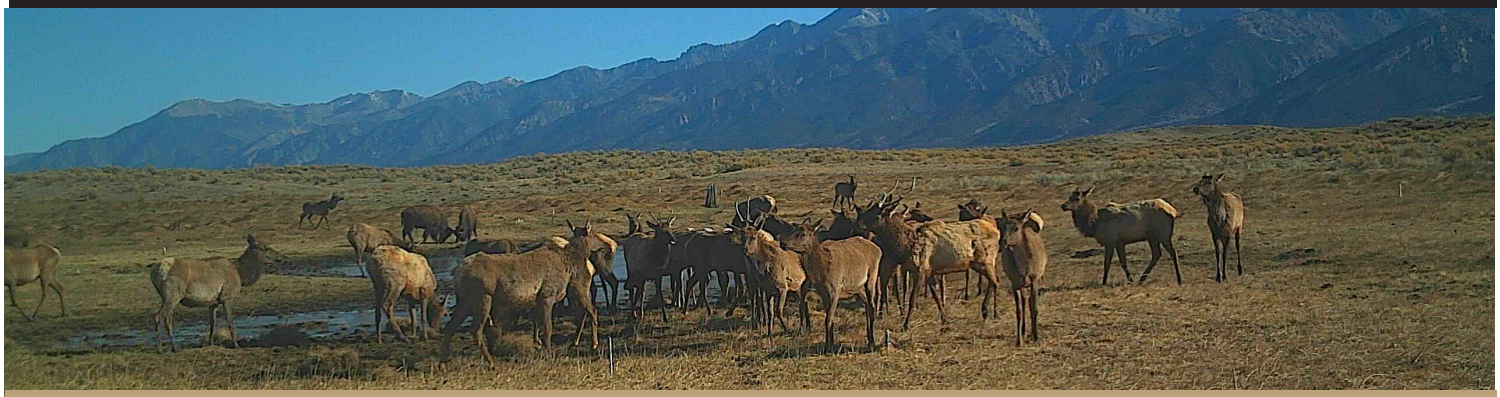
Rocky Mountain Network
RESOURCE BRIEF

National Park Service
U.S. Department of the Interior

Inventory and Monitoring Division
Natural Resource Stewardship and Science



How Much is Too Much: Ungulate Use of Wetlands in Great Sand Dunes National Park, 2016–2019

Heavy Ungulate Use of the Wetlands

In recent years, something new and concerning caught the attention of staff at Great Sand Dunes National Park. Elk were using the sandsheet wetlands more and more. Monitoring from 2016 to 2019 by the NPS Rocky Mountain Inventory and Monitoring Network and park staff revealed that heavy use by ungulates (hoofed mammals) was degrading many wetland sites. Added to the region's history of livestock grazing, park managers realized that they needed a plan to better understand and protect these biologically rich but sensitive wet areas.

In 2019, a framework for finding a healthy balance between ungulates and wetlands was published as the park's *Ungulate Management Plan*. This involved various management "actions" to reduce ungulate use of sensitive wetlands.

Adaptive management requires that any good plan needs a way to measure its success and adjust accordingly. To do this, the plan called for scientifically rigorous ways to measure ungulate use in the park and link that to the health of wetlands. While ungulates can have positive impacts on the landscape, the park needed ways to specifically measure and manage the negative impact from overuse. These measurement tools could then be applied before and after ungulate management to assess how well it was working. One source of information for these measurements was ongoing monitoring of wetlands in the park since 2010. This article summarizes a report[1] of the park's baseline conditions from 2016 to 2019 and potential tools derived that could help implement the park's ungulate management plan.

How Do We Measure Wetland Use?

The first step in protecting the wetlands was to clearly define disturbances. The park needed accurate estimates of when, where, and how intensely ungulates were using the park's woody and herbaceous wetlands.

The tools

Dung counts, radio-collars (telemetry), and motion-triggered camera surveys have all been used to learn about ungulate use of the park. Because each method has its strengths and weaknesses, the network designed a way to measure ungulate use intensity that combined the best information from each. These Ungulate Use Indexes, for both herbaceous and woody wetland types, mapped when and where ungulate use was heaviest and could also help steer management action.

What we learned

The Ungulate Use Indexes showed heavy wetland use in the park at most of the wetland sites monitored. Use was roughly twice as high inside a bison fence bounding a large portion of the southwest section of the park where both elk and bison ranged, especially in herbaceous sites, compared with outside the fence, where elk primarily ranged.

Timing-wise, bison and elk moved with the seasons. In spring, elk used herbaceous wetlands most heavily near a lake in the southwest corner of the bison pasture and in the southeast corner of the bison pasture, inside and outside of the fence. In summer and fall, elk concentrated in woody wetlands around Sand Creek in the bison pasture. In winter, elk heavily used the area north of the bison pasture up to Deadman Creek. Also in winter, both bison and elk shifted towards the northwest corner of the park near the Baca National Wildlife Refuge.

How Are Wetlands Doing in the Park?

The next step was to measure how wetland condition responded to ungulate use. The park needed a repeatable and easily measurable way to score wetland condition in relation to ungulate use.

The tools

Building on the Ungulate Use Indexes, the network identified two ways to measure wetland health: 1) several hand-picked metrics, and 2) the Wetland Condition Index (WCI)—an overall index of health. Park staff chose the hand-picked metrics based on management needs and experience. The WCI was carefully modeled from both woody and herbaceous wetland data.

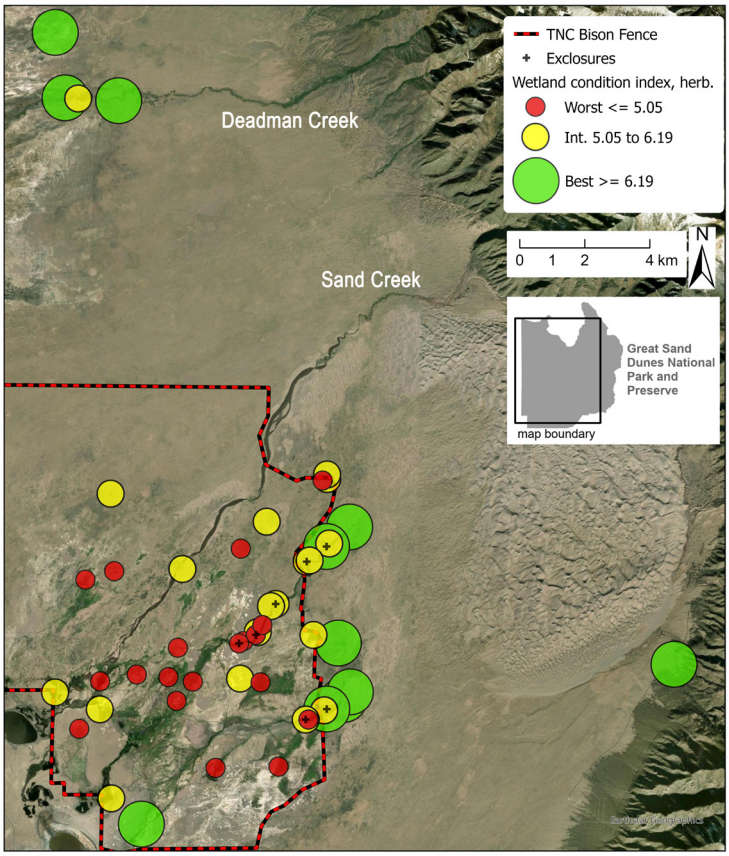


Fig 1. Herbaceous wetland conditions in Great Sand Dunes NPP, CO, 2016–2019. Bison are managed by The Nature Conservancy (TNC) inside the fence. "+" = ungulate exclosure. "Int." = intermediate.

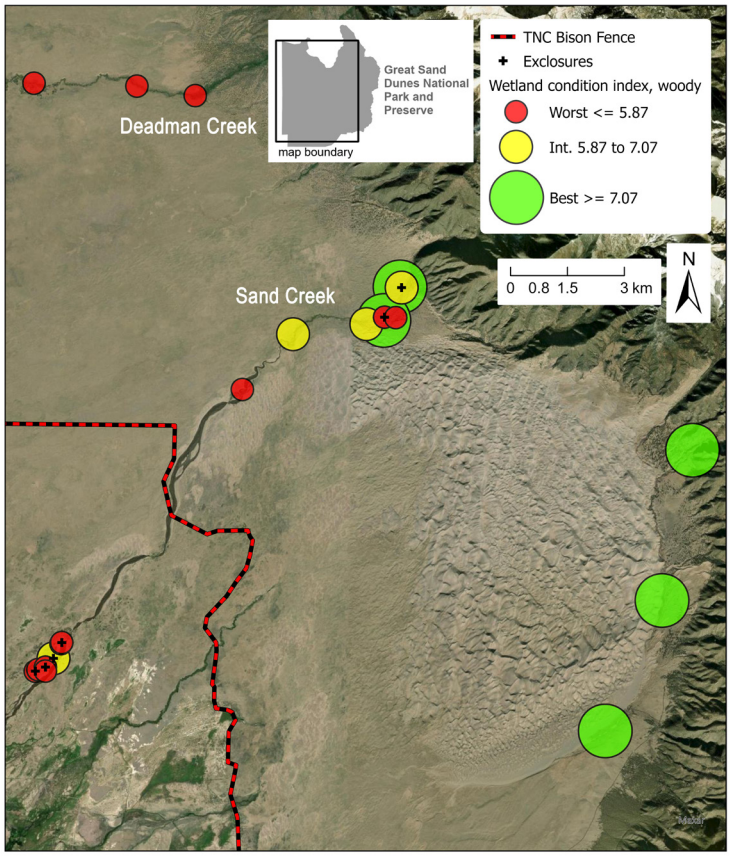


Figure 2. Woody wetland conditions in Great Sand Dunes NPP, CO, 2016–2019. Bison are managed by The Nature Conservancy (TNC) inside the fence. "+" = ungulate exclosure. "Int." = intermediate.

Hand-picked metrics

The following hand-picked metrics were readily measurable and specifically meaningful for park managers:

- density of browsed willow and cottonwood
- cover of two plants that thrive in disturbed habitat: Rocky Mountain iris and silverweed
- cover of grasses that are highly sensitive to disturbance
- prevalance of plants that thrive in wetlands

Wetland Condition Index (WCI)

The WCI is like the Dow Jones Industrial Average, synthesizing multiple inputs into a single score. The index tightly predicted the relationship between wetland condition and ungulate use. It also accounted for environmental factors that can influence wetlands, like climate and water availability. Managers now have a reliable tool to predict wetland condition in response to ungulate management.

Defining best, intermediate, and worst condition

The hand-picked metrics and the wetland condition indexes provide numeric scores. But how can these numbers guide management? How would we know when conditions might have changed in a meaningful way? Using on-the-ground knowledge of park conditions, cutoff points were set for three categories: best available condition, intermediate condition, and worst condition. These cutoff points can help determine when a site has moved from one condition class to another.

More Information

[1] 2016–2019 baseline ungulate use and wetland condition report (https://irma.nps.gov/DataStore/Reference/Profile/2309023)

Rocky Mountain Inventory & Monitoring Network—Wetlands

What we learned

In herbaceous wetlands, which were mostly inside the bison fence, 22% of sites were in best condition and 39% were in worst condition. Conditions were worse at sites inside the fence, where both bison and elk grazed, but improved with distance outside the bison pasture (Fig. 1).

Woody wetlands, which occurred mostly outside of the bison fence, fared slightly worse. Only 18% of sites were in best condition, and 66% were in worst condition. As with herbaceous sites, the worst conditions occurred inside the bison fence. Wetland condition generally improved at sites with distance outside the fence, except along Deadman Creek and at some sites along Sand Creek near the mountain front (Fig. 2).

Applications

With 2016–2019 baseline wetland conditions in hand and ongoing monitoring information available, park staff will be able to compare wetland conditions before and after elk management, which began in 2020. This will show how well, and where, management actions are having the desired effect. For example, improved wetlands will likely show less browse on willows and cottonwoods.

This analysis of wetland condition in the park included suggestions about where and when to focus ungulate control and how to improve the design of exclosure fences. Using the Wetland Condition Indexes with continued monitoring will help the park achieve its goal of a healthy balance between ungulate use and wetland conditions.