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All but exterminated by the early 1900s, American bison (Bison bison) have made an extraordinary comeback, now numbering in the hundreds of thousands. Though bison are not an endangered species, "bison-ness"—the ecological function performed by large bison herds as they graze and interact with the landscape—is an endangered phenomenon. Restoring that ecological role is critical for the sustained health not only of bison but of North America’s grasslands and the species within them.

The continent’s grasslands evolved with bison. Moving in herds of tens of thousands, these animals churned and fertilized the soil. Their grazing patterns influenced the heterogeneity of grasslands, maintained habitat for prairie dogs and birds, and, in conjunction with natural fire cycles, served as a key driver of grassland ecology (reviewed in Knapp et al. 1999, Sanderson et al. 2007, and Gates et al. in press). In addition, bison horning behavior controlled tree encroachment by destroying saplings, and their wallowing behavior created depressions in otherwise flat prairies, providing critical habitats for other species.

Over the past century, agriculture and the absence of free-ranging bison herds have made North American grasslands a greatly threatened biome. Up to 96 percent of the tallgrass prairie is gone, and much of the mixed and short-grass prairies have been converted for agriculture, cattle grazing, industry, or development (Samson et al. 2003). Concerned about the loss of bison as an ecological driver of the prairie, the Wildlife Conservation Society (WCS) is working with various stakeholders—state and federal agencies, Native American groups, conservationists, and bison producers—to restore the ecological function of bison and help secure the future role of the species on the continent’s remaining grasslands.

Historic Fall and Rise

Only a few centuries ago, more than 30 million bison thundered over much of North America. Plains bison (B. b. bison) ranged from northern Mexico to central Canada, while wood bison (B. b. athabascae) ranged from boreal forests to the Arctic plain. Through hunting, disease, encroachment, and industrial-scale slaughter, bison had dwindled to fewer than 1,200 animals by the early 1900s (Hornaday 2002 [1889]). The animals were saved from extinction by...
the efforts of a handful of ranchers, conservationists, sportsmen, and the American Bison Society (ABS), founded in 1905 as part of the New York Zoological Society (now WCS). With Theodore Roosevelt as honorary chair, the ABS reintroduced bison to reserves in South Dakota, Oklahoma, and Montana, launching one of the most significant success stories in American conservation. In 1935 ABS members dissolved the society, believing that their mission—the “preservation and increase of American bison”—had been accomplished.

To some extent they were right. Today there are nearly 500,000 bison distributed across almost all U.S. states (including Hawaii) and many Canadian provinces. Yet the vast majority of these animals—roughly 95 percent—live in commercial herds, raised primarily for meat (Boyd 2003). Their management is often divorced from their native ecosystems, forcing the species into a gradual process of domestication. Commercial bison are typically confined by fences and subject to artificial selection for behavior (such as docility) and morphology (such as bulk). They are not subject to the forces of natural selection such as weather, food scarcity, mate competition, and predation by wolves and other carnivores.

Only about 20,000 plains bison and 10,000 wood bison live in what are called conservation herds, the 61 public or private herds in North America that are managed principally for conservation (Freese et al. 2007). Yet less than half of those animals—some 14,500—exercise natural movement patterns (considered free-ranging), and far fewer experience a full suite of natural selection forces as they would have in the wild 200 years ago. Clearly most of the bison in North America are not integrated with their native ecosystems. In fact, confined to less than 1 percent of their original range, bison are essentially ecologically extinct.

**Birth of the Second Recovery**

To help avert ecological extinction, WCS reinaugurated the American Bison Society in 2005. The ABS consulted with experts from Native American groups, the bison industry, U.S. state and federal agencies, universities, NGOs, and experts in Canada and Mexico. They then helped draft a vision statement calling for the science-based ecological restoration of bison within the next century. Titled the “Vermejo Statement on Ecological Restoration,” it defines ecological restoration as occurring “when multiple large herds [more than 1,000 animals] of plains and wood bison move freely across large landscapes within all major habitats of their historic range, interacting in ecologically significant ways with the fullest possible set of native species, and inspiring, sustaining, and connecting human cultures” (Redford and Fearn 2007).

This ambitious goal will require a long-term, collaborative commitment among public, private, and indigenous partners willing to:

- Maintain sizeable, free-roaming herds that are able to contribute to overall ecological recovery.
- Manage herds for the long-term maintenance of health, genetic diversity, and genetic integrity in part by allowing bison from different genetically uncompromised herds to interbreed.
- Restore native ecosystems, species, and ecological interactions by restoring the natural behavior and scale of bison.
• Provide incentives such as habitat conservation grants to help offset costs that may accrue to bison producers, managers, and other stakeholders working toward ecological restoration.
• Create education and outreach programs to inform the public and policymakers about the value of ecological restoration.
• Share data and techniques about managing for ecological restoration.
• Work across international borders to coordinate bison restoration efforts among Canada, the U.S., and Mexico.

Hurdles to Recovery
Achieving the vision of ecological restoration will require overcoming several major obstacles. First among them is the threat of diseases transmissible from bison to cattle and other animals, particularly brucellosis and tuberculosis. Due to the real and perceived risks that these diseases pose to commercial interests, they often prohibit bison reintroductions and dramatically limit where bison can freely roam (Reynolds et al. 2003). Restoration efforts will therefore require extensive testing and screening of source herds, routine health monitoring, and effective regulation regarding quarantine, translocation, and health screening.

A second hurdle involves the genetic integrity of bison, compromised due to cross-breeding with domestic cattle well into the 1900s. Many of the 61 conservation herds in North America are contaminated with cattle genes (or have not been adequately assessed due to limitations of testing technology). Eleven of the 13 federally managed herds show evidence of past hybridization with cattle (Halbert and Derr 2006). In addition, smaller bison herds (fewer than 1,000 animals) have limited long-term genetic viability (Gross and Wang 2005). Only eight conservation herds (five of plains bison and three of wood bison) exceed 1,000 animals, a concern for the future of the species (Gates et al. in press).

Regulations and logistics pose their own unique hurdles to recovery. Bison live in increasingly fragmented herds and habitats, crisscrossed by human development and different jurisdictional lines. Depending on location, bison may be regulated as either livestock or wildlife, and some are listed as endangered, such as the Mexican herd. Over the long term, more land for larger herds will be necessary to allow the species to influence grasslands and interact with natural systems. However, lands adjacent to current bison-inhabited areas are often not available for bison restoration due to political, social, and economic concerns involving management priorities, cattle grazing leases, or disease issues.

Steps Toward Restoration
In May 2007 WCS published a multi-stakeholder report detailing the goal of ecological restoration and how it might be achieved. This movement is gaining ground on multiple fronts. What follows are some of the efforts on behalf of bison restoration.

Federal Efforts. On October 9, 2008, U.S. Interior Secretary Dirk Kempthorne created the Bison Conservation and Management Working Group. Its purpose is to coordinate management of U.S. federal herds with input from the National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, Bureau of Indian Affairs, and Bureau of Land Management. This coalition encourages partnerships and promotes public education on bison. A recent workshop resulted in a set of recommendations to address the genetic management of public herds (Hedrick 2009). These include steps to minimize inbreeding depression and maintain genetic variation by (1) mimicking natural extended bison populations by regular, careful exchange between federal bison populations, and (2) expanding individual herds or clusters to have an effective population size of 1,000.
State Efforts. Several states manage free-ranging bison herds in the interest of ecological restoration. In Utah’s remote Book Cliffs, for example, a new herd was established with 14 bison provided by the Ute Indian Tribe and 31 bison moved from the Henry Mountains by the Division of Wildlife Resources. Alaska has begun a wood bison restoration project in the Minto and Yukon Flats regions, with more than 50 animals in a holding center until various stakeholders finalize plans for reintroduction. Some states control bison populations through hunting via lottery, which helps re-establish that cultural connection to bison.

Tribal Efforts. In collaboration with the Native American Fish and Wildlife Society, the InterTribal Bison Cooperative (ITBC) formed in 1992 with the goal of “restoring buffalo to Indian Country to preserve our historical, cultural, traditional, and spiritual relationship for future generations.” Today the ITBC helps 57 member tribes manage approximately 15,000 bison by providing seed animals, technical support, and help with funding and outreach. (See related article on page 52.)

Mexico’s Initiative. In 2008 the ABS sponsored a project in which ecologists from Universidad Nacional Autónoma de Mexico established baseline information and a recovery plan for Mexico’s only migrating bison herd, which ranges from Janos, Mexico, (where it is considered endangered) to Hidalgo County, New Mexico (where it is considered livestock). This southernmost population of bison lives within the proposed Janos Biosphere Reserve. While the future of the herd is now compromised by the border fence, which has blocked part of the area used by the bison, the process to start a new herd farther south is in progress.

Canada’s Efforts. Canada has a long history of bison conservation. Established in 1922, its Wood Buffalo National Park in northern Alberta supports approximately 2,500 bison, the largest free-roaming and self-regulated bison herd in the world. Parks Canada has supported plains bison restoration at the Elk Island, Grasslands, and Prince Albert national parks, and has shared animals for restoration efforts elsewhere. In addition, WCS Canada is coordinating a survey of public and private plains bison herds in Canada to assess the status of overall restoration.

Role of NGOs. The World Wildlife Fund-U.S. and the American Prairie Foundation have created the American Prairie Reserve in northeast Montana, composed of 86,000 acres of deeded and leased land that is managed as a prairie reserve for a growing herd of bison and other grassland species. The Nature Conservancy manages approximately 5,000 bison on nine preserves and in 2008 restored a genetically valuable herd to its Broken Kettle Grasslands in Iowa. In Canada, Nature Conservancy Canada has restored bison to Old Man on his Back, a preserve in Saskatchewan.

Commercial Efforts. Many members of the National Bison Association and Canadian Bison Association—producers who raise bison as a healthy source of protein—support the goals of ecological restoration. The Durham Ranch in Wyoming, Cheyenne River Ranch in South Dakota, and Olson Bison Conservation Ranches in Alberta, Saskatchewan, and Manitoba are among those at the forefront of this effort, managing herds with minimal intervention. Turner Enterprises, the U.S.’s largest bison owner, has dedicated one herd, the genetically unhybridized Castle Rock herd in New Mexico, to be managed specifically for conservation.

IUCN Role. The IUCN-Species Survival Commission’s American Bison Specialist Group will soon publish a report with comprehensive biological and ecological information about the species. This group of more than 60 volunteer scientists and conservationists outlines several conservation guidelines, including the view that “planning and management of ecological restoration projects should be decentralized to the level of the local communities and supported at the highest levels of government policy.”

A bison wallows on the plain in South Dakota’s Wind Cave National Park, home to a genetically pure federal conservation herd. Wallowing behavior—done in part for relief from insects—creates depressions that catch rain water, providing habitat for plants and animals.

Credit: Kent H. Redford
The ecological restoration of bison across its range over the next century will require collaboration among all these diverse stakeholders. To inform the effort, ABS and its partners have developed information tools, such as the Atlas of Bison Conservation, which helps assess the economic and demographic realities in potential restoration areas, and a review of best practices for disease management.

Without a concerted effort at ecological restoration, we risk losing “bison-ness” and the opportunity to one day see thousands of bison on a vast landscape—a true national wildlife treasure. Restoring bison as ecological actors in America’s wild places will not only help revive parts of the continent’s grasslands, but will also reconnect Americans with an icon of the past that can help create a more sustainable future.

To see a bibliography, more photographs, and a video about The Nature Conservancy’s bison restoration at Broken Kettle Grasslands Preserve in Iowa, go to www.wildlife.org.

This article has been reviewed by subject-matter experts.