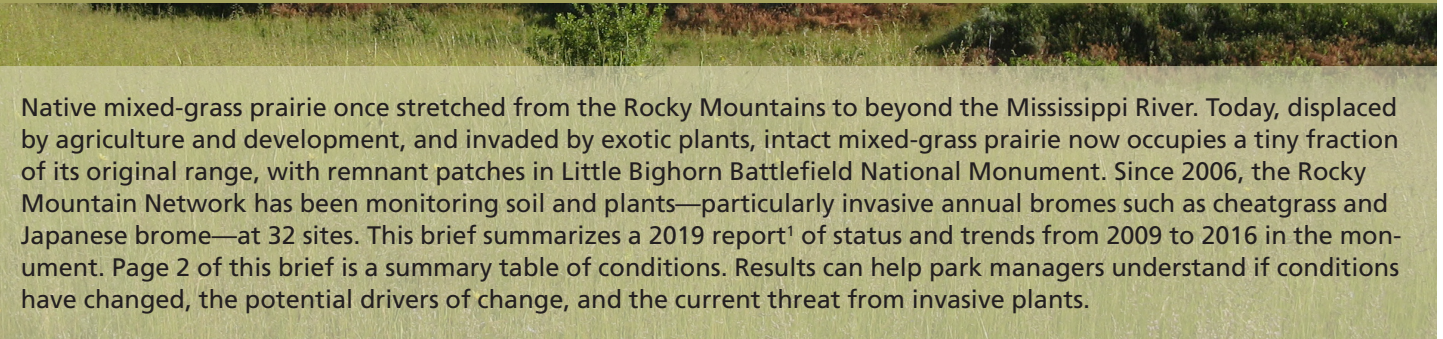




Mixed-Grass Prairie Conditions at Little Bighorn Battlefield National Monument, 2009–2016



Native mixed-grass prairie once stretched from the Rocky Mountains to beyond the Mississippi River. Today, displaced by agriculture and development, and invaded by exotic plants, intact mixed-grass prairie now occupies a tiny fraction of its original range, with remnant patches in Little Bighorn Battlefield National Monument. Since 2006, the Rocky Mountain Network has been monitoring soil and plants—particularly invasive annual bromes such as cheatgrass and Japanese brome—at 32 sites. This brief summarizes a 2019 report¹ of status and trends from 2009 to 2016 in the monument. Page 2 of this brief is a summary table of conditions. Results can help park managers understand if conditions have changed, the potential drivers of change, and the current threat from invasive plants.

Highlights

- Vegetation and soil conditions have not significantly changed between 2009 and 2016. This takes into account short-term climate variation during that period and a change in field crew.
- The diversity of native plant species appears to be in good condition. However, values just barely met the reference (good) condition threshold and highly variable data meant low confidence for this assessment.
- Soil stability was in good condition. This alleviates concern about erosion, especially as it might expose artifacts in the monument. Erosion could become a problem in areas dominated by cheatgrass.
- Native forbs and shrubs covered less area than desired, which warrants some concern.
- The relative cover of litter was high at all sites, warranting some concern. While litter cover cools the soil and protects seedlings, too much can inhibit their germination and growth by blocking sunlight. Litter buildup also adds fuel to fires. High litter cover can result from the exclusion of grazing and natural fire regimes.
- Native grass cover was low, whereas exotic invasive annual brome grass cover was high. These related conditions warrant serious concern.
- Available moisture appeared to influence key measures, such as native species richness and both exotic and native grass cover. When it was high during the previous growing season, it appeared to boost annual brome cover.

Management Implications and Future Monitoring

Despite healthy soil conditions and acceptable native species richness, the overall condition of mixed-grass prairie in the monument warrants significant management concern. Key indicators of the prairie's health were in trouble, like native grass cover. Moreover, conditions can change quickly after disturbances or unusual (but increasingly common) weather events that favor the spread of invasive species.

Most concerning, widespread invasive annual bromes appear to negatively affect native grasses and native species richness. Brome abundance may be linked to climate; exotic annual brome cover increased when available moisture was high in the previous growing season. During these years native grass cover decreased, perhaps through competition. A related concern is the recent detection of wiregrass (*Ventenata dubia*), an exotic invasive that is difficult to control.

Fortunately, new management decision tools will soon be available through the US Geological Survey-led Annual Brome Adaptive Management Project (ABAM). Another potential tool is to study how water balance affects indicators of mixed-grass prairie health and then use climate forecasts to predict future changes.

We will continue annual monitoring at the monument and collaborating with the NPS Northern Rockies Exotic Plant Management Team and ABAM. The next trend report will incorporate data collected through 2020.

¹ Borgman, E. M. 2019. [Little Bighorn Battlefield National Monument vegetation composition, structure, and soils: 2009–2016 status and trend, revised September 2019](#). Natural Resource Report. NPS/ROMN/NRR—2019/2013. National Park Service. Fort Collins, Colorado.

Summary of upland plant community conditions in Little Bighorn Battlefield National Monument, 2009–2016. The 2016 value of each indicator is reported along with its 95% confidence interval. Results represent parkwide conditions, unless distinguished by subpopulation into the relatively flat upland, gulley1 Custer unit ravine, or gulley2 Reno-Benteen unit ravine habitats. Reference condition values indicate good health.

Indicator of Condition	Specific Measures	2016 Value	Reference Condition	Condition Status/Trend ¹
Upland Plant Community Structure and Composition	Native species richness	9.4 species (6.4-12.9 species)	>8 species	
	Native forb cover	6.6% (3.8-10.3%)	>15%	
	Native grass cover	44.2% (31.5-58.0%)	>70%	
	Shrub cover	1.6% (0.0-5.7%) in uplands 1.3% (0.2-4.4%) in gulley1 8.6% (0.8-23.0%) in gulley2	1-5% in uplands 10-15% in gullies	
	Litter cover	90.7% (73.5-98.5%) in uplands 83.1% (66.9-93.9%) in gulley1 73.7% (44.4-96.2%) in gulley2	35-60% in uplands 20-30% in gullies	
Exotic Plant Management	Nonnative annual brome grass cover	22.1% (10.8-34.6%)	<5%	
	Annual brome dominance (% of sites with annual brome cover >20%)	70%	<5%	
	Non-brome exotic species cover	20.3% (13.2-29.9%)	<5%	
Soil Erosion Potential	Soil aggregate stability (index from 1 to 6)	4.7 (1.6 standard deviation)	>4.5	
	Bare ground cover	6.5% (0.5-21.8%) in uplands 11.4% (3.3-23.6%) in gulley1 18.8% (1.1-50.1%) in gulley2	5-15% in uplands 25-40% in gullies	

¹ Symbol key. Circle border: heavy weight = high confidence, medium weight = medium confidence, dotted = low confidence. Circle color: green = reference condition, yellow = intermediate condition, red = non-reference condition. Arrow direction: sideways = condition is unchanging, upward = condition is improving, downward = condition is deteriorating.



More Information

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The Rocky Mountain Network is one 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 six parks throughout Montana and Colorado.