battlefield National Monument, nourishing streamside plants and providing a home for tiny aquatic insects, like caddisflies and mayflies. These insects feed fish and other predators underwater as larvae, and additionally feed birds and bats once the winged adults emerge. While the river is vital to the park's hydrology (water cycle), it also has cultural significance for its critical role in the Battle of the Little Bighorn.

Rivers are sensitive to a variety of stressors. Excessive nutrients from agricultural runoff, sediment from eroding slopes, and air pollution can degrade them. While rivers like the Little Bighorn naturally move back and forth across their floodplain over time, when fine sediment levels are out of balance, riverbanks can erode and alter the river's historical character. Furthermore, climate change warms rivers and lowers streamflow by shrinking mountain snowpack. This can ultimately affect fish and aquatic insects. Because the Little Bighorn River signals the effects of multiple stressors, we monitor its current condition and keep track of long-term trends in its condition to inform the park's resource managers.

Some resources we measure:

- Water chemistry, like pH and nitrogen levels
- Physical habitat, like woody debris and the size of sand and cobble along the streambed
- Algae and aquatic insects

This scientist kicks the streambed to knock aquatic invertebrates loose into his waiting net. The mix of aquatic invertebrates he finds reveals much about conditions in the river.

Learn more at our website (What We Monitor>Protocols>Stream Ecological Integrity)

Upland Vegetation and Soils

Native mixed-grass prairie once stretched from the Rocky Mountains to beyond the Mississippi River. Boasting colorful wildflowers and rippling grasses, dotted by an occasional western snowberry or big sagebrush shrub, the mixed-grass prairie plant community plays a vital role in cycling water, carbon, and other nutrients through the soil for continual reuse. It feeds and shelters small mammals, reptiles, and birds, like the lark sparrow. In addition, components of the Battle of the Little Bighorn played out on these grasslands, making them integral to the park's cultural landscape.

Today, displaced by agriculture and development, and encroached upon by invasive exotic plants, intact mixed-grass prairie now occupies a tiny fraction of its original range. The remnant patches protected at Little Bighorn Battlefield are particularly threatened by invasive annual grasses, like cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*). Recent expansion of these invasives across the northern Great Plains and throughout the park threaten the prairie's resiliency. They displace native grasses, burn more frequently, and change the character of the prairie away from historical conditions. Research suggests that future climate conditions may boost the spread of problematic invasive species, further threatening mixed-grass prairie. To support park management, we monitor mixed-grass prairie conditions to learn how the prairie functions and responds to stresses.

Learn more at our website (What We Monitor>Protocols>Upland Vegetation and Soils)

Some upland characteristics we measure:

- Native plant species (grasses, forbs, shrubs, trees)
- Presence/absence of invasive exotic plants
- Tree density and proportion of living trees
- Potential for soil erosion (soil texture, bare ground)
- Soil chemistry (pH, carbon, nitrogen, minerals, and the amount of organic matter)
- Disturbances (fire, rodent activity, roads/trails)

Documenting plant species and abundance within a vegetation plot. Tall, green grass in the foreground is bluebunch wheatgrass, while the background, rose-colored grass is dry cheatgrass.

Explore the Rocky Mountain Network website

Contact us!

Learn about inventory and monitoring in the monument and play with:

- species lists for your park (What We Inventory>Species Lists)
- interactive visualization tools for learning about climate, water quality, air quality, and landscape patterns (Reports & Publications>Data Visualization)