

Briefing Statement FY 2019

Bureau: National Park Service
Issue: Bison Grazing in Northern Yellowstone
Members: Montana and Wyoming Congressional Delegations
Park: Yellowstone National Park

Key Points:

- Bison aggregate in the Lamar Valley and create massive grazing lawns of dense, short-statured plants through intense and repeated grazing. This grazing strategy creates highly nutritious food through summer by prolonging and intensifying new plant growth, similar to when humans repeatedly mow their lawns.
- Bison grazing stimulates nutrient cycling and water-holding potential, resulting in higher grassland productivity. The deposition of feces and urine into the soil releases plants from nitrogen limitation; as a result, precipitation becomes the primary factor influencing plant growth.
- In some areas, intense grazing changes plant compositions from grass-like to forb life forms, and from bunch to rhizomatous growth forms that send out roots and shoots from underground stems. However, these changes have not decreased plant productivity. Rather, grazing increased above-ground production by up to 20%.
- This natural grazing regime benefits grasslands in Yellowstone by diversifying the composition of plants, increasing plant production, enhancing soil nutrient availability, and improving soil water holding capacity. These benefits will help maintain the functional integrity of grasslands under a warming climate.

Background:

- Migratory ungulates can manipulate landscapes by intensely grazing some areas to keep plants in early spring-like conditions. Young short-statured plants have a higher portion of digestible material that improves diets.
- Numbers of ungulates in northern Yellowstone have remained high for numerous decades, indicating many thousands of animals are attaining adequate forage to sustain body condition, reproduction, and survival.
- No single density of ungulates or level of grazing is optimal in a wilderness because some wildlife species need a variety of habitats, while others favor disturbed or undisturbed habitats. Variable grazing intensities across the landscape produce a variety of vegetation conditions, with heavily grazed areas and nearly ungrazed areas.
- Soil organic matter is the fraction of the soil made up of decaying plant and animal tissue. It is a key indicator of soil health because it supports microbes that make nutrients available to plants and improves soil water-holding capacity. Agricultural practices manage soil organic matter to exceed 2 to 8%.

Current Status:

- During 2012-2017, Dr. Chris Geremia and colleagues monitored the effects of bison grazing on grasslands after bison numbers in northern Yellowstone increased from <600 in 2000 to more than 4,000 by 2016.
- Northern Yellowstone produces sufficient herbaceous vegetation to support between 5,000 and 10,000 bison based on satellite-derived estimates of forage production, bison use patterns, and population composition data. There are currently about 3,700 bison in northern Yellowstone.
- Measurements at 30 field sites indicated precipitation was the single most important driver of year-to-year differences in net aboveground production by grasses, far exceeding the effects of grazing.
- Grasses in the Lamar Valley maintained net aboveground production under grazing intensities of 60 to 70%. Clipping experiments indicated the removal of up to 80% of plant material reduced the amount of plant matter available at the end of the growing season, but not net aboveground production.
- Control plots that excluded grazing illustrated that current levels of grazing stabilized or enhanced net aboveground production of plants, especially when grazing intensities varied from 10 to 30%.
- Greenhouse studies of dominant grasses in the Lamar Valley found they were resilient to grazing, maintaining aboveground growth while being grazed and reallocating resources to root production during wet years.
- Soil organic matter averaged 13% across sites and ratios of carbon and nitrogen supported microbes that converted soil nutrients into plant-available forms. Intense grazing did not change soil health, which was resilient due to increased nutrient turnover (feces, urine) that stabilized organic matter and preserved moisture.
- Intensively grazed areas (>50%) comprise a tiny portion (10%) of available grasslands in northern Yellowstone. Most summer ranges and all winter ranges experience low to moderate grazing.

Contact Person: Cameron Sholly, Superintendent, (307) 344-2002, cam_sholly@nps.gov; September 19, 2019