



The ecological future of North American bison

Editor's Note: Following are remarks of Mike Soukup, NPS associate director for Natural Resource Stewardship and Science, on the occasion of the Wildlife Conservation Society meeting on the ecological future of North American bison, held in Denver, Colorado, 23 October 2006. His address rounds out the discussion of bison management in North America by sharing a context for the scientific findings of our cover article on the history and genetics of federal bison herds and examining several other important and interrelated management considerations.



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Bull bison, Yellowstone National Park, Wyoming.

Few symbols, and no other animal, are so associated with our national parks as the American bison. These great beasts were amidst the geysers of Yellowstone and an integral part of the vista that inspired creation of the first national park in 1872.

It is part of our emblem to this day. It is on the arrowhead of every National Park Service employee uniform, and at the entrance of every national park unit. The bison is the emblem for the Department of the Interior—suggesting that the bison also has a claim on the vast lands of the Bureau of Land Management and the U.S. Fish and Wildlife Service. At least two states feature the bison on their new state quarters (Kansas and North Dakota). It is part of the psyche of generations of Americans, especially as their daily lives were more circumscribed in suburbs and cities, that it is their birthright to see wild bison in a wild setting. Indeed it is the Park Service mission to fulfill that need. And for many more generations bison have been central to the culture of many Native Americans.

The reason that I was delighted to accept your invitation and join you for this meeting is that my responsibility in the National Park Service, as the associate director for Natural Resource Stewardship and Science, is to ensure that the bison and the processes under which it evolved are both understood and not lost to future generations. We are justly proud of our long record of sponsoring

observations and studies that provide understanding of the bison in its natural habitat. The process part—that's the rub—as you well know. Our task is not simply to provide herds of bison for viewing at a safe distance, on a visit to Yellowstone, or Badlands, or Theodore Roosevelt national parks. That would seem simple enough. But we must keep some part of the nation's bison wild, subject to the same selection pressures that made the animal—that is our real challenge.

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I want to spend my few minutes here on how we must face that challenge on three fronts: providing a National Park Service perspective on genetics, disease, and behavior of bison. And underlying both our understanding and our management practices in all of these fields is the issue of boundaries. The idea of discrete boundaries has been clearly drawn for the National Park Service by the Congress. (Congress has had less success impressing this upon the bison.) Bison once roamed freely across the western landscape, and evolved without regard to boundaries. That hasn't changed. Our vision for the future must realize and address that reality.

Thanks to the breakthrough in molecular genetics we know a great deal about the genetics of the NPS bison herds. They are not all equal from a genetic value. Some like the Yellowstone and Wind Cave herds, by good fortune of how they were saved or how they were collected, have significantly more variation. (Genetic studies are very recent, and were jointly supported by the U.S. Geological Survey, National Park Service, and National Science Foundation.)

Some herds have significantly less variation, but they contain genetic differences that are important to bison conservation and recovery. But some herds have too much variation; that is, they have genes that show they descend from historical crosses between *Bison* and *Bos*—between bison and domestic cattle.

Before we think about what we can do with this knowledge, it is worth remembering how we have it. The enzyme that allows us to identify these DNA markers through the process of polymerase chain reaction (PCR) originally came from a thermophilic bacterium found in the Yellowstone hot springs. And we have access to so many polymorphic markers because of the work of Drs. Natalie Halbert and Jim Derr (Texas A&M University) and precisely because of the close relation between bison and cattle, and the gene map being developed for domestic cattle.

It is not enough to know where the significant variation in our bison herds resides; we must know what it takes to maintain it. This we get from the modelers—those who can look at what we have in the genetics, life history, and ecology of the bison and tell us what we need. The National Park Service was fortunate to hire one of the best ecological modelers in the business, John Gross. These models make clear that to maintain genetic variation you need to have large herds—herds numbering in the many hundreds, or better yet, thousands.

For some small parks, the only way to achieve a sustainable population size is to manage herds at a broader scale, by moving bison between herds. But we can't do that today because of disease. The silver lining is we're lucky that we didn't do this in the past because we didn't really understand the genetics.

The National Park Service is now collaborating with the U.S. Department of Agriculture and the states of Idaho, Montana, and Wyoming to continue long-term planning processes for the eventual elimination of brucellosis from Greater Yellowstone Area bison and elk.

Why? Because just as it is troubling for us to be shooting bison that turn up in national parks because there is reason to suspect they carry cattle genes, so it is bad news to shoot bison that roam outside of national parks because they could be brucellosis carriers.

We need veterinary medical breakthroughs to remove these barriers. So the National Park Service is instigating research “for more effective vaccines, more effective vaccine delivery techniques for free-ranging wildlife, and better diagnostic techniques for identifying infection in live animals—all are priority research and development needs.” That is our commitment, as Mary Bomar, the new director of the National Park Service, pledged to Senator Thomas in her confirmation hearings.

A visitor to Hayden Valley in August is likely to get stopped by bison rutting on the road. Recently more than 2,000 bison from Yellowstone gathered with the snorting, and dust rolling, and hundreds of massive bulls competing for mates. This spectacle—this process—is one of the selection factors that influenced bison survival for eons.

Less often seen, but now well documented by biologists working year round in Yellowstone is increasing predation by wolves on bison. Molly's Pack in Pelican Valley has lived on bison in winter, and three years ago a second pack formed in Hayden Valley makes bison its exclusive winter diet. At least two other packs also make bison part of their diet. Hunting bison with fang and claw is especially dangerous because, unlike elk, bison stand their ground. There is an innate elegance in natural systems where predator and prey constantly test each other's mettle, and each other's fitness, as they vie for survival. One of the many positive aspects of wolf restoration to Yellowstone National Park is a strong, wild bison that can match any future vision we have for this species.

Selection pressures on commercial bison are obviously quite different, where competition between bulls may be secondary to weight gain, and good behavior may be docility rather than avoiding predation by wolf packs. (I think of wild animals as the pros, and domestic animals as the couch potatoes.)

So the behavioral and genetic differences between domestic and wild bison are likely to increase this century, even as we blur those distinctions in the public perception. Bison on the plains can help sell bison in the market, but they are not the same.

Which brings me back to this matter of boundaries. We in the National Park Service must be diligent in observing our boundaries. But bison are notorious in their disrespect for fences and other human-defined boundaries. As we treat them as more than symbols of the wide-open West, as we learn more about them, we can change some of our practices as well. I am confident we can do this. We began a pilot project a couple of years ago in the Southeast called the Seamless Network of Parks, which seeks common, biologically based, management practices regardless of the blend of federal and state agency lands. Perhaps one day, wild bison will freely graze the public lands set aside as bison habitat.

Our vision for the future of bison should be great herds that roam across vast expanses without detecting agency jurisdictions. Accomplishing this will take better cooperation on public lands. Strong partnerships with private landowners can make this vision a reality. We could have bison conservation areas, as we do now for bears in the Rocky Mountains. Perhaps some day bison conservation lands can be connected as corridors so that bison can move freely, and gene frequencies will not need to be managed by trucking bison from place to place. Genetically true bison that increase in these areas can provide for disease-free replenishment of bison herds whenever opportunities arise in their former native home range.

The National Park Service has and will continue to support restoration of bison as an important part of the heritage of North American cultures, and as a key species in North American ecosystems. This workshop is a key step toward achieving a common vision of restoration of bison in North America.

With a wide-reaching vision, the time could come when bison also have a visible role in the daily lives of many more Americans in the West. In some places bison will be hunted by wolves, in some places by humans, but keeping them wild will be the principle that drives decisions. If we can do that, we all will be keeping faith with those who saved these great animals from extinction. Our part is to ensure that bison have not just survived, but remain an authentic part of our heritage.

