Ocean of Grass: A Conservation Assessment for the Northern Great Plains

Northern Plains Conservation Network

Dedicated to the creation of healthy landscapes for all grassland species

2004

Acknowledgments

Writing and Editing Team
Steve Forrest, Holly Strand, Curt Freese, Eric Dinerstein; World Wildlife Fund US
Jonathan Proctor, Predator Conservation Alliance

Map Analysis and Modeling
Bill Haskins, Big Sky Conservation Institute
Holly Strand, World Wildlife Fund US

Numerous individuals provided assistance in the development of this document. The preparers would like to thank: Bethanie Walder and Adam Switalski, Wildlands CPR; John Carlson, Montana Heritage Program; Brian Martin, Jennifer Hall, Jerry Reichert, and Bob Paulsen, The Nature Conservancy; Bob McCready, Prairie Wings; Jeff Kessler, Biodiversity Conservation Alliance; Tom Lalley, Darcy Tickner and Cortland Barnes, WWF; Kyran Kunkel, Turner Endangered Species Fund; Dale Lott, University of California Davis; Rich Reading, Denver Zoological Society; Pat Fargey, Bill Henwood, Parks Canada; Cliff Wallis, Alberta Wilderness Association; Shelly Pruss, University of Alberta; Paul Sneed, Prescott College; Rob Gardner, Society of Grasslands Naturalists; Minette Johnson, Defenders of Wildlife; Dan Licht, Great Plains Restoration Council; Jan Swenson, Badlands Conservation Alliance; Nancy Hilding, Prairie Hills Audubon Society; Bob Scott, Doug Coffman, Montana Big Open; Kathy Daly, Reed Noss, The Wildlands Project; Tyler Sutton, Chair, NPCN Steering Committee; Jeff Runge, U.S. Fish and Wildlife Service; Lindsay Rodger and Freya Nales, World Wildlife Fund-Canada; Bob Bramblett, Montana State University, Gordon Orians, University of Washington; Kirk Keopsel, Sierra Club; Travis Livieri, Prairie Wildlife Research.

Cover photo courtesy of Cliff Wallis

Preparation of this Conservation Assessment was generously funded by a grant from the J.M. Kaplan Fund, and from matching funds provided by World Wildlife Fund-US and The Ecology Center.

Forrest, S.C., H. Strand, W.H. Haskins, C. Freese, J. Proctor and E. Dinerstein. 2004. Ocean of Grass: A Conservation Assessment for the Northern Great Plains. Northern Plains Conservation Network and Northern Great Plains Ecoregion, WWF-US, Bozeman, MT.

Endorsing Organizations

Alberta Wilderness Association

Biodiversity Conservation Alliance

Defenders of Wildlife

Grasslands Naturalists

Wildlands Project — reconnect restore rewild

denver zoo — open every day

Badlands Conservation Alliance

The Big Open Project

Center for Native Ecosystems

Big Sky Conservation Institute — arts and technologies for a healthy world

Predator Conservation Alliance

Sierra Club — Founded 1892

The Conservation Alliance of the Great Plains

WWF

Central Montana Wildlands Association

Prairie Hills Audubon Society of Western South Dakota, Inc.

Executive Summary

The Great Plains occupies not only the center of the North American continent, but also figures centrally in our cultural consciousness. Images of a vast sky, blackened by swarms of migrating birds or insects, or vistas filled with spectacular numbers of bison, elk, and pronghorn to the horizon of a seemingly endless plain are etched in our collective memory, whether passed down through the stories of Native Americans or of Lewis and Clark and other early explorers. The contours of the indigenous landscape are, in many places, still clearly visible beneath a thin veneer of civilization only recently overlaid. This is a big landscape, and it inspired awe and appreciation of the wealth of nature in a way that perhaps was unrivaled in its time, a place where European nobility and North American artists came simply to marvel. But over the span of just a few decades in the late 1800s, nature's abundance in the Great Plains vanished, as the native grasslands were plowed for crops and fenced into tame pastures.

The region is at an historical divide as it comes full circle. Farming and ranching continue, but there is growing recognition, evidenced by the decline of prairie towns, out-migration of young people, and failing local economies, that the grand experiment that converted much of the ocean of grass into wheat and cattle production has had mixed results. At the same time, many Great Plains landscapes are now highly altered and the functional role of several key grassland species has been severely reduced or eliminated. As a result, much of the biological dynamism and resilience of the prairie ecosystem is missing. With less than 1.5% of the ecoregion's land area managed primarily for biodiversity conservation, it is increasingly difficult to maintain, much less restore, the region's remarkable flora and fauna and their ecological roles.

Our premise is that there is power in working with, rather than against, the natural processes that shaped the plants and animals attuned to this landscape. We also believe that by restoring the biodiversity of the plains we will help restore the spirit and livelihoods of those who live and work here, as well as recapture the imagination and interest of people throughout the world.

With this in mind, grassroots, regional, and national conservation organizations working in the Northern Great Plains formed the Northern Plains Conservation Network (NPCN) in 2000 to coordinate their mutual interests in grassland conservation and to chart a future that integrates conservation with the renewal of the human communities and economy of the Northern Great Plains. The focus of this effort is the Northern Great Plains Ecoregion (NGP), an area that World Wildlife Fund has identified among its "Global 200," one of the 238 most biologically significant places on Earth.

This ecoregional assessment of the Northern Great Plains is the first step in charting that course. A key result is the identification of ten terrestrial landscapes in the U.S. and Canadian plains where opportunities exist to restore large-scale ecological processes and provide habitat for significant populations of native wildlife. Some of

the largest blocks of untilled prairie remaining in North America are contained within them. Many offer restoration potential for the black-tailed prairie dog ecosystem, a key Great Plains ecosystem. Outstanding opportunities exist to restore and preserve habitat for a suite of endangered, sensitive, and keystone species within these areas. In short, these are areas that meet the goal of restoring a significant part of the natural heritage of the grasslands to its full biological potential.

This analysis also identifies 24 outstanding reaches of Northern Great Plains rivers and streams. Some of the longest reaches of undammed rivers in North America exist within the ecoregion, providing opportunities to conserve representative habitat for fish, other aquatic species, and riparian species.

The need to address scale as a component of the conservation landscape, particularly in grasslands, is becoming increasingly clear. Global climate change, declining species trends, invasive species, and widespread disturbance patterns (fire and drought) unique to the grasslands suggest the need to think at larger scales than in the past. This assessment is intended to stimulate and focus greater attention on those large landscapes in the Northern Great Plains with high biodiversity and exceptional restoration potential. These large areas complement more numerous, and often smaller, areas of biological importance identified by The Nature Conservancy and others. Comprehensive conservation will require attention to the entire suite of these biologically important areas. This assessment recognizes, however, that protecting these high-priority areas will not, by itself, maintain the biological health and integrity of the ecoregion. Good stewardship of the intervening landscape is crucial. The resulting matrix of conservation and working landscapes will support the full range of biodiversity, will be more resilient to environmental change, and will provide a more diverse economic base for the people that live there.

At this divide in history for the Northern Great Plains, the need and opportunity for biodiversity restoration and conservation, based on conservation areas both small and large across the ecoregion, has never been more evident. Conservationists, political leaders, tribal members, ranchers, farmers, recreationists, and local community members, working cooperatively, can build on these biological cornerstones to support both native biodiversity and economic alternatives provided by wildlife and other natural amenities. NPCN's efforts to this end are guided by four principles:

- *Sound stewardship of public, private and Tribal lands is necessary for restoring and conserving the ecoregion's biodiversity;*
- *The land and its wildlife are important culturally and spiritually for many people, but especially for North American native people;*
- *Conservation can often benefit local communities by stimulating a more diverse and healthier economy;*
- *Partnerships between conservationists and local*

communities will be crucial for achieving biodiversity conservation goals in the Northern Great Plains.

In the short term, we can start to improve the conservation landscape in the following ways:

- Expanding the amount of land designated as reserves or managed primarily for biodiversity conservation from the current 1.5%;
- Promoting ecologically sustainable management in both the agricultural and nonagricultural portions of the landscape that: (a) prevents further loss of native prairie; (b) limits spread of nonnative plant and animal species that are destructive to native biodiversity, and (c) leads to widespread adoption of grazing practices that restore and maintain native prairie habitats and species diversity;
- Restoring populations of native species and securing their long-term viability, including restoration of ecologically functional populations of bison; and
- Ensuring that flows in the Missouri River system and its significant tributaries, including the Milk, Cheyenne, and White Rivers, can support the full complement of aquatic and riparian species.

The modern conservation movement in North America can be said to have begun with the efforts to conserve the few remaining American Bison, whose last stronghold was on the prairies of the Northern Great Plains. It is fitting that we take up, at the beginning of a new century, the conservation challenge offered by those remaining few bison—to restore them and their fellow species to their functional roles in the biodiversity of the plains. As the author Richard Manning notes, "The grass can grow again."

Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

Almost 200 years ago, in 1805, Meriwether Lewis stood at the confluence of the Marias and Missouri Rivers in what is now Montana, and observed that:

> *"…the country in every derection around us was one vast plain in which unnumerable herds of Buffalow were seen attended by their shepperds the wolves; the solatary antelope which now had their young were distributed over it's face; some herds of Elk were also seen; the verdure perfectly cloathed the ground."*[1]

Today, most North Americans equate important and spectacular wildlife concentrations with far off places such as the East African Serengeti or the Amazonian rainforest. Yet the assemblages and numbers of plants and animals seen by Lewis 200 years ago in the North American plains were no less remarkable. Spanning a prairie landscape nearly 450 miles (750 km) long and 175 miles (300 km) wide through Canada and the United States, the Northern Great Plains was once, as Lewis's account testifies, North America's answer to Africa's Serengeti Plains. Tens of millions of bison (*Bison bison*), elk (*Cervus canadensis*), pronghorn (*Antilocapra americana)*, mule deer (*Odocoileus hemionus*) and other wildlife grazed an ocean of grass, pursued by wolves (*Canis lupus*), grizzly bears (*Ursus arctos*) and other predators. Prairie birds and waterfowl occasionally darkened the sky during their migrations. So magnificent was the region's wildlife that European royalty, artists and others commonly came on safari to hunt, paint or just to marvel.

Several Native American tribes made their homes in the midst of this wildlife spectacle. Indeed, human presence dates back 10,000 years. Plains peoples pursued the abundant game, or lived agrarian lifestyles in the fertile river bottoms. And figuring prominently in the lives and cultures of these people was the American bison – the largest land animal in the New World.[2] Perhaps no other species so dominated the cultural and biological history of any region, with numbers that may have totaled some 30 million or more.[3]

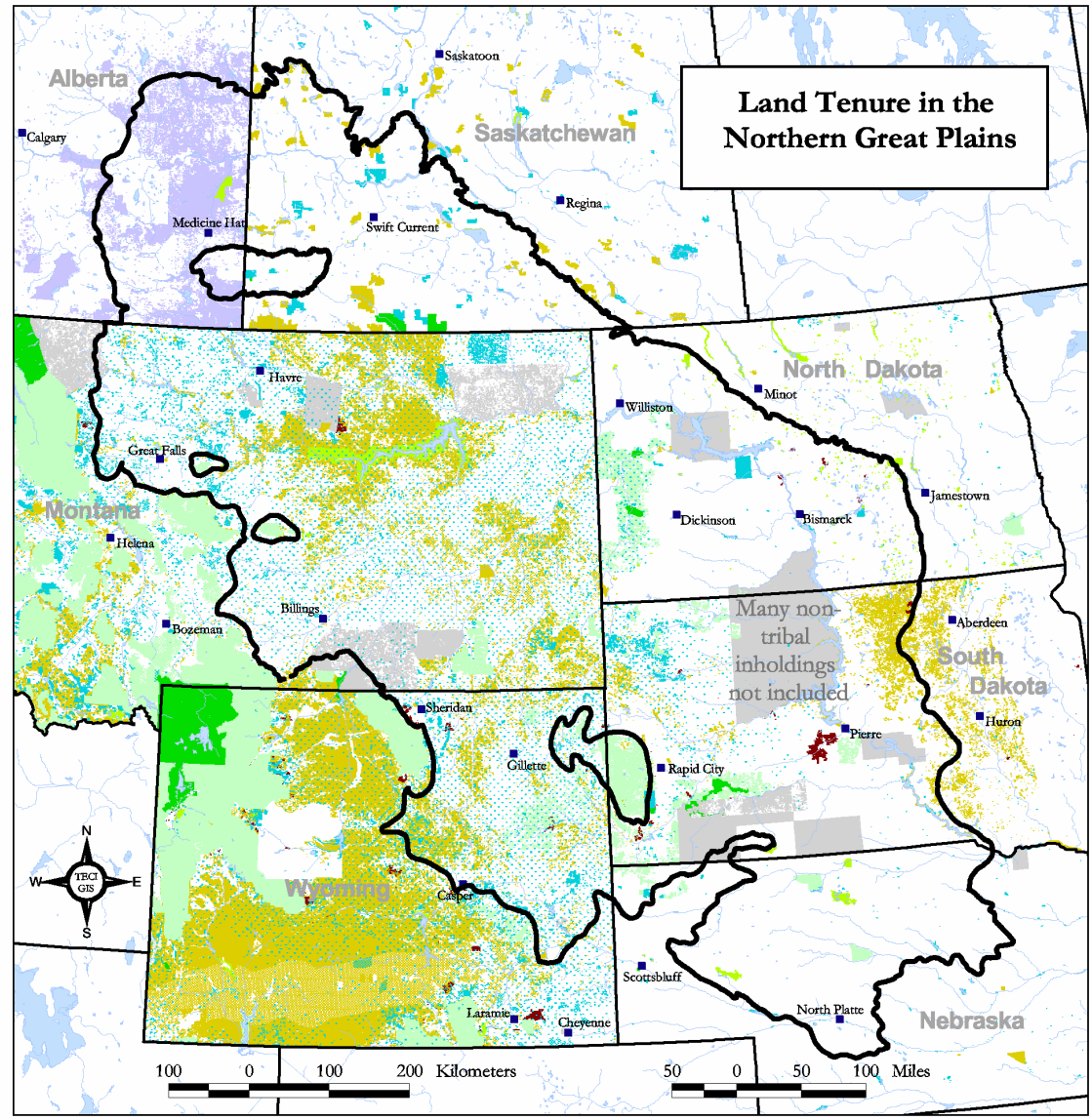
However, all this changed almost overnight. By the mid-19th century, technological and economic revolution came to the prairie in the form of railroads and a market for raw bison hides. The railroads brought not only the means to transport the hundreds of thousands of hides taken annually, but also European settlers, who sliced away at the

[1] DeVoto, B. 1953. The Journals of Lewis and Clark, Bernard DeVoto, ed. Houghton Mifflin Co., Boston, p. 125.

[2] Roe, F.G. 1951. The North American Buffalo: A critical study of the species in its wild state. Univ. of Toronto Press at 335; Callenbach, E. 1996. Bring back the buffalo: A sustainable future for America's Great Plains. University of California Press, Berkeley; Isenberg, A.C. 2000. The destruction of the bison. Cambridge University Press.

[3] Id. Others have placed the number much higher, generally around 65 million. A recent estimate based on forage productivity estimated historic bison carrying capacity at between 21-88 million. Weber, K.T. 2001. Historic Bison Populations: A GIS-based estimate. Proceedings of the 2001 Intermountain GIS users' Conference, Pp. 45-51.

Figure 1. Land Tenure in the Northern Great Plains



SOURCES

Alberta Natural Heritage Information Centre. Date unknown. Land ownership by quarter section.

Conservation Biology Institute/World Wildlife Fund. 2000. Protected Areas Database.

Ducks Unlimited. 2003. Holdings and easements.

Montana Natural Resources Information System. 2002. Major land ownership.

Sask. Natural Heritage Program. 2000. Ownership.

The Nature Conservancy. 2003. Holdings and easements.

U.S. Forest Service. 2001. Boundaries of National Grasslands.

U.S. Geological Survey. 2002. National Atlas of the U.S. - Federal land ownership.

Wyoming Gap Anaysis. 1996. Land ownership and management for Wyoming.

LEGEND

- Northern Great Plains Ecoregion boundary
- National Forests and National Grasslands
- National Wildlife Refuge or Wildlife Areas
- Other federal lands and easements
- Tribal/First Nations lands
- National Parks
- State or provincial lands
- Crown lands in Alberta
- Private preserves and conservation easements

WWF

native prairie with plows. Coupled with the thousands of professional hunters that spilled into the plains after the Civil War, the great bison herds were doomed. By the mid 1880s, the North American bison was virtually extinct, along with a human culture that had existed with it for thousands of years.

In the late 1880s, encouraged by ill-conceived government policies and disingenuous land developers, even more European settlers flocked to the Northern Great Plains. Hundreds of thousands established homesteads that were, even at the time, too small to support the families that farmed them. Warnings from 19th century visionaries like John Wesley Powell that the land west of the 100th meridian (figure 5) was not suitable for dry-land agriculture and would require an alternative approach to settlement went unheeded. Deceived by a period of relatively wet years and encouraged by the economic bonanza provided by World War I, thousands more arrived. "The Great Plow-up" saw cultivated land on the prairies of Montana rise from 250,000 acres (101,000 ha) to 3.5 million acres (5,500 sq miles, or 1.4 million ha) between 1909 and 1919.[4] The soils of the Great Plains are mostly "loess" soils, meaning they were deposited by the wind in millennia past. Without grass to hold them in place, the soils were once again free to move. And move they did when in the 1930s a severe drought combined with poor conservation practices to create the "Dust Bowl." In March 1935, geologists in Wichita weighed the atmosphere overhead and estimated that 5 million tons of dust was suspended above the 30-square-mile city.[5] To this day, the era remains one of the most sobering and widespread environmental catastrophes in North American history.

In his book *Grasslands*, the writer Richard Manning notes, "[t]he hubris of the industrial age was the belief that because we could make machines work, we could make the landscape into a machine and make it work like one."[6] The grasslands of the Northern Great Plains stubbornly resisted these attempts. Faced with the realization that one out of every three years was likely to be a drought year, and that those years were likely to be sandwiched between periods of prolonged drought, many abandoned the prairie for good. The exodus of would-be settlers, which totaled some 60,000 in Montana during the same 10-year period as the Great Plow-up,[7] continues to this day. Those settlers that remained stocked their untilled areas of native prairie with cattle or sheep. However, drought and occasional brutal winters also kept livestock producers living on the economic margin in many areas—the "Dirty Thirties" were followed by the "Filthy Fifties," as drought returned in its ongoing cycle. The result is that, after the initial surge of homesteading, there has been a long and continuous exodus of people and capital, particularly from the Northern Great Plains.

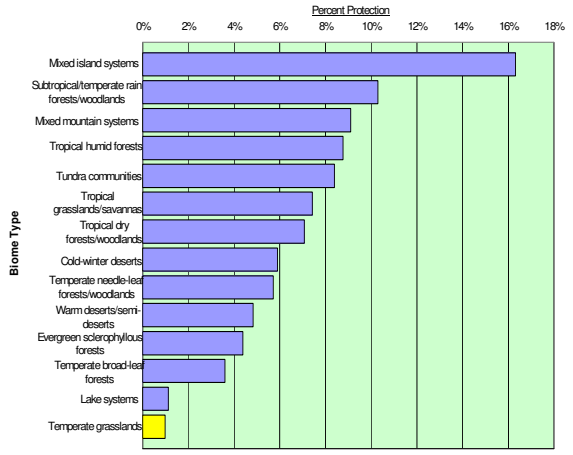
Meanwhile, biodiversity diminished in response to human exploitation of the plains. In most areas, colonies of the burrowing black-tailed prairie dog (*Cynomys ludovicianus*) were poisoned or plowed out of existence to make way

[4] Manning, R. 1995. Grassland. Penguin Books, New York. pp 145.

[5] Id. pp 149
[6] Id. pp 262
[7] Id. pp 143

for crops and livestock. Numerous species that depend on or benefit greatly from the prairie dog for survival, like its highly specialized predator, the diminutive black-footed ferret (*Mustela nigripes*) or the mountain plover (*Charadrius montanus*), a shorebird adapted to forage in the cropped

Figure 2. Global Biome Protection Less than 1% of the world's temperate grasslands are under some kind of protective status — 9 times less than tropical grasslands and savannas (Appendix K). Of all the world's biomes, temperate grasslands have the least protection.



grasses of prairie dog colonies, have subsequently become imperiled. Except for a few isolated populations, elk, which were once abundant on the prairies, have also faded from the landscape. Deprived of the herds of bison and elk on which they depended, and eliminated as pests when they occasionally preyed on the livestock that replaced the native grazers, grizzly bears and wolves no longer roam the prairie. River otters (*Lutra canadensis*) and beaver (*Castor canadensis*) were driven from prairie streams by overexploitation and dewatering for irrigation.

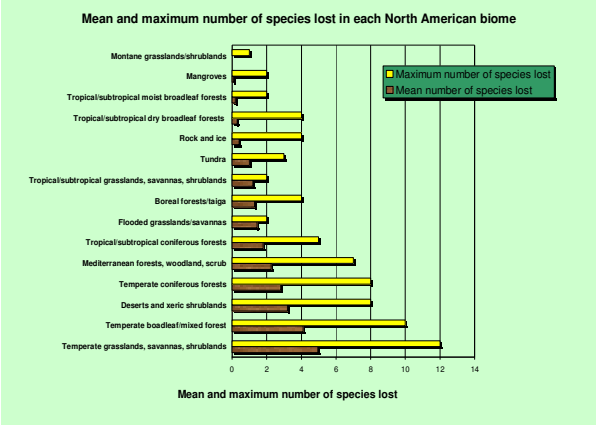
Perhaps the most profound ecological link that has been severed is the loss of the American bison. Although bison exist in a few small public herds and the species is gaining popularity as an alternative breed of domestic livestock, the bison of the Great Plains is today ecologically extinct. Bison disturbance (grazing, trampling, and wallowing) no longer influences native vegetation and species composition over large scales as it once did.[8] Bison-style grazing no longer creates the mosaic of vegetative structures over large areas that provided habitats for many other species. Gone, too, is a large and abundant food source for predators and scavengers. Finally, decomposing bison carcasses no longer create rich patches of nutrients for vegetative growth.[9] It has been argued that management of domestic livestock can be employed to mimic the effects of bison. The reality, however, is that livestock, and even few bison herds, are rarely managed in this way today.

The loss of biodiversity suffered by the plains would not have been as tragic were it not coupled with a lack of preservation of significant remnants of undeveloped grasslands in the process of settlement. North America's grasslands are not unique in this regard—temperate grasslands of the world have received little conservation attention relative to other biomes (Figure 2). Less than 16% of the NGP ecoregion (about 28 million acres/11 million ha) is managed primarily for natural resources conservation,[10] with about 2.5 million acres (1.01 million ha), or less than 1.5%, managed to ensure conservation of biodiversity, which includes lands like wildlife reserves and parks. We estimate that 99% of the

[8] Truett , J.C., M. Phillips, K. Kunkel and R. Miller. 2001. Managing bison to restore biodiversity. Great Plains Research 11:123-44.
[9] Lott, D. 2002. American bison: A natural history. University of Californa Press, Berkeley.
[10] Based on IUCN classification, see Appendices J and K.

non-urban landscape of the NGP is today either farmed or grazed by domestic livestock, including some of the areas we consider protected. For example, two-thirds of the 1.1-million-acre (0.4 million ha) Charles M. Russell National Wildlife Refuge, MT, the ecoregion's largest protected area,[11] is grazed by cattle. There is no correlate temperate grasslands protected area in North America on the scale of the 3.7 million ac (1.5 million ha) Serengeti/Masi Mara of Africa, which retains a remarkable representation of the African grasslands fauna. Lack of large-scale areas where biodiversity is the primary management objective on the North American grasslands may explain why 74% of 39 species we classify as grassland obligates with distributions centered in the NGP are listed as imperiled by federal, state, and provincial governments (Table 1). On average, temperate grassland biomes have suffered greater "loss" of species (more species are no longer found within the full range of their former habitats) and more species have been extirpated from at least part (and often an extensive part) of the grasslands than any other North American biome.[12]

Figure 3. Species Loss by Biome (after Laliberte, note 12).



Human communities of the Northern Great Plains are now also at an ecological and economic crossroads. The average age of farmers and ranchers across most of the ecoregion is around 60 years.[13] Children of farmers and ranchers are leaving the land for better opportunities in urban areas. Economies of prairie communities are in decline as foreign competition and other market forces, combined with a climate that is marginal or sub-marginal for efficient crop and livestock production, often leave producers in debt. And with a declining human population, important community services such as schools and medical facilities are disappearing as well. Those people that remain behind on the land find it increasingly difficult to maintain economic parity and are increasingly dependent on government subsidies. Meanwhile, pressure on the landscape persists, as government programs continue to encourage tilling of remaining native prairie.

In contrast to the descendents of European settlers, Native Americans,

[11] The actual land base of the CMR Refuge, which includes the Ft. Peck Reservoir, is smaller—about 871,000 acres (352,000 ha) excluding the area inundated by the reservoir.

[12] Laliberte, Andrea. 2003. Human Influences on Historical and Current Wildlife Distributions from Lewis & Clark to Today. Ph.D. Dissertation. Oregon State University. Also, Laliberte, A.S. and W.J. Ripple. 2003. Wildlife encounters by Lewis and Clark: A spatial analysis of interactions between Native Americans and wildlife. Bioscience 53:994-1003.

[13] See, e.g., U.S. Dept. of Agriculture, 1997 Census of Agriculture, Volume 1, National, State and County Tables. http://www.nass.usda.gov/census/census97/volume1/vol1pubs.htm

whose populations and cultures were decimated by European settlement, are among the few demographic groups growing in the NGP. Those few U.S. counties with positive population growth in the NGP over the last decade predominantly include Indian Reservations. However, Native Americans are not immune from the depressed conditions of plains economics. Native Americans have the highest poverty rate of any ethnic group in the U.S. (24.5% according to the 2000 census).[14] Yet tribal game and fish agencies have taken lead roles in reintroduction of native species, such as the black-footed ferret and swift fox (*Vulpes velox*)[15]. In addition, the Intertribal Bison Cooperative has successfully promoted the development of tribal bison herds, indicating continuing interest in restoration of this important cultural link with the landscape.

A report recently prepared by the Economics Research Service of the U.S. Department of Agriculture[16] concludes that three factors largely account for the rapid loss of population from rural counties during the last decade:

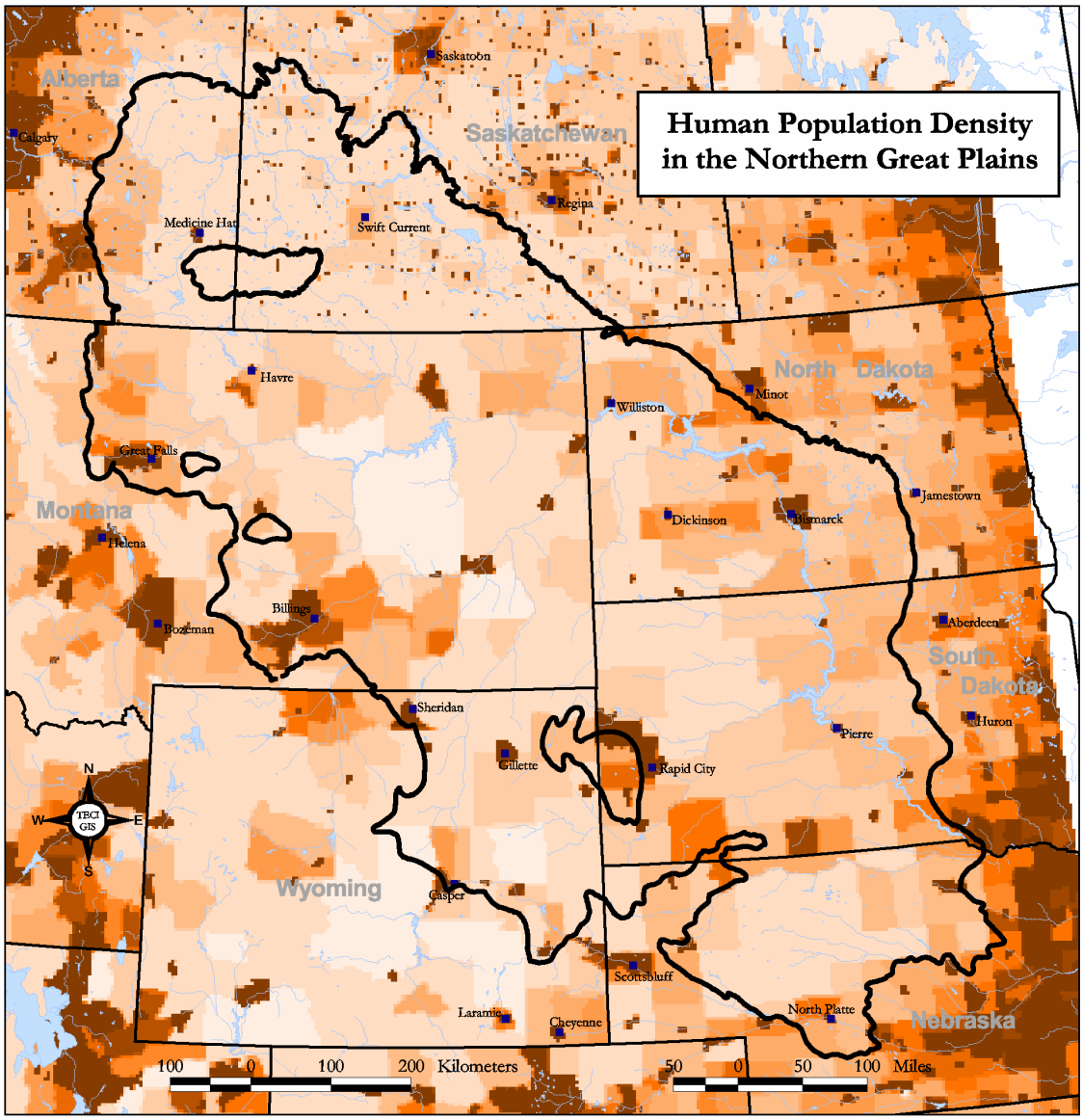
- **Low population density**: Counties with already low population densities, in particular counties with fewer than 2 people per square mile, were more likely to lose people than counties with higher densities;
- **Remoteness from metro areas**: Counties that are not adjacent to major population centers show a much greater tendency to lose population;
- **Recognition of natural amenities**: Counties that fail to recognize natural amenities for outdoor recreation, as measured in this study by the presence of lakes, mountains, and a favorable climate, where much more likely to have lost population than counties with good natural amenities.

Other studies in the West have also shown that communities located near natural areas and wilderness have healthier economies than communities that are not so located.[17] Conservation areas generate economic activity for nearby communities in several ways:

- They **attract and retain as residents** people who bring money into the community; this includes businesses whose owners and employees want to be located near natural areas for recreation, as well as retirees and professional services (doctors, architects, etc.);

[14] Thurow, L.C. 2002. Poverty settles in Great Plains. USA Today, Monday, Sep. 30, 2002, p. 13A.
[15] Proctor, J., S.C. Forrest, and B. Haskins. In press. Identifying potential focal areas for black-tailed prairie dog restoration. *In,* Conservation Biology of the Black-tailed Prairie Dog, J. Hoogland, ed. Island Press.
[16] McGranahan, D.A. and C.A. Beale. 2002. Understanding rural population loss. Rural America 17:2-11.
[17] Rudzitis, G., and H.E. Johansen. 1991. How important is wilderness? Results from a United States survey. *Environmental Management* 15:227-233.

Figure 4. Human Population Density in the Northern Great Plains



SOURCE

Center for International Earth Science Information Network, International Food Policy Research Institute and World Resources Institute. 2000. Gridded Population of the World, Version 2.

LEGEND

Northern Great Plains Ecoregion boundary

Projected 2000 human population:

- <0.1 humans / sq mi
- >0.1 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

WWF

- They **attract tourists and recreationists** and the dollars they spend;
- Management of the conservation area results in **local employment and expenditures for local goods and services** as well as **production of some marketable products.**

Of the factors associated with significant population decline, the only one that can be directly altered in any practical way is the availability of natural amenities. In the Northern Great Plains, one of the most obvious natural amenities that could be greatly enhanced is public access to native prairie and increased wildlife populations.

The opportunity to achieve the dual and potentially mutually beneficial goals of rural renewal and restored biodiversity in the NGP has never been greater. Areas of low population density (less than 2 people/sq mile), as the data indicate, will probably continue their rapid downward demographic spiral. The aging ranch and farm population portends massive changes in land ownership over the next two decades. In some areas, industrial-scale agriculture that is ever-more effective at reaping government subsidies will take over,[18] while in others, particularly those lands with recognized natural amenities (abundant wildlife and native prairie, hunting, fishing, great scenery and solitude), new buyers will be people and corporations who want lands for their exclusive recreational use.[19] Either case results in less public access to these lands and their natural amenities and lost opportunities for large-scale ecological restoration.

The need for a conservation plan for the NGP that addresses the challenge of restoring NGP biodiversity in the context of these sweeping socioeconomic changes helped bring together in 2000 a group of local and national conservation organizations concerned about the ecoregion. These groups, acting together as the Northern Plains Conservation Network (NPCN), feel that a new and bold vision for the ecoregion is needed to serve as a guide to help rethink and redirect not only the efforts of conservationists, but of all those concerned about the region's future. For the benefit of human and natural communities, the intent of this document is to assess the conservation landscape in a way that will offer greater chances for conservation of the ecoregion's biodiversity at scales needed to restore the region's biological potential, while at the same time offering insights as to where this might be best accomplished.

[18] Large Family Farms, Very Large Family Farms and Nonfamily farms comprise only 8.2% of total U.S. farms yet own 33.5% of all farmland and receive 52.5% of all commodity support subsidies. Hoppe, R. and Weibe, K. 2002. Land ownership and farm structure. Chapter 1.3 i*n,* Agricultural Resources and Environmental Indicators, 2003. U.S. Dept. of Agriculture, Economic Research Service, Agriculture Handbook AH722. http://www.ers.usda.gov/publications/arei/ah722/arei1_3/DBGen.htm

[19] See, e.g., Tschida, R. 2003. Hunters find private land less accessible. Bozeman Daily Chronicle, February 23, 2003.