

Yellowstone's Prehistoric Bison: A Comment on Keigley (2019)



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On the Ground

- We provide additional information addressing the issue of whether American bison (*Bison bison*) were generally absent or present in Yellowstone National Park prior to its establishment in 1872.
- Our results support Keigley's conclusion that bison herds before the mid-1800s were absent in Yellowstone National park, and particularly the park's northern range.
- Our results also support Keigley's conclusion that bison had no significant role in the ecological processes that helped shape the park's original landscape.

Keywords: bison, Yellowstone National Park, Native Americans, market hunting.

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Keigley undertook an analysis and synthesis of several lines of evidence, including archeological information, Native American practices, and early Euro-American reports, to assess the potential presence of bison (*Bison bison*) in the area that was eventually to become Yellowstone National Park (YNP).¹ Overall, he found this “array of evidence” indicated bison herds were absent in YNP before the mid-1800s. Herein we provide additional information on the presence and absence of bison prior to the 1872 establishment of YNP, with particular emphasis regarding the park's northern ungulate winter range, or “northern range,” as well as its Lamar Valley. Currently as many as 4,000+ bison, well above historical population norms for the park, utilize YNP's northern range throughout the year. And, in the northern range's Lamar Valley, high bison densities have had major impacts to soils, riparian and wetland vegetation, and stream and river channels (Fig. 1).^{2–5}

Gates and Broberg indicated that humans utilized Yellowstone from the early Holocene until about 3,000 to 1,500 years before present, after which the abundance of archeological material diminished coincidentally with the Little Ice Age (ca. 1450 to 1850).⁶ Increased climate severity during the Little Ice Age likely reduced ungulate populations in mountainous areas and may explain the diminished archeological material during that period. Deep snow accumulations in mountainous areas can significantly affect forage availability for grazing animals and these patterns often strongly correlate with migration to lower elevations.⁶ If severe winters were a common occurrence during the Little Ice Age, it would seem unlikely that bison would have overwintered in mountainous areas such as those represented by Yellowstone's northern range.

The journals of Osborne Russell in the 1830s provided the earliest Euro-American observations of bison abundance and distributions in the YNP area. Keigley's review of those journals indicated that reports of bison were frequent for areas outside the park; however, there was not a single reporting of bison inside the park, a contrast suggesting an absence of bison in YNP.¹ In the 1830s, as well as previous decades, Sheepeaters (Shoshone speaking Native Americans) were the primary occupants of the area that eventually was to become YNP and its surrounding areas. In summer they went high into the mountains in pursuit of “mountain sheep” (i.e., bighorn sheep; *Ovis canadensis*), whereas in winter they settled along sheltered creek or river bottoms with access to “elk, sheep, deer or even bison” (p. 46).⁷ Janetski reported that Russell found the Sheepeaters in the Lamar Valley to be “neatly clothed in dressed deer and sheep skin” (p. 40).⁷ It was further noted that because of the quality of their tanned deer, elk, and sheep skins, the Sheepeaters were “able to trade them to Plains groups for buffalo robes” (p. 48).⁷ These observations provide additional merit to a conclusion that there was a general absence of bison inside the park in the early 1800s.

Following the extermination of bison herds on the Snake River Plains, Keigley indicates Bannocks and Shoshone began to regularly traverse the park, across the current-day northern range and specifically through the Lamar Valley, on their way



Figure 1. Example of ongoing impacts by bison to Rose Creek in the Lamar Valley where compaction and trampling by historically high numbers are contributing to streambank collapse, as well as channel widening and incision. In addition, intensive bison herbivory is preventing establishment and growth of riparian plant communities (e.g., willows, cottonwoods, sedges), thus preventing them from providing root strength (bank stability), litter and insect inputs to the stream, and shade from vegetation canopies that mediates water temperature.

to buffalo grounds on the plains in southeastern Montana.¹ These transits of the park apparently occurred from ~1840 until the late 1870s.⁷ It seems doubtful that Bannocks and Shoshone would have consistently journeyed to the east side of the Rocky Mountains in search of bison had there been significant numbers of these ungulates present within the park's northern range.

Kay undertook a compilation of wildlife observations from the journals of early trappers and explorers where he "systematically recorded all observations of ungulates and other large mammals found in 20 first-person historical accounts of exploration in the Yellowstone area from 1835 to 1876" (p. 251).⁸ He evaluated a total of 765 observation days. Within the Greater Yellowstone Ecosystem, bison composed 3% or less of the total number of ungulates reported in these journals as "seen" or "killed." Based on the reported relative scarcity of both ungulates and large carnivores, Kay concluded that "ungulates were not historically abundant in and around Yellowstone National Park" and that "bison were rare" (p. 288).⁸

In another assessment of wildlife occurrence and abundance in and around the park, Schullery and Whittlesey synthesized observations and reports from between 1806 and 1881.⁹ Although bison, sometimes in large numbers, were occasionally witnessed at lower elevations outside the park in early reports, any bison inside the park were infrequently reported up until about 1870 and there were no specific reports identifying bison herds in or near the northern range's Lamar Valley prior to 1870. However, starting in the early 1870s the occurrence of reported bison in the park became more common and bison herds of several hundred or more

were sometimes observed. P. Norris, who later would become the park's first superintendent, reported in 1880 there were about 600 bison in the park, consisting of three herds.⁹ This apparent increase in park bison during the 1870s occurred at a time when bison on the Great Plains were approaching extermination due to market hunting.¹⁰ Heller indicated that bison in the early years of the park had been largely "derived from the original remnant of our great western herd" and owed their preservation to the fact that they consisted of "individuals which voluntarily or under pressure from the hunters on the plains chose to winter in the Yellowstone Park region" (p. 458).¹¹

The age structure of long-lived woody species provides another perspective of ungulate populations in the 1800s. For example, from 1800 through the early 1900s there was a trend of an increasing number of cottonwoods (*Populus* spp.) per decade in the Lamar Valley, indicating that ungulate levels during that period were not sufficiently high to prevent the establishment of cottonwood trees.¹² The resultant "j-shaped curve" for number of cottonwood trees vs. decade represented an expected relationship where young cottonwoods had, over time, been able to consistently grow above the browse level of ungulates. Thus, even if bison or other ungulates utilized the northern range during the 1800s, their numbers were sufficiently low that a continuous recruitment of cottonwoods was able to occur.

Yellowstone's bison have been managed by the Park Service since the early 1900s and these practices shed further light on the issue of seasonal migration patterns that might have occurred prior to park establishment. From 1902 to

1952 northern range bison were fed hay inside the park every winter, and from 1913 to 1932 nearly 7 km of woven wire fence were maintained along the northern boundary of YNP to prevent bison and other ungulates from leaving the park.¹³ After bison culling inside the park was stopped in 1968, a policy of boundary control was adopted by the Park Service to prevent them from leaving the park, a policy that variously included hazing to keep them inside and, in some cases, the shooting of bison that approached the boundary.¹⁴ Thus, the extent to which winter weather and snowpack accumulations might normally drive bison to lower elevations and eventually out of the park has generally been thwarted by Park Service management practices over the last century. That these various practices (i.e., supplemental winter feeding, boundary fences, and hazing) have been a long-term component of bison management strongly suggests that the northern range was not a preferred wintering ground for bison.

We are unaware of any journal or historical account confirming the occurrence of bison herds on the northern range before the 1870s. Furthermore, the climatic conditions of the Little Ice Age and associated archeological data, observations about Lamar Valley Sheepeaters' clothing, use of the park's northern range as a route by Shoshone-Bannocks to obtain bison in eastern Montana, and a continuous record of cottonwood recruitment in the Lamar Valley during the 1800s provide additional insights and indicate an absence of significant bison numbers prior to park establishment. Collectively, these various lines of evidence are supportive of Keigley's conclusions that 1) bison herds were absent before the mid-1800s, and 2) they had "no significant role in the ecological processes that shaped YNP's prehistoric landscape" (p. 1).¹

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