



# BUFFALO FIELD CAMPAIGN

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Matthew Hogan, Regional Director  
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**RE: Yellowstone bison 12 month status review (FWS/R6/080098)**

**Determining the loss, destruction, and curtailment of Yellowstone bison's indigenous range.**

Dear Regional Director Matthew Hogan,

On behalf of Buffalo Field Campaign, I am attaching the following publication for your consideration which speaks for itself:

Jeff M. Martin et al., *Integrated evidence-based extent of occurrence for North American bison (Bison bison) since 1500 CE and before*, Ecology 104(1): e3864 (2023).

The best available science requires a determination documenting the loss, destruction, and curtailment of the Yellowstone bison population's indigenous range in the Greater Yellowstone bioregion.

One published "approximation" is based on recordings made by European Americans in a period of time when bison were being extirpated across their indigenous range. Plumb et al. 2009 at 2377, 2378 ("an approximation of pre-settlement distribution based on archived reports and journals of expeditions through the area" covering 20,000 km<sup>2</sup> or 4,942,108 acres of habitat from the headwaters of the Yellowstone and Madison Rivers to the lower valleys). The authors did not discuss the methods and reasoning supporting their approximation of an 85% loss in the Yellowstone bison population's range and habitat. Glenn E. Plumb et al., *Carrying capacity, migration, and dispersal in Yellowstone bison*, Biological Conservation 142: 2377-2387 (2009).

The loss, destruction, and curtailment of Yellowstone bison's indigenous range and habitat is an important factor in determining whether the isolated population is threatened or endangered in the wild.

In order to assist efforts informing the International Union for Conservation of Nature's Red List and Green List assessments and benchmarks for recovering species, Martin and fellow authors published a multi-disciplinary evidence-based dataset of 6,438 high quality observations of bison to arrive at a maximum distribution of 13,065,476 km<sup>2</sup> or 59.1% of continental North America.

*"Protecting the Last Wild Bison"*

While we present a historic EOO [extent of occurrence] for bison since 1500 CE below, it is conceivable to create extents of occurrence for bison in various other time periods. That is, other time periods may be of particular interest to explore effects of earliest human arrival or climatic changes over the deeper geologic records. For example, one component often omitted from the literature is the role of global climatic conditions during the late Holocene, especially the Medieval Warm Period (MWP; 950–1250 CE,  $\approx$ 700–1000 yBP), the subsequent Little Ice Age (LIA; 1450–1850 CE,  $\approx$ 100–500 yBP), and the transitional phase between these two events. The approximate 2.5°C global temperature difference between these two events would have caused drastic changes in animal biogeographic distribution (Koch and Barnosky 2006, Wanner et al. 2008, Trouet et al. 2009, Viau et al. 2012). The former, MWP, would be more like the temperature conditions currently experienced across the globe. The latter, LIA, was accompanied by colonial westward expansion, introduction of exotic livestock species (i.e., cattle (*Bos taurus*), horses (*Equus caballus*), sheep (*Ovis aries*), etc.) and associated novel diseases (i.e., Texas tick fever, bluetongue, malignant catarrhal fever, etc.), and overharvesting of game populations (Hornaday 1889, Stoneberg Holt 2018). However, during the MWP, the human population was less numerous and largely Indigenous, and the anthropogenic pressures were likely less compared to LIA or today (Hill et al. 2008), offering a more “natural” biogeographic distribution of animals especially in North America. Therefore, mapping the historic EOO of bison during this time is critical for a more accurate and comprehensive baseline assessment of bison restoration and understanding their former realized niche prior to being anthropogenically driven to near extinction during a time similar to current levels of global warming at approximately 1°C above the 20th century average.

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Although impending climate change is expected to alter the geographic distribution of fundamental abiotic and realized biotic ecological niches for bison, it is likely that the maximum extent of observations (i.e., presence/absence) in the historical and prehistorical record may assist in elucidating regions of increased macroevolutionary selection, patterns, and processes. Thus, reintroducing bison into these areas may be of considerable interest for conservation of the species in anticipation of further climate change, agricultural intensification, urban encroachment, and land use/land cover change.

Martin et al. 2023 (Metadata S1).

The U.S. Fish & Wildlife Service thus has a reliable dataset and the scientific expertise to more reliably determine loss of range and habitat for various time periods, and for examining various factors, such as climate change, that threaten or endanger the persistence of Yellowstone bison in their indigenous range.



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