

Key Points:

- The Superintendent was informed that the Secretary of the Interior wanted (1) Yellowstone bison managed more actively like cattle on a ranch, and (2) the Bureau of Land Management to conduct an assessment of the number of bison the park could support using the animal unit month (AUM) concept. This approach is traditionally used to manage forage use by grazing livestock.
- Yellowstone National Park (YELL) was not established to be a commercial ranch with domesticated animals and human-controlled animal, nutrient, and water inputs. Rather, it was established to preserve a wilderness where untamed, free-roaming animals and natural processes with wide-ranging variations are allowed to prevail in an environment enjoyed, but not dominated, by humans.
- No single "stocking rate" (i.e., density) of ungulates is optimal for conserving biodiversity and ecological processes because some species of wildlife need a variety of habitats, while others favor severely disturbed or undisturbed habitats. A wide range of grazing intensities should occur across the landscape to produce a mosaic of vegetation composition and structure, with some heavily grazed areas and some nearly ungrazed areas.
- Independent evaluations sponsored by the National Academy of Sciences (2002) and the U.S. Geological Survey (2005) concluded YELL is not overgrazed and bison have not reached carrying capacity (>6,200 bison). However, migrations outside the park increase during winters with deep snowpack and more than 4,700 bison.
- A total of 4,816 bison were counted in YELL during summer 2017, including 3,969 in northern YELL and 847 in central YELL. About 1,173 bison were removed from the population this winter, primarily in northern YELL. Thus, biologists expect about 4,300 bison after calving, which will be verified with a count in late July.
- Some sites in northern YELL are intensely grazed by bison, but the locale with the highest consumption (Lamar Valley) supports large areas of rhizomatous grasses from abandoned hayfields that fare relatively well in response to repeated, intense grazing; despite low standing crop by the end of summer.
- Intensively grazed areas comprise a small portion of the available summer habitats for bison and elk in YELL. The majority of the summer range and all of the winter range has moderate to low consumption rates due to a substantial decrease in elk numbers throughout the park and fewer bison in the central region.
- The biomass and production of ungulates in YELL has remained relatively high for decades; indicating many thousands of animals are attaining adequate forage to sustain sufficient body condition for reproduction and survival. This would not occur if YELL was overgrazed and ungulates exceeded ecological carrying capacity.

Background:

- The Yellowstone National Park Act of 1872 dedicated land as a public park for the benefit and enjoyment of the people. Congress directed the Secretary of the Interior to "provide for the preservation ... of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition."
- The desired condition for the native shrub-grass plant association in northern YELL is a sustainable community with functioning water, soil properties, energy and nutrient cycles, and disturbance dynamics (e.g., fires, floods, herbivory). Some areas of the extensive grasslands would be more heavily grazed than others.
- The desired condition for wildlife in YELL is to sustain or restore populations of native wildlife consisting of untamed, free-roaming animals that live in an environment not dominated by humans and whose behaviors, movements, survival, and reproduction are predominantly affected by their own decisions and natural selection.
- Bison are the only exception to this practice and are frequently captured near the park boundary and shipped to slaughter facilities pursuant to a court-mediated plan finalized in 2000 due to concerns about brucellosis transmission risk to cattle. Chronically infected elk populations in surrounding states are not managed similarly.
- Since numbers of migratory ungulates are allowed to vary substantially among seasons and years, quite unlike the stocking and rotation of livestock on commercial rangelands and grazing allotments, grasslands within the park should not be expected to look like nearby ranches cultivated, fertilized, and irrigated for cattle production.
- During the 1980s and 1990s, elk were abundant (11,000-19,000) and the primary grazer in northern Yellowstone. Grass consumption was relatively high (45-55% of annual above-ground production) in some areas and comparable to the consumption of grasses (60%) in the savanna systems of the African Serengeti.
- In 2002, an independent review of grazing and grasslands in northern YELL by the National Research Council cautioned "For example, some people compare the northern range unfavorably with nearby ranches, but that reflects a mixing of values. Ranching seeks high production for human uses, but YNP seeks to preserve a natural environment and the species and ecological processes within it."
- An independent evaluation of the food-limited carrying capacity for Yellowstone bison was completed by Colorado State University and the U.S. Geological Survey in 2005. With about 5,000 elk, the model predicted a carrying capacity of more than 8,000 bison. With about 20,000 elk, the model predicted a capacity of about

6,200 bison (see <http://www.americanbisonsocietyonline.org/Portals/7/PlumbEtAl2009.pdf> for more details). Currently, there are about 8,000 northern Yellowstone elk; 80% of which winter outside YELL.

- As northern Yellowstone elk numbers decreased by 75% following predator restoration, bison numbers quadrupled in northern YELL during the 2000s and grazing became more concentrated and prolonged in certain areas (e.g., Lamar Valley) compared to the more dispersed and seasonal grazing by elk. Grass consumption by abundant bison during 2012 to 2014 was higher (49%) than when elk were the dominant grazers (31%) and exceeded 70% annually in some areas.
- Climate is a primary factor influencing grass production because variations in precipitation and temperature strongly influence soil moisture which, in turn, limits production. As a result, variations in weather among years contribute to large variations in grassland production. Also, the proliferation of nonnative plant species since 2005 has fundamentally changed the composition and production of some grassland communities in YELL.

Current Status:

- During 2012-2014, biologists performed mechanical removal experiments to test the response of grasslands to controlled, simulated grazing. Total aboveground production was maintained even when clipping intensity (i.e., removal of leave tissue) reached 80%. However, removal of more than 30% of annual production reduced standing crop available at the end of the growing season.
- Since 2012, biologists have been documenting changes in the amount of above-ground production, percent consumption by the grazing community, soil nutrient availability, soil organic matter, plant composition, bare ground, and litter at 30 sites in high-use bison areas in YELL. A summary of findings to date could be produced by December 31, 2018.
- Biologists are completing a remote sensing analysis using satellite data to classify vegetation communities based on spectral signatures, with field staff ground-truthing sites to improve mapping precision. Also, biologists are using real-time GPS data recorded from Iridium telemetry collars fit to bison to generate use surfaces/maps. Staff are visiting sites to collect standing crop estimates.
- By November 30, 2018, biologists will estimate (1) the forage capacity of habitats in YELL for bison using park-wide annual production estimates generated from remote sensing satellite data, (2) recommended stocking rates based on livestock models, and (3) current stocking rates using bison aerial counts and utilization distributions estimated from radio-collared bison.
- Before requesting the Bureau of Land Management conduct a habitat and AUM evaluation during 2019, it would be necessary to define what constitutes a good evaluation of habitat and carrying capacity for wild bison. Rangeland managers focus on indicators of grassland condition such as plant species composition, amount of plant litter and soil erosion, extent of standing cover and bare ground, and whether grazing patterns are moderate and uniform with high standing biomass and low grazer abundance. Conversely, wildlife ecologists focus on net aboveground production, spatial and temporal heterogeneity, energy flow and nutrient cycling, biodiversity, and ungulate body condition. These focuses (state versus processes) would need to be coalesced.
- To advance the Interagency Bison Management Plan and the restoration of plains bison, there is a need to restore seasonal movements of bison across jurisdictional boundaries to conditions resembling those for other ungulates in the Yellowstone area. This restoration would contribute to the National Park Service mission of preserving wildlife and the ecological processes that sustain them for the benefit and enjoyment of people.
- Managing Yellowstone bison more intensively like livestock on a ranch would be a set-back for restoration and would likely lead to intense negative publicity, civil disobedience, litigation, and further attempts to list plains bison as threatened pursuant to the Endangered Species Act; which would constrain future management options.

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