



Response To "A Rebuttal To 'Reinterpreting The 1882 Bison Population Collapse'"

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On the Ground

- The generally accepted ancestral bison herd size, the existing records and estimates of bison slaughter, and the contention that bison were hunted to extinction do not add up.
- Defending the hypothesis that bison were slaughtered to extinction requires adding unreasonable millions to the slaughter estimates or reducing the projected ancestral bison herd to about five million.
- A more reasonable approach is to assume bison were also dying at a high rate because of other factors, such as disease.
- I believe the disease rate was exacerbated by the loss of intelligent human grazing management practiced by the Original American First Nations.

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There seems to be a great deal of agreement between my article and Dr. Irving's comments. I would like to first focus on the following areas of agreement:

- 1) **Bison are believed to have been very numerous in North America in the early 1800s.** The ancestral herd estimate extremes that I have seen are 21 to 88 million animals (<https://doi.org/10.1016/j.rala.2019.06.003>).¹

"Bison were numerous in North America before expansion of European culture, that fact is not in dispute" (<https://doi.org/10.1016/j.rala.2019.06.003>).¹

"in the period of 1872-1874... there were perhaps 10 millionâ (<https://doi.org/10.1016/j.rala.2019.06.003>).¹

"generally accepted 20 million that remained in the 1840 time frame" (<https://doi.org/10.1016/j.rala.2019.06.003>).¹

These comments by Dr. Irving indicate that he does not challenge my assertion that the North American bison herd in the 1800s is believed to have numbered in the tens of millions. Indeed, he seems to consider this belief to be accurate. (I ask only that my reader concede that the belief exists and is widespread.)

- 2) **Historical records of bison slaughter fail to account for the number of bison believed to have been slaughtered, assuming tens of millions of bison hunted to extinction.**

"... the period of 1872-1874 when 3.6 million were slaughtered." "From 2 corners of the northern herd... 140,000 hides..." (<https://doi.org/10.1016/j.rala.2019.06.003>).

Dr. Irving calculates that one hide equals five dead buffalo. Hornaday says this was the case in the south in 1871 because people knew "little of the proper mode of curing hides" and "[t]his condition of affairs rapidly improved" (p. 495).² Hornaday states that each marketed hide, "... in 1872 represented three dead buffaloes, in 1873 two, and in 1874 one hundred skins delivered represented one hundred and twenty-five dead animalsâ (p. 499).² When estimating kills in 1881 to 1883 in the northern range, perhaps less prone to spoilage, I used two dead animals per marketed hide, as in 1873.

"Between 1841 and 1874 the [Red River] hunt harvested 3,419,819 bisonâ | 103,631 bison per yearâ |â

This comment is fascinating. Hornaday² wrote that the Red River Hunt killed 652,275 bison between 1820 and 1840. Roe³ calculated the 1841 to 1874 numbers using Hornaday's method in order to show how flawed Hornaday's method was. Roe calls his own calculation "hypothetical carts" and says,

“The meticulously minded may demur to the above, on the ground that extant evidence explicitly denies it. Precisely the same objection applies to Hornaday’s computations covering 1820–40” (<https://doi.org/10.1016/j.rala.2019.06.003>). Although this figure was fabricated by Roe expressly to mock Hornaday’s calculations as baseless exaggeration, even Dr. Irving says, “Taken at face value, one could argue this was a sustainable harvest” (p. xxx). Hornaday was particularly fascinated by the Metis Red River Hunt, because he felt it supported his thesis that the “American’s” bison were destroyed by foreigners, in his mind, visiting citizens of Europe and members of Original American nations. As an example, Hornaday wrote, “... the Indians of all tribes... killed an immense number of buffaloes every year... They were too lazy and shiftless to cure much buffalo meat...” (p. 499). Roe, in criticizing Hornaday’s numbers from the Red River Hunt, seemed at least partly intent on defending the “half-breeds” from what he saw as the “injustice” of Hornaday’s racist agenda (p. 412).³ My personal sympathies lie with Roe.

Incidentally, I did not write “100,000 per year.” I quoted a source that stated the kill rate was “hundreds of thousands... annually” (p. 11-13)¹ and agreed that this matched with the sources I’d consulted, if it was considered loosely to mean somewhere between two hundred thousand and slightly over a million.

- 3) **Because bison definitely nearly went extinct, additional explanation is necessary.** I myself see three possible alternate explanations. A.) There were not tens of millions of bison. The huge herds are a myth. (My calculations came to about five million total bison ever in all of North America, if they were exterminated by the recorded hunting.) B.) The estimated kills are wrong. In order for 60 million bison to be exterminated from 1730 (Hornaday’s origin of the disappearance) to 1883 (using an annual increase of 1.1, conservatively calculated from the Brucellosis-infected Yellowstone bison increase⁴ as compared with Dr. Irving’s estimated increase factor of 1.25 and the 1.125 increase factor estimated by Koucky,⁵ which I used in the chart in my article), 6,000,003 bison would have to be killed every year, adding to a total of 913,405,015 bison slaughtered. One could question if nearly a trillion rifle shells were even manufactured from 1730 to 1883. C.) Bison increase was not healthy and normal. Because increase includes both calves born and animals dying of causes other than hunting, an unhealthy increase can actually be a substantial decrease. Thus, the calculations in B) indicate that for every animal killed by a hunter, one to five died of disease, starvation, thirst, exposure, or bogging, depending on whether the original herd numbered 20 or 60 million (Dr. Irving estimates 40 million). The explanation Dr. Irving favors is not entirely clear, probably a combination of B) and C), referred to as “civilization.”

“[T]here was a relentless wave of ‘civilization’ that proceeded from the eastern United States that eliminated bison in its path...” “... the continuous pressure of ‘civilization’” “It is reasonable to conclude that ‘civilization’ would have done the same thing all along the eastern and southern side of the bison domain in the U.S.” (<https://doi.org/10.1016/j.rala.2019.06.003>)

I basically agree that “civilization” was responsible for the deaths of the hundreds of millions of bison unaccounted for in the slaughter estimates. The interpretation that I propose, and it is merely my interpretation, can be stated with the following assertions: Grazing management is a worthy study and not irrelevant to ecosystem health. Loss of grazing management can be catastrophic. The original American peoples were talented grazing managers with effective methods developed over 14,000 years. Because of extensive trade routes, before Original Americans in North America were “discovered” by Europeans of English and French origin, they had already been devastated by European diseases brought to Central and South America by the Spaniards. (For instance, the Blackfeet were devastated by a smallpox epidemic in 1780-81,⁶ 25 years before the Lewis and Clark expedition.) Without management, the bison herds increased exponentially and damaged the functioning of the energy flow, water cycle, and nutrient cycle in their ecosystem, as has been documented with hands-off-managed bison in Yellowstone Park.⁷ “Civilization” created new and quicker routes of disease transmission. The weakened herds in their damaged environment died of epidemic, starvation, etc.

- 4) **Bison harvest in the 1800s was not sustainable.** This is true. But the reason it is true is because equal or greater numbers of bison were also dying of other causes, particularly disease. Because the slaughter has been covered pretty extensively, I would like to spend a little time considering the other causes. After all, the slaughter was carried out at a truly mind boggling level, and the other causes seem to have been still more devastating. What is the number that comes after “mind boggling”? And should we not care why that many bison were dropping dead?
- 5) **Roe’s work is a glaring omission from my study.** I am deeply grateful to Dr. Irving for bringing it to my belated attention. I look forward to reading it carefully from the standpoint of the new “rangeland management is meaningful” paradigm. It is impossible to become adequately acquainted with such a dense work of scholarship in the 5 days since my copy showed up in the mail, but just glancing through it is intriguing.

I found several places where Roe chastised earlier authors for inflating slaughter rates and creating mathematically unreasonable models. He seemed to have been frustrated by the generally accepted equation: tens of millions plus

millions minus hundreds of thousands equals zero, but found no reasonable alternative. Koucky wrote,

In 1926, while hunting on the former northern buffalo range, I saw a cluster of buffalo skeletons arranged much like a herd of cows lying on a meadow. I examined the skeletons and, with my training as a pathologist, could find no suggestion that the animals had been killed. They had simply laid down and died. Obviously, the entire herd had been sick (p. 28).⁵

Koucky also found reports providing,

direct evidence of intimate contact between domestic cattle and the buffalo in 1880–81 in the Blackfeet country where the disappearance of the buffalo was first observed and in the year when this first occurred. These cattle had originated in the southern states where tick fever was endemic (p. 562).⁸

Tick fever in cattle has an 81% death rate.⁸ What might Roe's fine intellect have done with this information had it been available to him in 1951, especially if he had been able to combine it with Goodnight's report that bison, supposedly animals that can migrate, "had remained until the grass was gone, and had died from starvation by thousands and thousands" (p.85) with good grass only 30 miles away across a divide?⁹ To reiterate Koucky, obviously the entire herd had been sick.

I am intrigued by the report Dr. Irving mentions by William Blackmore in 1873 of 40 miles of carcasses along the Arkansas River.³ Roe quotes Blackmore as saying, "hunters had formed a line of camps along the banks," (p. 418) but it isn't clear from the brief quotation if Blackmore actually saw the camps or merely conjectured them. Then, as now, everyone knew that any dead buffalo had been killed by hunters. Anthrax is more deadly than tick fever, is spread in contaminated water,⁸ has a strain found in Iowa, Nebraska, and the Dakotas (just north of the Arkansas River) that has been in North America for 13,000 years,¹⁰ and was probably responsible for a bison epidemic in Nebraska in 1825 and possibly in 1858 in the Platte River Valley⁵ (again, not far north of the Arkansas River) (R. A. Stoneberg, personal communication, 2010). Did Blackmore see evidence of yet another of the devastating epidemics that slew millions of bison?

I also noticed in passing that Roe discussed some records of the ecological degradation that I have attributed to the loss of intelligent grazing management. I find this stunning. According to Dr. Irving, Roe's work was conducted from the mid-30s to its publication in 1951. I am not intimately familiar with Roe's native range, but I know that my native range in the 1930s was suffering from the same lack of management and the same ecological degradation that I believe occurred in the early 1800s. In the 1930s, domestic herds were very large because of the homestead rush, and grazing management was in its infancy. I would think no less of Roe if, coming from that environment, he believed that unhealthy rangelands were in their natural condition,

but my brief glimpses of his book convince me that he sensed something was not right with the bison range.

- 6) **About 700,000 bison were slaughtered in the northern herd in 1881.** The chart that occurs in my article actually shows 635,000 bison slaughtered in 1881 and 685,000 slaughtered in 1882. Those numbers are fairly consistent. If you recall, I had a smaller waste factor than Dr. Irving, but I also included hides shipped by the Northern Pacific Railway and a generous factor for Original American use.

Despite so much agreement, Dr. Irving and I do disagree over some of the mathematical models. I remain unconvinced that the answer to the discrepancy between the projected ancestral herd and the slaughter estimates, which include waste factors, tribal harvest factors, and homesteader harvest factors, is to merely keep adding additional millions to the slaughter estimates. Much more convincing is the conclusion that the herds were unhealthy and therefore lacked the natural increase that would have made the slaughter rates sustainable. This conclusion is supported both by relatively abundant historical records of an unhealthy ecosystem with unhealthy bison and by evidence from Yellowstone Park that bison can overpopulate and negatively impact their environment.⁷

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