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Transforming Department of Interior Bison from Livestock to Wildlife

Lee Jones, Ungulate Health Specialist, Wildlife Health Office, USFWS, National Wildlife Refuge System, Natural Resource Program Center, 10 E. Babcock Rm 105, Bozeman, MT 59715; lee_c_jones@fws.gov

Peter Dratch, Lead Biologist, Inventory and Monitoring Program, USFWS, National Wildlife Refuge System, Natural Resource Program Center, 1201 Oakridge Drive, Fort Collins, CO 80525; peter_dratch@fws.gov

In the last 200 years, North American plains bison have moved across a spectrum of species recovery and restoration. From the brink extinction with only 1,000 remaining, bison were managed in captivity as zoo exhibit animals or livestock, then progressed to intensively managed wildlife to lightly managed and monitored wildlife, and finally in a few places to free-ranging animals (Figure 1). Captive and intensive management is essential in the early phases of species recovery, but when compared to elk, deer or wild sheep, it's clear that bison have been left behind.

When considering the pathway of a species from extinction to restoration, it's worth noting that extinction can occur in two ways. Demographic death of a species occurs when the last individuals of a species are gone. Genomic extinction occurs when the genetic makeup of a species changes substantially. Bison have progressed beyond the first hurdle thanks to the diligent efforts of early conservationists such as Hornaday (1889), but we now face the challenge to prevent genomic extinction through domestication of plains bison in conservation herds.

Molecular markers are powerful methods of ever-increasing resolution that can be used to learn more about genetic variation and the results of early hybridization experiments with cattle. The primary methods used are DNA marker microsatellites, powerful tools used for population differentiation and detection of introgression; mitochondrial DNA haplotyping, subject to selection, commonly used for maternal lineage diversity, also providing additional information on introgression; and single nucleotide polymorphism (or SNPs) that have the most resolution across the

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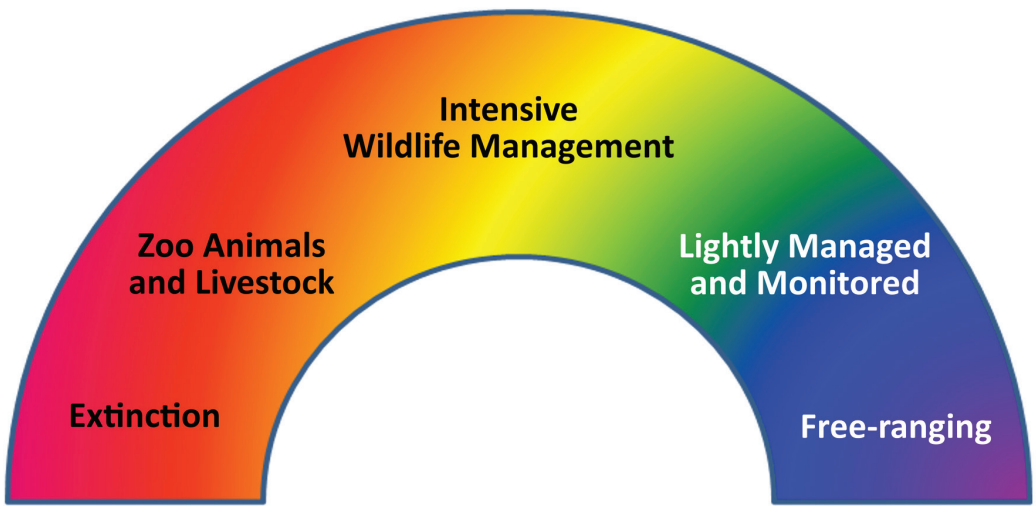

Figure 1. Restoration efforts for wildlife species, including North American plains bison, have generally moved through this spectrum of management. Plains bison currently exist across this spectrum.

genome. These methods are commonly used in livestock production for genetic trait selection in domestic animals, but can also be employed to conserve genetic diversity within herds (Giglio et al. 2016).

In DOI conservation herds the goal is to preserve wild bison. A wild bison is a member of a herd with a large enough population size to prevent loss of genetic variation and with low levels of cattle or subspecies introgression, and subject to some of the forces of natural selection, including breeding competition (Dratch and Gogan 2010).

In the past decade, we have made significant progress towards improving Interior conservation of wild bison, and we elaborate on seven steps forward in managing plains bison conservation herds as wildlife:

- Minimize round-ups and handling, as injury or mortality can impact an animal's fitness.
- Continue to let animals die of disease to allow for the development of natural disease resistance.
- Introduce predators where possible, as an important component of natural selection.
- Explore alternative genetic sampling techniques as needed, such as using remotely delivered biopsy darts.
- Augment herds as warranted to restore gene flow across large, fragmented landscapes; and increase the size of the wild plains bison metapopulation.
- Donate surplus bison to support the wildlife value of bison for conservation and cultural purposes, including developing alternative funding mechanisms to support management of conservation herds.

- Restore bison to their former ecological role on large landscapes.

With continued expansion of human-altered landscapes and increasing effects of climate change, restoration efforts will have to consider historic population patterns and future conditions. Moving bison restoration forward will take conscious effort and commitment, and incorporating these seven steps into conservation herd management will conserve the wild character of DOI bison.

The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

References

Dratch, Peter A., and Peter J.P. Gogan. 2010. Bison conservation initiative: Bison conservation genetics workshop; report and recommendations. Nat. Res. Rep. NPS/NRPC/BRMD/NRR—2010/257. Fort Collins, CO: NPS. www.nature.nps.gov/biology/documents/Bison_Genetics_Report.pdf.

Giglio, R.M., J.A. Ivy, L.C. Jones, and E.K. Latch. 2016. Evaluation of alternative management strategies for maintenance of genetic variation in wildlife populations. *Animal Conservation* 19:380–390. http://dx.doi.org/10.1111/acv.12254.

Hornaday, William T. 1889. The extermination of the American bison, with a sketch of its discovery and life history. Annual report of the Board of Regents of the Smithsonian Institution for 1887, Part 2, 369–548. Washington, DC: Government Printing Office. www.gutenberg.org/files/17748/17748-h/17748-h.htm.