New Directions for the Prairie Economy

Connecting Conservation and Rural Development in the Northern Great Plains

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Darren Green / PhotoSpin

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New Directions for the Prairie Economy

Connecting Conservation and Rural Development in the Northern Great Plains

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EXECUTIVE SUMMARY

Rural communities and landowners of the Great Plains are at a crossroads. The intersection involves towns that are struggling to survive, a generational transition in land ownership, an important but uncertain future for agriculture, and prairie ecosystems and wildlife of importance to both local communities and the American public. This report examines the potential role of a nature-based economy in supporting and diversifying the economic base of the Northern Great Plains (NGP) of the United States (encompasses Montana, North Dakota, South Dakota, Wyoming and Nebraska). After reviewing the NGP's economic, demographic and land use trends, we examine the economic values of the region's natural ecosystems and wildlife and how those values might be converted into tangible benefits for landowners and businesses, and into incentives for restoring and conserving the very land and biodiversity from which those values arise.

> Development of nature-based economic activities provides common ground to work together.

Our analyses highlighted conditions and trends in four sectors in the NGP:

THE ECONOMY

- Metropolitan areas have been doing well over the last two decades while rural and Indian (greater than 50% Indian population) counties have lagged far behind in economic growth and employment.
- The long-term decline of agriculture's contribution to the economy has continued and now constitutes about 4% of the Gross State Product of the five NGP states. Nevertheless, agriculture remains very important for the region, particularly for rural communities, when considering direct, indirect and induced effects.
- Service jobs, followed by retail and government jobs, have been growing in importance and now, collectively, account for roughly 70% of all employment in the NGP.
- U.S. government crop subsidies, totaling $11.2 billion for the NGP from 1995-2006, have usually accounted for most—and often all—of net farm income.

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J. Michael

POPULATION CHANGE

The dearth and decline of economic opportunities in rural regions of the NGP appear to be driving some aspects of population change in the NGP, with four trends standing out:

- Metropolitan, micropolitan and Indian county populations have been growing while rural county populations, with a 20% decrease from 1990-2007, have continued their long-term decline.
- A corollary of the preceding pattern is that the highest rates of population loss have occurred in counties that already have very low population numbers.
- The contrast in population trends of metropolitan and micropolitan counties compared to rural counties is primarily due, first, to rural counties having higher out-migration than in-migration rates and, second, to the death rate exceeding the birth rate in rural counties.
- Compared to other NGP counties, rural county populations have a disproportionately small number of young adults and large number of older adults, which portends steeper rural population declines in the near future.

LAND OWNERSHIP AND MANAGEMENT

Retirement and mortality in the rural baby-boom population over the next two decades may lead to a massive turnover in land ownership and, potentially, change in land management, as increasing numbers of ranches and farms come onto the market. Four trends in land markets and management in the NGP stand out:

- The value of both cropland and rangeland has generally increased 10-15% or more annually over the last decade.
- Profits from agriculture have not kept pace with increased land values and thus, according to surveys within the region, the rate of return has declined by one-third to nearly one-half over the last two decades.
- A substantial and increasing number of land buyers—more than one-third according to studies within the region—are non-local and are buying for investment or recreational purposes, while many sellers are retiring and settling estates.
- Hundreds of thousands of acres of native prairie are being plowed and Conservation Reserve Program lands are going back into production, driven by agricultural subsidies, strong demand for biofuel feedstocks, and advances in crop and farming technology.

NATURE-BASED ECONOMIC ACTIVITY

Our review of nature-based economic activities in the NGP revealed four conditions and trends:

- Although the NGP has captured a relatively small share of the national ecotourism market—less than 1% of hunting, fishing and wildlife viewing, for example—the last two decades have seen a rapid increase in ranch-based ecotourism (including hunting) businesses.
- Ecolabeling of grassland products has great potential in the NGP because of the extensive cover of native grasslands. However, such labeling is poorly developed and therefore almost no market differentiation exists for biodiversity-friendly beef production or other grassland products.
- The per-acre estimated values of ecosystem services generally exceed per-acre commodity rental values of the land; we estimate the value of selected ecosystem services in the NGP is $40.4 billion annually.
- Government programs aimed at conserving important ecosystem services through direct payment, conservation easements, and fee-simple acquisition are seriously underfunded and failing to meet conservation needs and targets.

Landowners, businesses and local communities may be able to increase and diversify economic activities through three major categories of nature-based economic development: 1) Natural amenities, which include those natural features of the landscape that make a place attractive for visiting (e.g., ecotourism and hunting) or living. 2) Ecosystem products, which include commercial products harvested from native or semi-native ecosystems, such as native plant seeds and native vegetation, whether harvested directly as hay or indirectly by livestock grazing. 3) Other ecosystem services, which include many services from healthy ecosystems for which no or only quasi-markets exist, such as provision of clean water, prevention of soil erosion, and carbon sequestration, and non-use services such as the value people derive from knowing wildlife exists and from conserving wildlife for enjoyment by future generations. The use of nature-based amenities, products and services for commercial purposes requires measures that ensure that they are supportive of biodiversity conservation on the lands being managed.

RECOMMENDATIONS

Development of these nature-based economic activities provides common ground for those interested in rural development and biodiversity conservation to work together. We conclude with the following ideas for fostering nature-based economic development in ways that also support the goals of biodiversity conservation in the NGP:

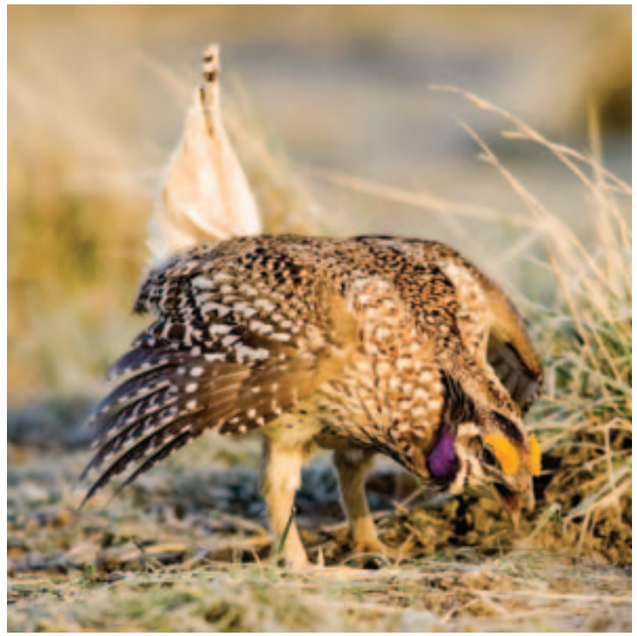
1. Fundamentally reform agricultural and biofuel policies in ways that fully recognize the value of native rangelands and the communities, ecosystem services, and biodiversity that depend on them.
2. Foster markets through the development of standards and guidelines, and potentially a certification system, for biodiversity-friendly grazing management.
3. Create ecotourism markets that reward landowners who conserve biodiversity.
4. Greatly increase payments for ecosystem services from private lands through both private markets, such as those being created for carbon credits, and direct government payments.
5. Greatly expand the system of conservation areas, both governmental and private, with a long-term goal of at least 10% of the Northern Great Plains in areas managed primarily for biodiversity conservation.
6. Foster a system of private nature reserves, both for-profit and non-profit, through more supportive government policies and private-sector investment.
7. Expand support for tribal interests in biodiversity conservation that builds on the traditional intertwining of tribal cultures and economies with prairie wildlife.
8. Assure federal lands are well managed for biodiversity and ecosystem services, including a review of BLM lands and national grasslands to determine where the public interest may be better served by managing them primarily for their biodiversity values.
9. Accelerate state and federal land acquisition and exchanges to improve management and protection of high priority areas.
10. Build a new rural development initiative that recognizes the importance of wildlife and healthy ecosystems for the well-being of local residents and economies.
11. Provide education and extension services that enable the modern private land manager to manage their land and businesses in ways that are profitable and sustainable and that nurture ecosystem services and their economic benefits.
12. Redirect and expand research and monitoring by private and public institutions to provide the information needed to better manage private lands for the diverse values of NGP ecosystems.

Diane Hargreaves

INTRODUCTION

Rural communities and landowners of the Great Plains are at a crossroads. The intersection involves towns that are struggling to survive, a generational transition in land ownership, an important but uncertain future for agriculture, and a landscape of prairies and forests, streams and wetlands, and remarkable wildlife of importance to both local communities and the American public. The purpose of this report is to examine these changes, with a focus on the Northern Great Plains (NGP) of the United States. We first review what is happening, and why, to the economies and populations of the vast rural regions compared to more urban areas. We look at agriculture, the dominant land use of the region, to understand its changing role in the economy. These economic, demographic and agricultural trends are the harbingers of further change in land ownership and management now underway, a change that could have far-reaching effects on prairie ecosystems and their wildlife and on their values for local and distant peoples alike.

Our interest is in seeing if and how the natural ecosystems and wildlife—the biodiversity—of the NGP can support and diversify the region's economic base and, if so, if biodiversity conservation can benefit as well. We therefore examine the economic values of the region's natural ecosystems and wildlife and how those values might be converted into tangible benefits for landowners and businesses, and into incentives for restoring and conserving the very land and biodiversity from which those values arise. This examination begins with the recognition that, broadly speaking, the rural economy of the NGP is already largely nature-based and that its native grasslands and rivers and wildlife are currently vital for the economic—and cultural—health of the region.



Diane Hargreaves

Diane Hargreaves

These economic, demographic and agricultural trends are the harbingers of further change in land ownership and management now underway.

We have no illusions that a nature-based economy is the main path to meeting the region's rural development needs, or that rural development is the best path to conserving the region's biodiversity. But we do believe there is a place where these two paths intersect, where there is common ground for merging the interests and needs of both for mutual benefit.

The analyses and recommendations in this report cover only the U.S. portion of the Northern Great Plains ecoregion. Nevertheless, the challenges facing rural communities and conservation are similar in the Canadian portion of the NGP and deserve to be analyzed with a search for solutions as well.

BACKGROUND

A HISTORY OF RAPID CHANGE

The world's temperate grasslands are among the most readily settled biomes on earth. Introduce livestock and native grassland instantly becomes an agricultural landscape. Where soils and climate are suitable, the plow and crops often follow. This pre-adaptation for rapid agricultural settlement is central to understanding the history of temperate grasslands and for charting their future.

The Great Plains of North America, stretching from southern Canada to the U.S.-Mexico border, exemplifies such rapid settlement. In the proverbial blink of an eye this ocean of grass went from a land of Native Americans and tens of millions of bison at the close of the 18th century, to exploration and mapping by people of European descent in the first half of the 19th century, to widespread agricultural settlement during the last half. Within a few decades the region converted from an Indian economy and land use based primarily on wildlife to a settler economy and land use based almost totally on agriculture. The change was so swift and complete that it preempted early conservation movements and the chance to designate large grassland areas for conservation. The Homestead Act of 1862, which facilitated rapid settlement of the Great Plains, preceded the creation of the nation's first national park, Yellowstone, by ten years.

Today, livestock grazing and crop agriculture cover more than 95% of the Great Plains. Thanks to land stewardship by ranchers and public agencies, much of the region remains in largely native grasslands with diverse flora and fauna, although, as described below, some habitats have been seriously degraded and some species have become imperiled. In large part because of this rich natural heritage and its intactness, the NGP is a global priority for conservation (Olson and Dinerstein 2002).

DEFINING THE NORTHERN GREAT PLAINS

The size of California and Nevada combined, the NGP spans 279,000 square miles across two Canadian provinces and five U.S. states (Figure 1), with the Rocky Mountain front defining the western boundary and the more humid tallgrass prairie the eastern boundary. The Missouri River flows for 1,000 miles through the region's midsection. Rainfall ranges from 12-18 inches on a west-to-east gradient. The NGP is characterized by mixed-grass prairie and can be divided into four subecoregions (Forrest et al. 2004):

Figure 1. The Northern Great Plains Ecoregion
(Source: Forrest et al. 2004).

Northwest Glaciated Plains: This subecoregion is covered largely by glacial till that offer soils relatively good for crop agriculture. One defining feature of its conservation value is that it includes the center of diversity in North America for birds dependent on grasslands.

Missouri Plateau: A rolling plain of shale and sandstone and thus generally less suitable for crop agriculture, this subecoregion includes vast areas of native grasslands with extensive cattle ranching.

Missouri Coteau: Characterized by rolling hummocks of glacial till dotted with numerous wetlands, many of which have been drained for cropland, the Missouri Coteau is one of North America's most important waterfowl nesting regions.

Nebraska Sandhills: A grassland-covered sand-dune formation interspersed with shallow lakes and fens, the Sandhills are primarily devoted to cattle ranching and harbor some of the most intact natural habitat of the Great Plains, with a unique combination of species recruited from both the adjacent tallgrass and shortgrass prairies.

In contrast to the tallgrass prairie of Iowa and Minnesota, which has been 99% converted to cropland, the semi-arid conditions of the NGP have favored livestock grazing in most areas. Consequently, roughly two-thirds of the NGP is in native or semi-native vegetation with nearly all native species of wildlife still present, if not abundant, across much of the landscape. Row-crop agriculture, primarily wheat and barley, is common in the more humid Northwest Glaciated Plains and Missouri Coteau. Vast areas of the Missouri Plateau and nearly all of the Nebraska Sandhills remain in native or semi-native grasslands devoted to ranching (Padbury et al. 2002). Seventy-six percent of the region is in private lands, 16% in public lands and 8% in Indian reservations (Forrest et al. 2004). The NGP population is approaching 1.2 million, or 5 residents per square mile (compared to 80 per square mile for the United States).

CONSERVATION CONDITIONS AND TRENDS

The NGP is typical of temperate grasslands globally in having less land in parks and similar protected areas—less than 2%—than any of the other 14 terrestrial biomes on Earth (Forrest et al. 2004). Nevertheless, because the NGP's native grasslands are still mostly intact, nearly all native species of flora and fauna are present, though some in greatly reduced numbers.

The ecoregion harbors approximately 1,595 species of plants, more than 350 of birds, 95 of mammals, 28 of reptiles, 13 of amphibians, and 120 of fish.

The ecoregion harbors approximately 1,595 species of plants, more than 350 of birds, 95 of mammals, 28 of reptiles, 13 of amphibians, and 120 of fish. Only one species may have gone extinct since European settlement—the Rocky Mountain locust (*Calopterus spretus*), which periodically broke out in vast plagues that swept from the mountains across the plains (Lockwood 2004). Some species, such as the grizzly bear and gray wolf, are largely extinct within the NGP. Others, such as the black-footed ferret, are highly endangered, and others that were once widespread and abundant, such as the black-tailed prairie dog and American bison, occur in such reduced numbers that they are ecologically extinct (meaning they no longer play their historic roles in shaping the grassland ecosystem) across more than 95% of their original range. Population declines among grassland birds are of particular concern. For example, populations of six species of grassland birds—mountain plover, Sprague's pipit, lark bunting, Baird's sparrow, Chestnut-collared longspur, and McCown's longspur—that breed in the NGP and winter in the grasslands of Chihuahua, Mexico, have declined 68-91% since 1968 (NABCI 2009). Among non-migratory birds of concern, the greater sage grouse is listed as endangered in Canada and has been proposed for listing as endangered in the United States.

Sodbusting—the plowing of native prairie to plant crops—is a current threat to biodiversity in the NGP, particularly in the Missouri Coteau, because it eliminates nearly all native species. The alteration and destruction of aquatic resources, such as the draining of wetlands, the damming of rivers, and the reallocation of water for irrigation threaten waterfowl, fish and other species, as well as the health of riparian areas in the NGP. Livestock grazing, if well

U.S. Fish and Wildlife Service

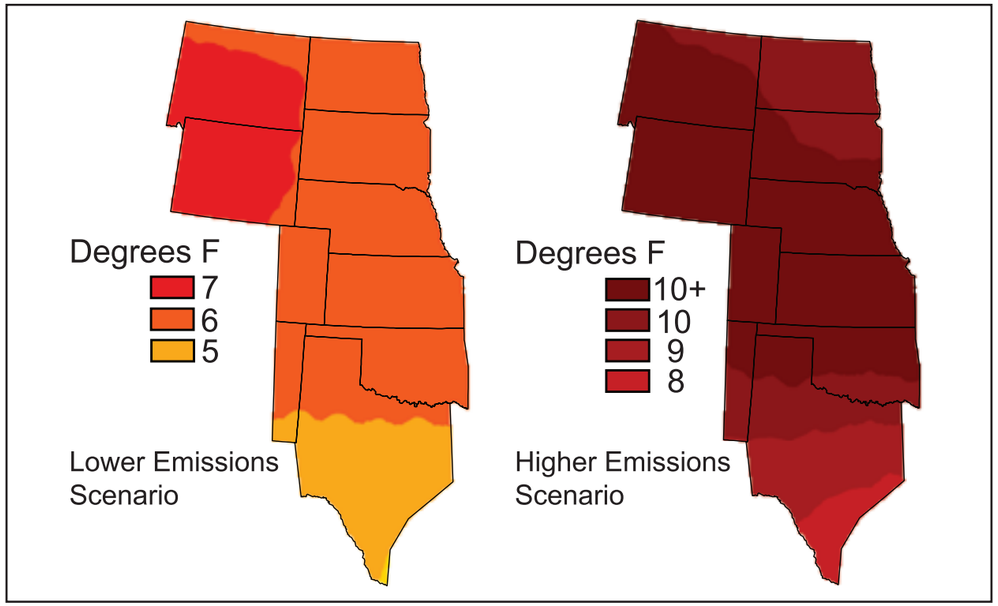


Figure 2. Summer temperature change by 2080-2099. Temperatures in the Great Plains are projected to increase significantly by the end of this century, with the northern part of the region experiencing the greatest projected increase in temperature (Source: Karl et al. 2009).

managed with an eye toward maintaining habitat diversity, maintains the vast majority of native species and a healthy ecosystem. But some rangelands are poorly managed and, in general, most livestock operations do not tolerate some important species of the prairie, such as prairie dogs, wild bison, and large predators (Freilich et al. 2003). A threat of major concern to ranchers and conservationists alike is the invasion of nonnative plant species such as leafy spurge and Russian olive (Forrest et al. 2004).

Oil and gas development also pose environmental concerns for both ranchers and conservationists in some areas of the NGP. For example, coal-bed methane development in the Tongue and Powder River regions of Wyoming and Montana is creating a network of roads and other associated infrastructure that fragment wildlife habitat with negative effects on sensitive species such as greater sage grouse (Walker et al. in press). Industrial discharges can contaminate streams and water supplies (PRBRC 2009).

Climate change, particularly higher temperatures, in the NGP poses a threat to the livelihoods of ranchers and farmers and to ecosystem health (Morgan et al. 2008). Current models predict an increase of 6 degrees (lower emissions scenario) to 10 or more degrees (higher emissions scenario) for summer temperatures before the end of the century in the region (Figure 2), increases that would cause serious problems for traditional crop and livestock production, as well as for native ecosystems and wildlife. Significant increases have already been recorded during the last few decades (Karl et al. 2009).

The biggest federal agencies in terms of land ownership—Bureau of Land Management (BLM) (8.62 million acres), U.S. Forest Service (3.53 million acres), U.S. Fish and Wildlife Service (1.14 million acres) and National Park Service (239,000 acres)—all, to different degrees, have mandates to manage for biodiversity. However, no federal or state land unit in the NGP is currently managed with the goal of restoring and conserving the full suite of native NGP biodiversity. Most public land acreages, including refuge lands, are leased for livestock grazing, which can pose conflicts with biodiversity management goals. The relatively small size and (or) configuration (e.g., long and narrow, such as the Charles M. Russell National Wildlife Refuge, or fragmented into two geographically separate units, such as Theodore Roosevelt and Badlands National Parks) of some of the most important parks and refuges as well as most BLM lands and national grasslands, present major challenges to ecosystem-scale management.

BIODIVERSITY CONSERVATION GOALS

Various federal (USFWS 2009a), state (MFWP 2009, NDGFD 2009, NGPC 2009, SDGFP 2009, WGFD 2009), tribal (ITBC 2009, Mako Foundation 2009) and nonprofit organizations (TNC 2000, Forrest et al. 2004, GF 2005, DU 2009a) have established conservation priorities and goals for the NGP or areas within it. Five overarching priorities seem to be shared by most:

- In managing the landscape, avoid further loss of native prairie, wetlands and other habitats to crop farming; control noxious, non-native species; and improve livestock management practices to conserve native prairie habitats and species.
- Restore and conserve native species in numbers and places that ensure their long-term survival.
- Ensure that the region's rivers and streams are healthy and support the full complement of aquatic and riparian species.
- Put more land into conservation through various means, including conservation easements, land acquisition and exchanges, wildlife-friendly economic incentives for private landowners, and stronger protection, consolidation, and expansion of public lands.
- Provide cultural and economic benefits to local communities.

Several organizations have called for devoting 10-15% of the ecoregion to reserves, both public and private, where biodiversity conservation is the primary goal. Central to meeting this goal is the creation of several large reserves of more than 1 million acres in which the full suite of prairie wildlife is restored and which could become iconic, much like Yellowstone National Park, in attracting visitors (Forrest et al. 2004, GF 2005).

ECONOMIC, DEMOGRAPHIC, AND LAND USE TRENDS

Our focus in this section is to understand how economic and population changes underway in the NGP are influencing land use. We begin with an analysis of economic trends because, in large part, they appear to be driving important demographic changes in the region. We then review these demographic changes and how they are affected by geographic location, existing population patterns, and other factors within the NGP. We conclude this section with a review of trends in land ownership and land use in the NGP and current and potential effects of these trends on biodiversity conservation. As we will see, there is a feedback loop as changes in how land is managed and how people make a living from the land are obviously beginning to influence economic conditions in some areas of the NGP.

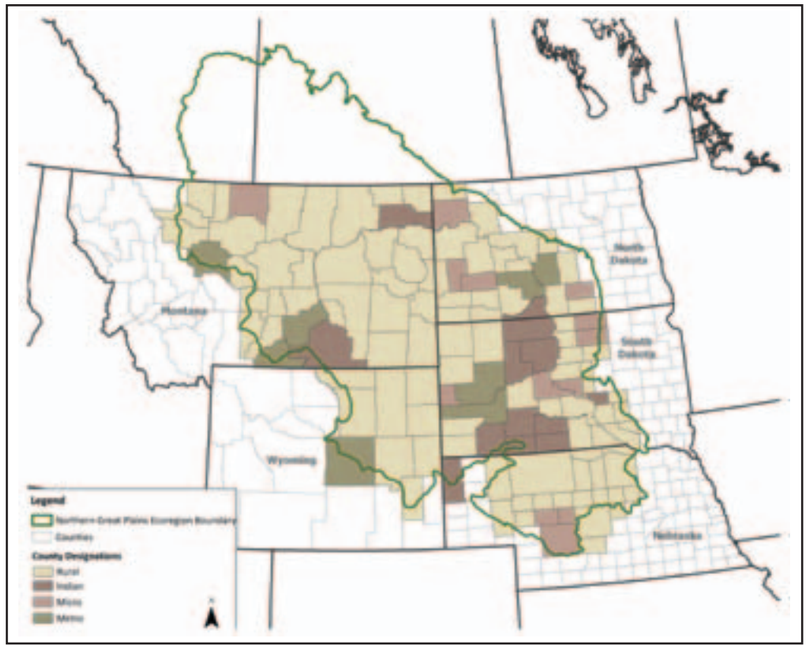


Figure 3. Northern Great Plains showing the 125 U.S. counties, by category, included in the analyses for this report. See text for description of categories.

ECONOMIC TRENDS

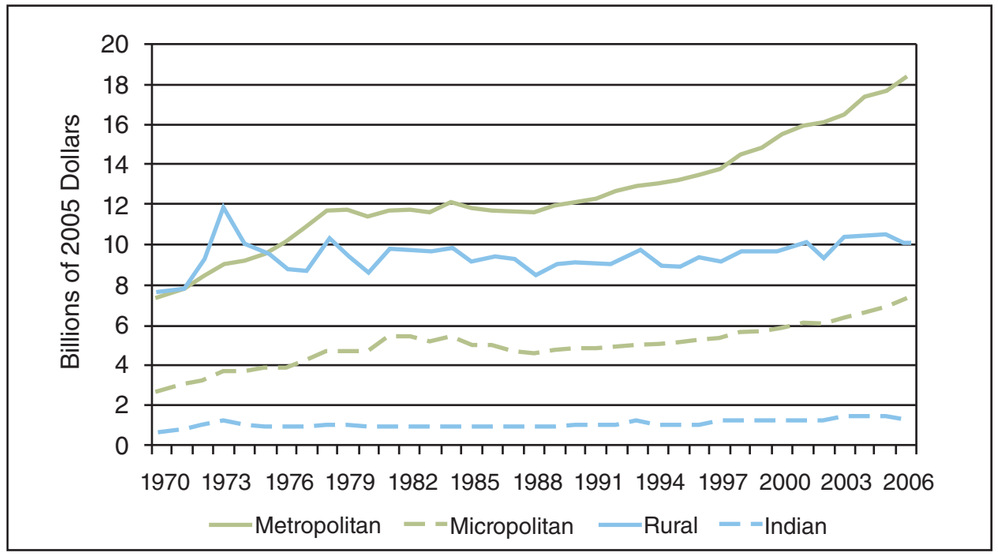
To examine economic and demographic trends in the NGP's 125 counties in the United States (for the remainder of the report "NGP" refers only to the U.S. portion of the ecoregion), we used the USDA Economic Research Service's system for assigning counties to one of three categories: metropolitan, micropolitan, and non-core counties. For some analyses, we further divided non-core counties into two categories: rural and Indian (Figure 3). The county numbers and definitions for each category are:

1. **Metropolitan:** Eight NGP counties with cities or urbanized areas of 50,000 or more residents, including any surrounding economically-linked counties as indicated by at least 25% of its workers commuting to the core area. These eight counties comprise five metropolitan areas.

PhotoSpin

2. **Micropolitan:** Thirteen NGP counties that have a population of 10,000-50,000, including any nearby counties with a 25% commuting link.
3. **Non-core:** These are the remaining 104 counties with fewer than 10,000 residents, which we further classified as follows:
   a. **Indian:** The 12 non-core counties in the NGP with greater than 50% Indian population (no metropolitan or micropolitan counties have greater than 50% Indian population).
   b. **Rural:** The 92 non-core counties with less than 50% Indian population.

Figure 4. Total personal income for the four NGP county categories, 1970-2006. Personal income includes private earning, income from government, dividends, interest, and rent, and transfer payments plus adjustments for residence minus personal contributions for social insurance (Source: USDC 2008).



Although total personal income has risen steadily in recent decades in NGP metropolitan counties, it has largely been flat in rural and Indian counties.

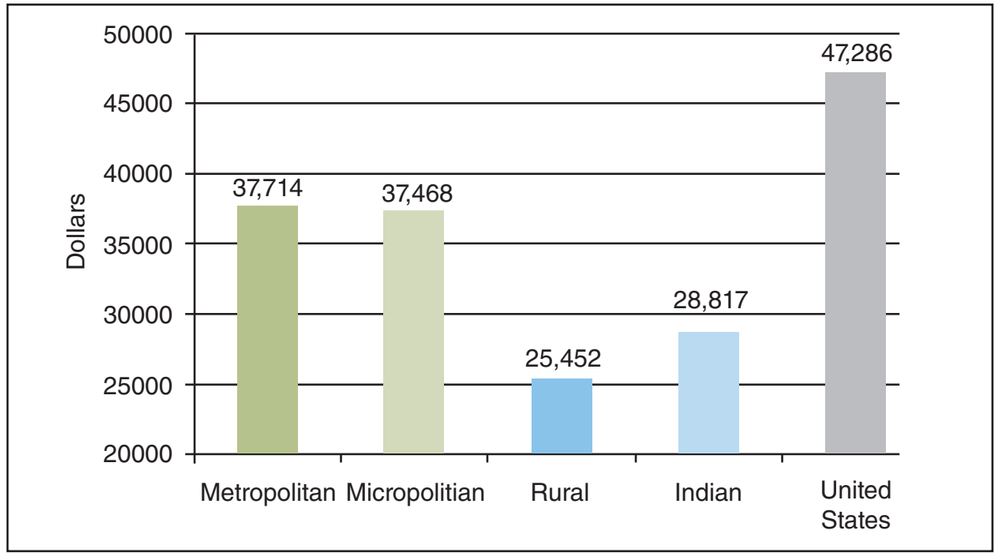
Overall, by various measures such as numbers employed, income levels, and average wage levels, the NGP has shown modest economic gains in recent decades. However, at a more detailed level, four economic trends stand out.

1. Metropolitan areas have been doing well over the last two decades while rural and Indian counties have lagged far behind in economic growth and employment.
2. The long-term decline of agriculture's contribution to the economy has continued and now constitutes about 4% of the Gross State Product of the five NGP states. Nevertheless, agriculture remains very important for the region, particularly for rural communities, when considering direct, indirect and induced effects.
3. Service jobs, followed by retail and government jobs, have been growing in importance and now, collectively, account for roughly 70% of all employment in the NGP.
4. U.S. government crop subsidies, totaling $11.2 billion for the NGP from 1995-2006, have usually accounted for most—and often all—of net farm income.

Although total personal income has risen steadily in recent decades in NGP metropolitan counties, it has largely been flat in rural and Indian counties (Figure 4).

Another measure of economic performance is earnings per job, which in 2006 shows the NGP well below the U.S. average and, within the NGP, rural and Indian counties well below

Figure 5. Average earnings per job in the four categories of NGP counties and the United States for 1970-2006 (Source: USDC 2008).



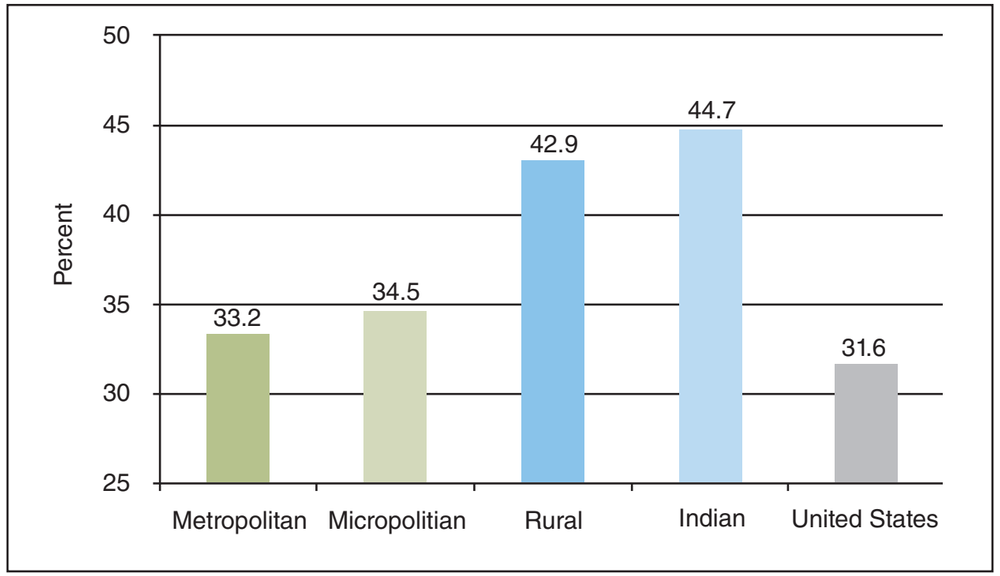


Figure 6. Contribution of non-labor income to total income in the four categories of NGP counties and the United States in 2006 (Source: USDC 2008).

metropolitan and micropolitan areas (Figure 5). Moreover, trends from 1993-2006 indicate that rural and Indian counties are falling ever farther behind in earnings per job (USDC 2008).

Per capita total income is steady or increasing in rural and Indian counties while earnings per job is decreasing because, in large part, non-labor income has become an increasing proportion of total income over the last two decades in both rural and Indian areas (Figure 6) (USDC 2006). Dividends, interest and rent have accounted for most non-labor income among all county categories since 1980, but age-related income (retirement, disability and Medicare) has constituted an increasing share of the total in rural and Indian counties.

Employment trends show even greater disparities. While all five metropolitan areas of the NGP experienced growth in people employed from 1990-2005, rural areas of the NGP, particularly in Montana and North Dakota, experienced more widespread losses in the number employed than any other region of the country (ERS 2006). Despite fewer jobs in rural areas, a declining population has enabled unemployment to stay below 4% in rural counties in 2006 and 2007. And while metropolitan and micropolitan counties averaged below 3% unemployment over those two years, Indian counties averaged around 7%. County-level employment data used in these figures, however, mask the higher unemployment rates found within Indian reservations. According to the 2000 U.S. census, the average unemployment rate for the five Indian reservations within the NGP of Montana was 21% (MDLI 2009) and the six within South Dakota was 22% (Scott 2003).

Anna Parciak / PhotoSpin

The cumulative result of these trends is that the NGP was alone among regions across the northern half of the United States in having a high number of counties—more than 30—with poverty rates above 20% in 1999. Only areas in the southern half of the United States showed similarly high poverty rates (McGranahan and Beale 2002).

The Agricultural Economy

Agriculture's relative contribution to the region's economy has been in steady decline for decades (Johnson and Rathge 2006). The contribution of agriculture to the Gross State Product of the five NGP states averaged 4% in 2006, down from around 8% in 1969 (Figure 7). Similarly, while total employment in the NGP increased more than 60% from 1969-2006, agriculture accounted for only 8% of total employment in 2006, down from around 20% in 1969 (Figure 8). Despite these trends, agriculture is still important for the NGP economy at the state level and, particularly, in rural communities (Leistritz et al. 2002, Wood 2006). For example, as measured by direct, indirect, and induced effects, which include

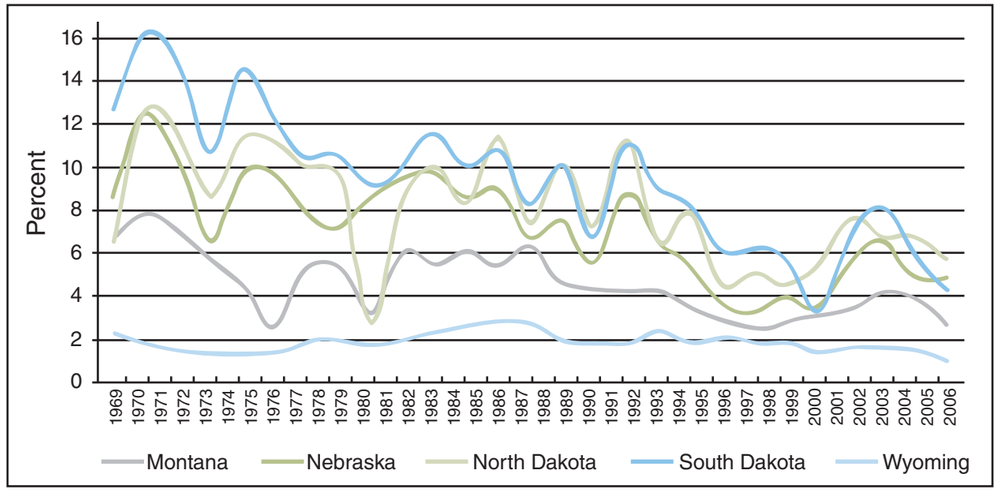
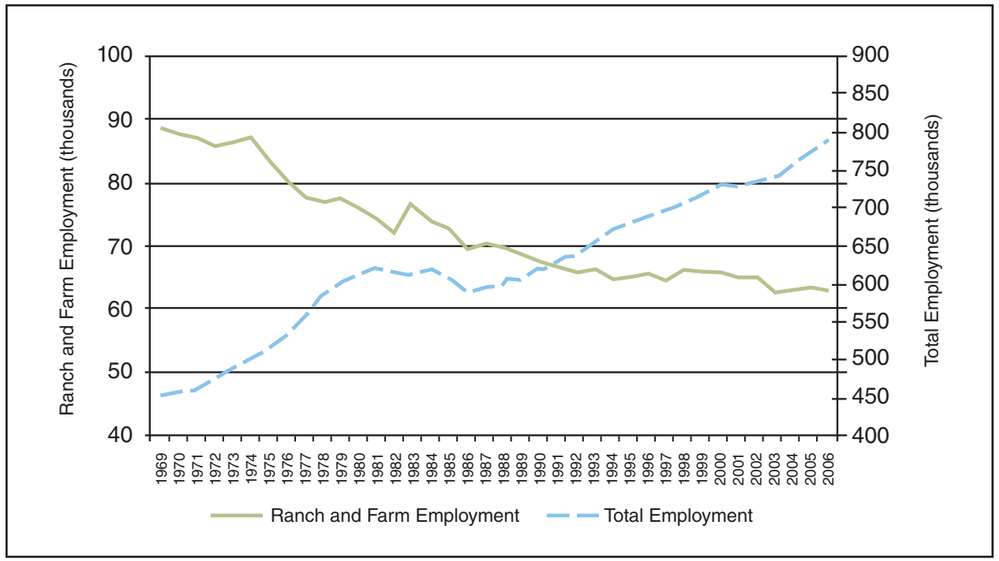


Figure 7. Contribution of agriculture as percent of gross state product (GSP) in the five NGP states, 1969-2006. GSP, the state equivalent to the gross national product, measures the value-added production by labor and property of each industry (Source: USDC 2008).

inputs and outputs, production agriculture accounted for an estimated 21.5% of the flow of dollars through the South Dakota economy in 2006 (Taylor 2009). Nevertheless, after an extensive review of North Dakota's rural economy, Wood (2006) stated that "it seems unlikely that production agriculture will ever again produce the jobs necessary to sustain rural communities."

Figure 8. Total employment compared to farm and ranch employment in the NGP, 1969-2006 (Source: USDC 2008).



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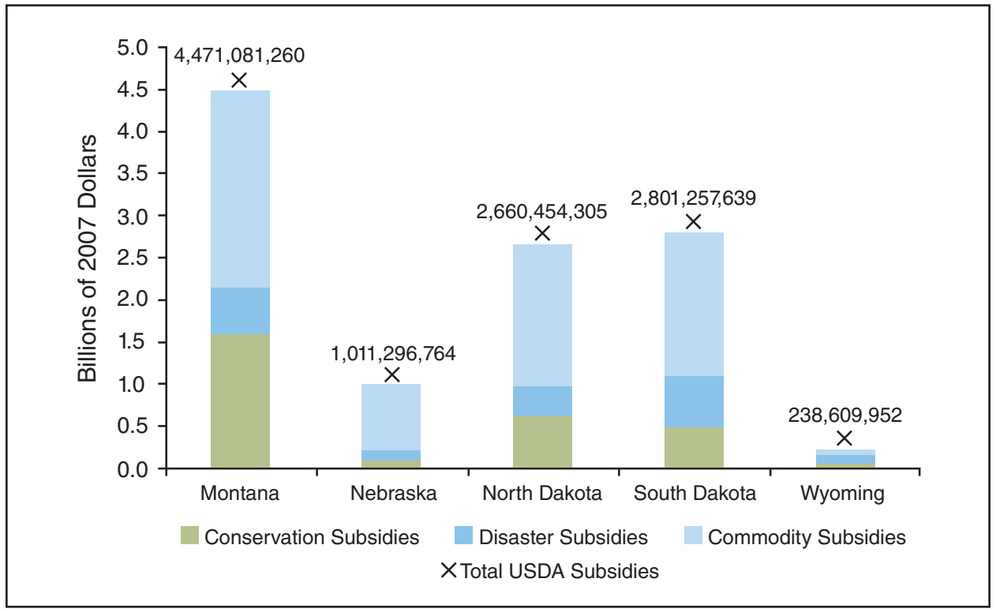
Federal subsidy programs for crops and cropland are a central feature of the NGP agricultural economy. From 1995 to 2006 NGP agriculturalists received $11.2 billion in subsidies, an average of more than $930 million annually (Figure 9). From 1980 to 2006, with production expenses often exceeding cash receipts, subsidies have constituted 45% to more than 150% of net realized income in the NGP (Figure 10). Subsidies were most important for profitability in Montana and North Dakota where they generally have exceeded 100% of net agricultural income since 1980, but in Nebraska, Wyoming and South Dakota government payments have generally accounted for 50% to occasionally more than 100% of net agricultural income.

The concentration of subsidy payments is only slightly less skewed in NGP states than for the United States: on average 7% of recipients received 50% of subsidy dollars in the five NGP states from 1995-2006, compared to a

U.S. average of 4%. These figures, however, exclude non-recipients, whose inclusion would skew the concentration of payments even more, particularly in states like Wyoming and Montana which have much more land in ranches, which often receive no subsidies, than cropland. Based on the latest USDA figures, in 2002 the proportion of agriculturalists not

Figure 9. Agricultural subsidies with the NGP region of each state, 1995-2006 (Source: EWG 2009).



receiving any subsidies ranged from 66% in Wyoming and 56% in Montana, to around 35% in Nebraska and South Dakota, to 22% in North Dakota (EWG 2009). Apart from the question of fairness, this disparity would seem to sharply slant the economic playing field toward conversion of unsubsidized rangeland to subsidized cropland.

soybeans for biodiesel—have consequently risen sharply in recent years. Although this has been profitable for many farmers, it has resulted in higher food prices for consumers and feed prices for cattle (Elam 2008).

Fossil Fuels

Coal, oil and gas have been important economic drivers in some regions of the NGP. In 2006, this energy sector accounted for

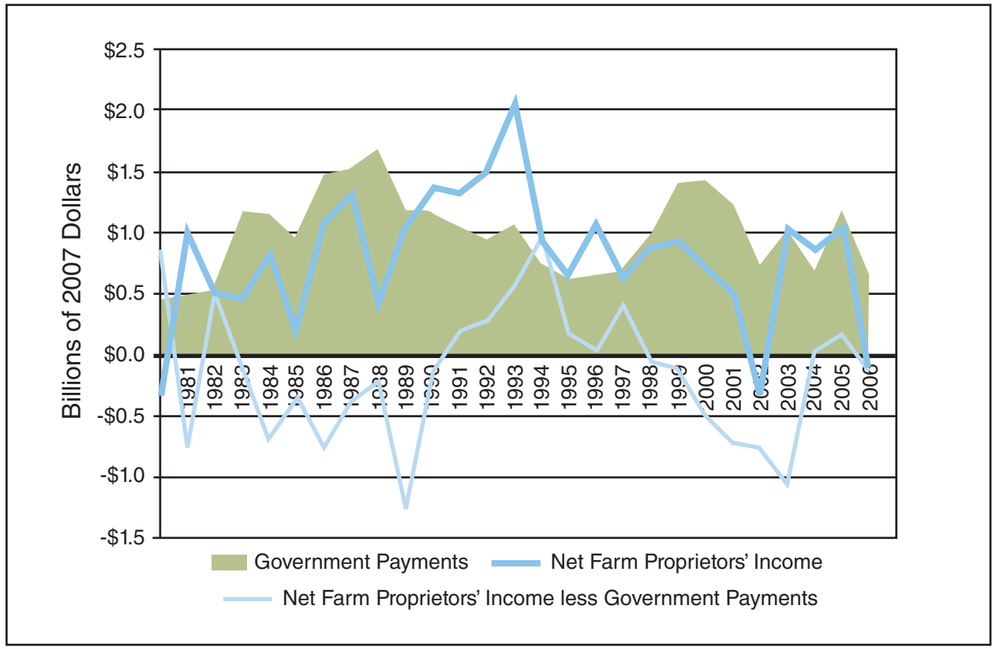


Figure 10. Government payments and net farm proprietors' income in the NGP, 1980-2006. Net income consists of total cash receipts and other income (such as government payments) less total production expenses (Source: USDC 2007).

Federal energy policies aimed at increasing ethanol and biodiesel production have recently become another major factor in the NGP agricultural economy. The Energy Independence and Security Act of 2007 mandates quotas, provides tax benefits for renewable food-based biofuels, and pays $0.46 per gallon for all ethanol blended with gasoline. Prices for feedstocks—largely corn for ethanol and

25-58% of employment in three counties—Campbell in Wyoming and McLean and Slope in North Dakota. In another six counties—one in South Dakota, one in Wyoming and four in Montana—these industries accounted for

Mardi Coers / PhotoSpin

11-25% of total employment (Headwaters Economics 2009). Employment in these energy sectors increased significantly in the late 1970s and early 1980s and then leveled off or declined until around 2000 when some areas experienced a resurgence. Among the most notable both economically and environmentally is coal-bed methane development around the Powder River Basin of northeast Wyoming and southeast Montana where 50,000-120,000 new wells are projected over the next 15-20 years (PRBRC 2009).

POPULATION TRENDS

Four patterns of population change in the NGP stand out:

1. Metropolitan, micropolitan and Indian county populations have been growing while rural county populations, with a 20% decrease from 1980-2007, have continued their long-term decline (Table 1).
2. A corollary of the preceding pattern is that the highest rates of population loss have occurred in counties that already have very low population numbers.
3. The contrast in population trends of metropolitan and micropolitan counties compared to rural counties is primarily due, first, to rural counties having higher out-migration than in-migration rates and, second, to the death rate exceeding the birth rate in rural counties.
4. Compared to other NGP counties, rural county populations have a disproportionately small number of young adults and large number of older adults, which portends steeper rural population declines in the near future.

Table 1. Population change in the NGP and the four categories of NGP counties, 1980-2007 (Source: USCB 2008).

Counties	Number of counties	1980 population	2007 population	% change 1980-2007	No. counties w/increase 1980-2007
All NGP	125	1,145,806	1,167,331	1.9	28 (22%)
Metropolitan	8	441,268	526,703	19.4	7 (88%)
Micropolitan	13	194,756	211,564	8.6	5 (38%)
Indian	12	67,169	74,131	10.4	8 (67%)
Rural	92	442,793	354,933	- 19.8	8 (9%)

Nearly 1.17 million people lived in the U.S. portion of the NGP in 2007. In contrast to 1980 when slightly more people lived in rural than metropolitan counties, in 2007 45% lived in metropolitan counties and 30% in rural counties (Table 1). Of the four county categories, only rural counties, as a whole, lost population during this period; and the loss was widespread, with 84 of 92 (91%) rural counties registering declines. This is a continuation of a rural decline that began in the 1930s (Johnson and Rathge 2006).

Population and economic trends in rural regions of the NGP are closely intertwined and, in a negative feedback loop, each appears to be pulling the other further down. Ranchers are retiring and their children are leaving in search of better opportunities. Small towns are shrinking and losing basic services, which in turn drives further out-migration. Meanwhile, communities and rural development specialists are scrambling to find ways to stop the hemorrhaging (Stauber 2001, Preston and Bailey 2007).

Factors Affecting Population Change

Population change is the result of two processes: 1) number of births and deaths (natural increase or decrease), and 2) migration into and out of an area. While populations of NGP metropolitan areas continue to grow due to both in-migration and natural increase, populations of non-Indian rural areas are declining primarily because of out-migration, especially among young adults. Although Indian rural counties also show strong out-migration, a high birth rate has resulted in net population gains (Figure 12).

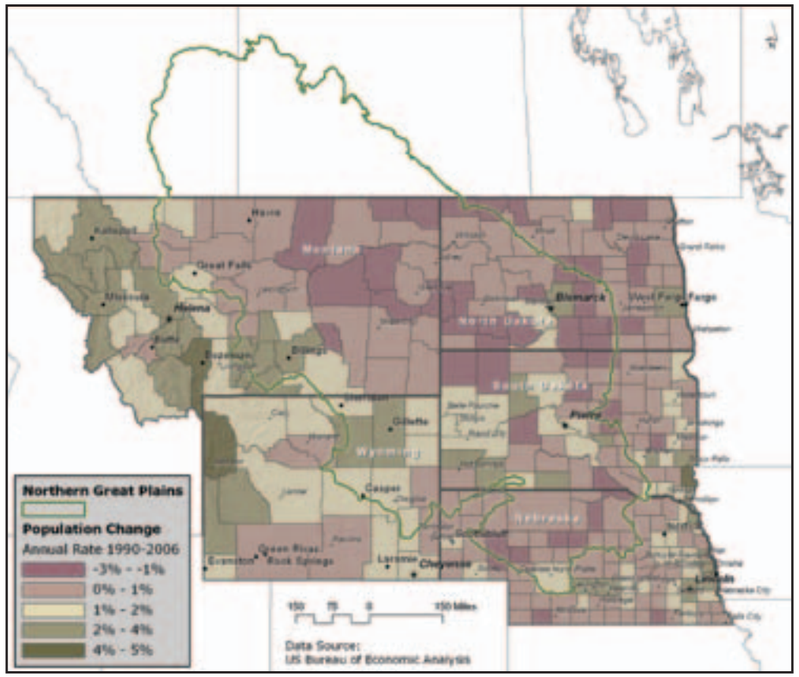


Figure 11. Population change in the NGP and non-NGP counties of the five-state region, 1990-2006 (Source: Headwaters Economics 2009).

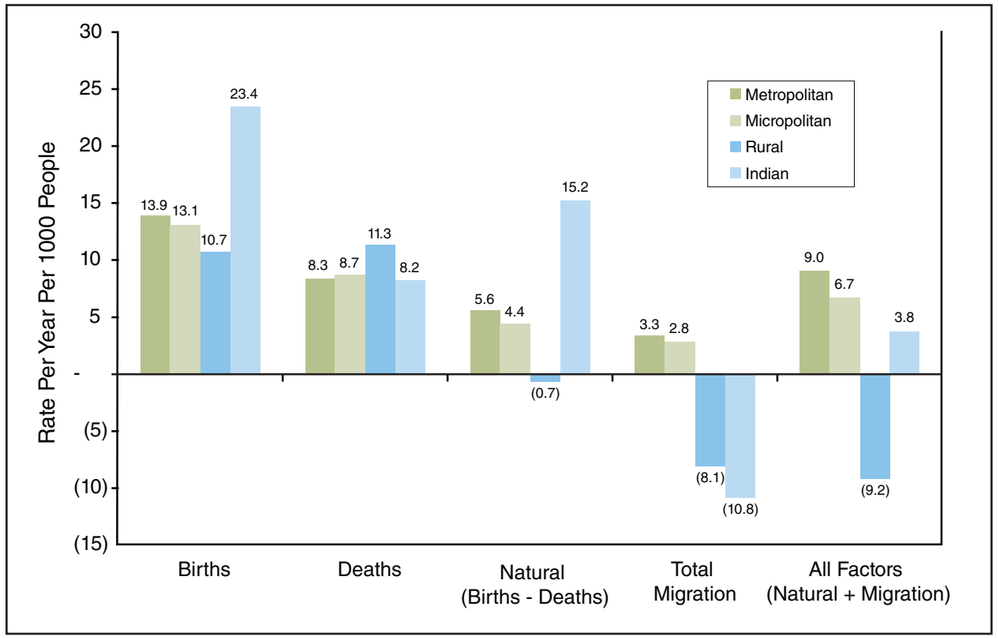


Figure 12. Components of population change in the four categories of NGP counties, 2000-2007 (Source: USCB 2009).

Nationally, three major factors appear to favor out-migration and to account for recent population declines in rural areas: 1) location away from metropolitan areas; 2) low population density; and 3) low level of natural amenities for outdoor recreation (McGranahan and Beale 2002). NGP data fit the national pattern showing out-migration occurring from non-metropolitan, rural areas. Low population density is also associated with population decline and strong out-migration in the NGP.

Metropolitan, micropolitan and Indian county populations have been growing while rural county populations, with a 20% decrease from 1990-2007, have continued their long-term decline.

All NGP counties that lost 20% or more of their population from 1980-2007 started with fewer than 18,000, and those that lost 30% or more all began with fewer than around 8,000 residents (Figure 13). This pattern is found

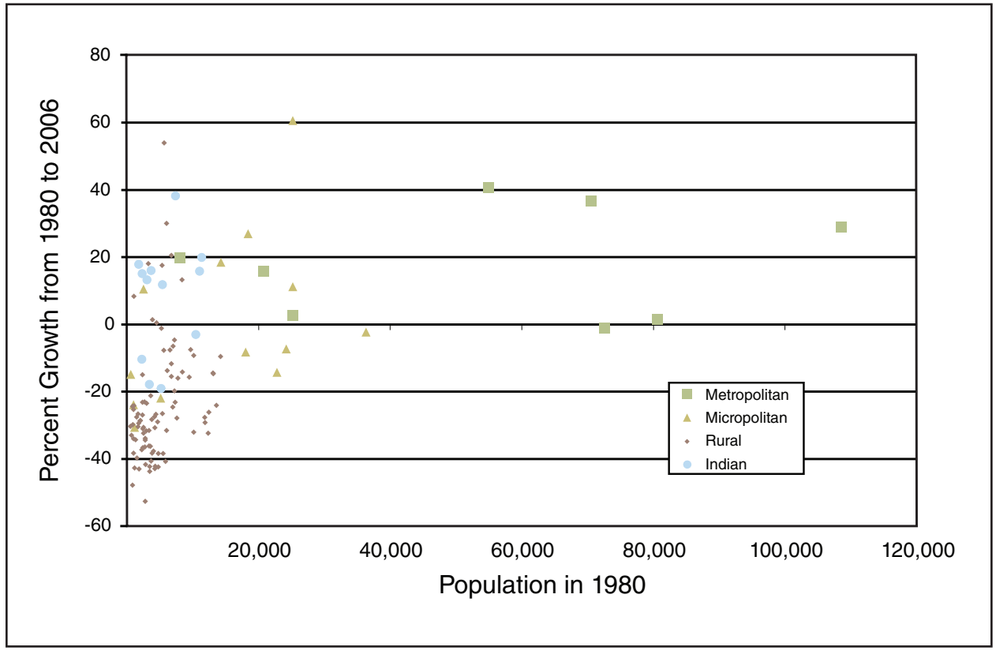


Figure 13 (above). Relation between 1980 population and percent population change from 1980-2006 for the 125 NGP counties. Each point represents a county (Source: USCB 2008).

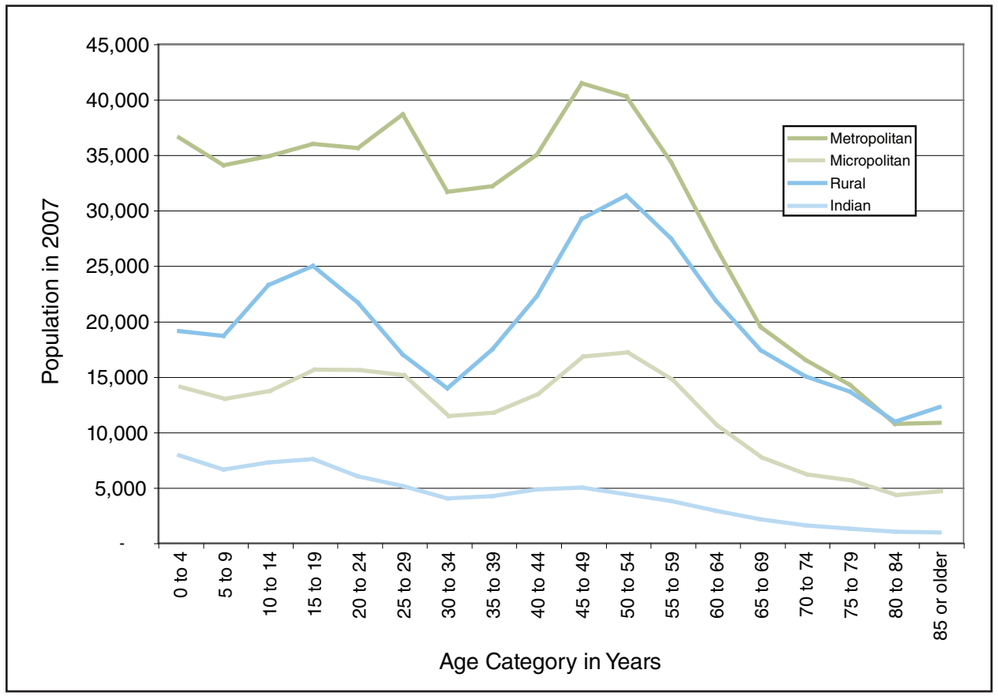


Figure 14 (below). Age structure in the four categories of NGP counties in 2007 (Source: USCB 2008).

Kristy Bly

across the Great Plains of the United States; of 261 counties with populations of fewer than 10,000 residents, 92% experienced net out-migration and 55% experienced more deaths than births from 2000-2007 (Wilson 2009).

Migration patterns in rural areas are strongly affecting birth and death rates and will have a major influence on future population trends and age structure (Figure 14). In rural areas the out-migration of young people during their peak child-bearing years results in a low birth rate and declining labor pool with, as Johnson and Rathge (2006:212) observe, "serious consequences for the viability of nonmetropolitan communities." Meanwhile, baby boomers (now 45-63 years old) and older people are not leaving, further skewing the age structure toward the elderly. The greater number of deaths than births in rural NGP counties from 2000-2007 (Figure 12) reflects, as noted above, a trend found across the Great Plains. As the baby-boom population further ages, the rate of population loss across the rural Great Plains can be expected to increase even more over the next two decades unless measures are taken to counter this trend.

A closer look at migration patterns reveals the brain drain resulting from out-migration by well-educated young adults from the NGP. From 1995-2000, North Dakota displayed the highest out-migration rate in the nation among young,

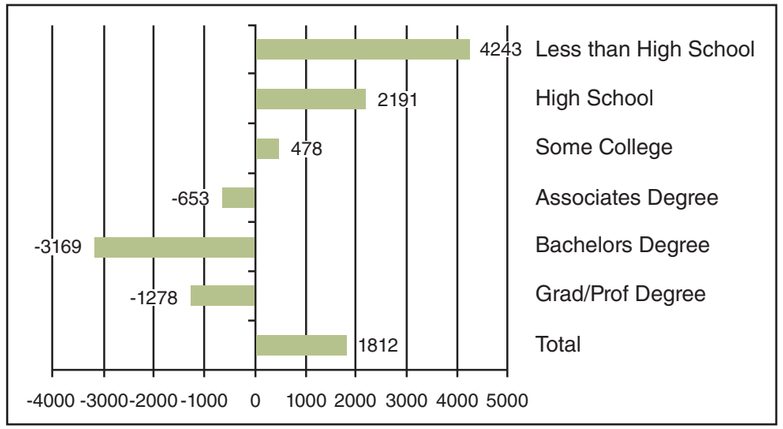


Figure 15. Estimated net migration into and out of Nebraska by level of education for ages 22-29, 1995-2000 (Source: NCCPE 2004).

single, college-educated people, followed by South Dakota (3rd highest rate), Montana (5th), Nebraska (10th), and Wyoming (16th) (Franklin 2003). Data from Nebraska provide a detailed picture of this trend (Figure 15). Though county-level data are unavailable, rural areas in the NGP almost certainly account for most, if not all, of these net out-migration rates.

The influence of natural amenities on socioeconomic conditions in rural America is well established: counties rich in natural amenities have high rates of employment and population growth (McGranahan 1999). According to Johnson and Beale (2002:12), "for rural communities struggling to offset job losses from farming, mining, and manufacturing, capitalizing on the recreational appeal of an area fosters economic development, attracts new residents, and retains existing population." Not surprisingly, given the importance of topographic relief in the USDA Economic Research Service's criteria for assigning natural amenity scores, non-metropolitan counties along and near the Rocky Mountain front and isolated mountain ranges such as the Black Hills score higher than other non-metropolitan counties, particularly those in the eastern half of the NGP that have low topographic relief and are dominated by crop farming (ERS 1999). Reflecting the national trend, NGP counties that have high natural amenity scores exhibit greater population growth than low-scoring counties.

Relatively high employment in oil/gas/coal is not correlated with population growth in recent years. For example, of the four NGP counties with 25% or more employment in oil/gas/coal in 2006, only one, Converse County in Wyoming, displayed population growth from 1990-2007 (USCB 2006, 2008).

TRENDS IN LAND OWNERSHIP AND MANAGEMENT

Retirement and mortality among the rural baby-boom population over the next two decades portend a massive turnover in land ownership and, potentially, change in land management, as increasing numbers of ranches and farms come onto the market. Four trends in land markets and management in the NGP stand out:

1. The value of both cropland and rangeland has generally increased 10-15% or more annually over the last decade.
2. Profits from agriculture have not kept pace with increased land values and thus, according to surveys within the region, the rate of return has declined by one-third to nearly one-half over the last two decades.
3. A substantial and increasing number of land buyers—more than one-third according to studies within the region—are non-local and are buying for investment or recreational purposes, while many sellers are retiring and settling estates.
4. Hundreds of thousands of acres of native prairie are being plowed and Conservation Reserve Program lands are going back into production, driven by agricultural subsidies, strong demand for biofuel feedstocks, and advances in crop and farming technology.

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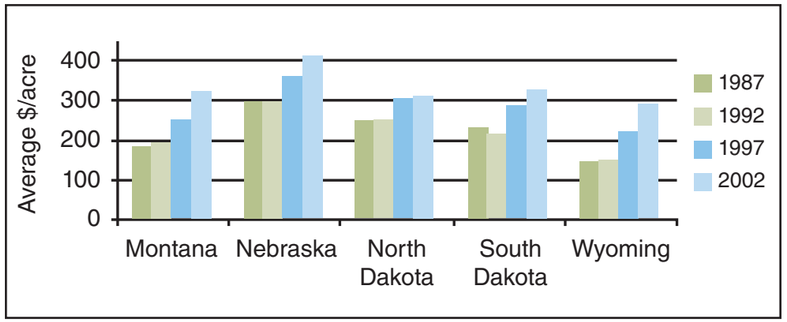


Figure 16. Average dollar/acre value, not adjusted for inflation, of agricultural land and buildings for the NGP region of each state in 1987, 1992, 1997, and 2002. (Source: USDA Census of Agriculture 2002).

Land Values

Land values in the NGP and in the Southern Great Plains are among the lowest in the United States. Nevertheless, values for both cropland and rangeland have increased sharply in the NGP, with Wyoming and Montana showing the largest percentage increase from 1987-2002 (Figure 16). This trend has continued: From 2007 to 2008, the average value of farm/ranch real estate for the five NGP states increased 18.3%, more than any other state or region in the country and double the national average (NASS 2008).

In South Dakota, land values in the rangeland-dominated western and south-central regions increased by 11-13% annually while the cropland-dominated central and eastern regions increased by 13-18% annually from 2001-2008. These trends were preceded by annual increases of 5-10% from 1996-2001 across the state (Janssen and Pflueger 2008). Farm subsidies augment land values; an estimated 22-24% of cropland values in the Northern Plains in 2000 were due to commodity program payments (Barnard et al. 2001).

A land market shift from the mountains to the plains of Montana has been evident in recent years. Norman C. Wheeler and Associates (2008), a Montana real-estate appraisal company, reported that for the period 2004-2007 "we continue to see sales which are exhibiting new or historic highs in the transitional areas of eastern and central Montana. It appears that there has been a strong shift in value to these areas." This shift has been attributed to rapidly rising land prices in the western region of the state driving buyer demand, especially among recreation buyers, for larger tracts in the east. Also, individuals buying land in the east with 1031 proceeds from the sale of western

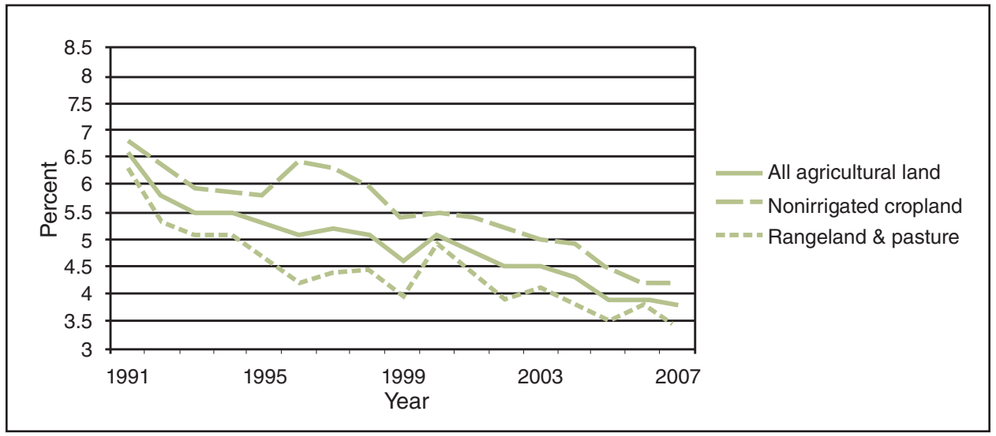
properties have been cited as driving up eastern Montana land values. (Section 1031 of the U.S. Internal Revenue Code allows individuals to defer capital gains taxes on the exchange of like-kind properties.) River-front properties, such as along the Yellowstone River between Billings and Miles City, and large rural ranches are especially valued in this market. Though the economic downturn that began in 2008 has softened the land market in Montana, Wheeler and Associates predict that the market for large, recreational ranch properties is fairly resilient and will quickly rebound (Norman C. Wheeler and Associates 2009).

In general, agricultural income has not kept pace with rising land values in the five NGP states in recent years. From 2001-2007, land values generally increased at more than twice the rate of increase in cash rents (Janssen and Pflueger 2008). In South Dakota, rates of cash return on both cropland and rangeland are the lowest since surveys began in 1991, declining from around 6.5% then to around 4% in 2008 (Figure 17). Similarly, in the Nebraska Sandhills the net rate of return has steadily declined from an average of 5.7% during 1990-1992 to 3.0% during 2005-2007 (Johnson 2007).

Who is Selling and Why?

The rapid rise in land prices in recent years has created a seller's market. Declining profit margins from agricultural lands and the fact that many landowners are at or approaching retirement age provide additional incentives to sell. South Dakota's 2008 survey found that 44% of sellers identified favorable market conditions as a reason for selling, compared to just 17% giving that reason in 2000. Thirty-one percent gave retirement and 14% gave estate settlement as reasons (Figure 18). Estate settlement is often associated with the younger generation of heirs not wanting to return to the ranch and thus deciding to liquidate holdings (Janssen and Pflueger 2008). In 2006 in Nebraska's Sandhills region, "active farmers/ranchers" represented 42% and "quitting farmers/ranchers" represented 21% of sellers, while 29% of sellers were non-agriculturalists (Johnson 2007).

Figure 17. Net rate of return by land use in South Dakota, 1991-2008 (Source: Janssen and Pflueger 2008).



Who is Buying and Why?

A 2004 article in The Wall Street Journal titled "Wall Street's Latest Pitch: Buy a Ranch" reported that major investment firms such as Bank of America and J.P. Morgan Chase & Co. were touting ranches and farms as an alternative investment (Rural Landscape Institute 2008). In 2001, wildlife recreationists spent $12 billion on land leasing and ownership in the United States, up from $7 billion in 1996 (Henderson and Novak 2005). Recent surveys and anecdotal information suggest that an increasing number of investment and natural-amenity buyers are entering the NGP land market. Most of these buyers will maintain the cattle operation and hire local ranch managers, but they are looking at the land as investment property and for recreation such as hunting, wildlife viewing, and enjoyment of the landscape. Real estate ads for eastern Montana ranches invariably highlight the wildlife and hunting potential of the land. Unlike the traditional owner, the recreational and investment buyer often only needs to earn enough off the land to support operations, not make a living. The value is in the monetary appreciation of the land itself.

In the Nebraska Sandhills in 2006, 50% of buyers were active farmers/ranchers, 38% were non-local, and 12% were local non-farmers/ranchers (Johnson 2007). In South Dakota, the top three reasons for buying land have not changed since the survey began in 1991, but the proportion buying land to expand their land base has shrunk while purchases for investment, hunting and recreation have strongly risen (Figure 18). Janssen and Pflueger (2008:17) conclude from their 2007 survey that "In most areas of South Dakota, farmers and ranchers expanding their operation are still the principal buyers of agricultural land. However, their dominance in the local area land market is increasingly challenged by investors, both local and non-local, interested in purchasing agricultural land for various reasons, including leasing land to local farmers, leasing/developing land for hunting and other recreation opportunities, and other motives. The implication is that farm ownership expansion comes at a higher price than before." This trend is reflected in a survey in the four-state corner region of Montana, North Dakota, South Dakota, and Wyoming that found ranchers concerned about rising land values driven by recreational and investment buyers that will make it difficult for young people to enter ranching (Hodur et al. 2007).

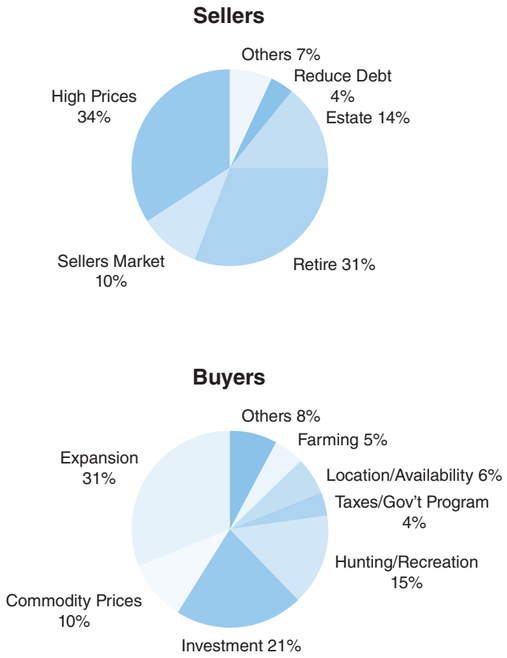


Figure 18. Reasons for selling and buying land in South Dakota, 2007-2008 (Source: Janssen and Pflueger 2008).

Land Use Trends

Despite its declining economic importance, agriculture—both livestock and grain production—will continue to strongly dominate land use in the region for the foreseeable future. Nevertheless, land use changes are occurring that create both concern and hope for merging conservation interests with sustainable rural development.

Of greatest concern is accelerated sodbusting, fueled by a combination of factors—more drought- and pesticide-resistant crops, minimum tillage and larger equipment that reduce input costs, and booming crop markets, now underpinned by U.S. government crop and biofuel subsidies. Compared to a rancher who maintains grass cover with little or no financial safety net, federal subsidies provide a safety net—a floor to the financial risks—for the owner who converts his or her grassland to cropland (Stubbs 2007). In recent years disaster payments have been far higher in areas in east-central South Dakota where large acreages of native prairie have been converted to crops, compared to long-standing cropland in eastern South Dakota—evidence that taxpayers are paying for the conversion of land better suited for keeping in native prairie (GAO 2007a).

Particularly if climate change leads to hotter conditions in the Great Plains, the long-term sustainability of crop farming in many areas is questionable. As Parton et al. (2007:738) note, "during much of the period when extensive agricultural expansion took place in the Great Plains, climate conditions were highly conducive to cropping systems. Given historical cyclical patterns of drought in the region, current agricultural practices may not be appropriate if these drought conditions resume and persist, as has occurred in the past."

In addition to largely eliminating native plants and animals, sodbusting often results in more rapid runoff and reduced water tables, downstream nutrient enrichment problems,

Diane Hargreaves

and the release of carbon. From 1982-2003 approximately 3.2 million acres of rangeland (primarily native vegetation) and 2.6 million acres of pastureland (primarily introduced forage plants) were converted to cropland in the Northern Plains (includes some tallgrass prairie region to the east of the NGP) (GAO 2007a). The Missouri Coteau region of the Dakotas has annual loss rates of native prairie as high as 2% in some key areas. At that rate, half of the remaining native grassland in those areas will be lost in only 34 years (DU 2009b).

High crop prices and subsidies have also caused many farmers to put lands enrolled in the Conservation Reserve Program (CRP) back into crop production. This is particularly serious because CRP lands are generally marginal for cropland, provide wildlife habitat, and are susceptible to high erosion rates when cultivated. In 2007, nearly 820,000 acres of CRP grasslands disappeared in the Dakotas and Montana (DU 2009a). Montana, South Dakota and North Dakota had the highest concentration of CRP acres enrolled in the country—8,414,712 acres, 23% of the total for the United States, as of February 2007. Contracts for a large portion of these acres are set to expire from 2008-2012 (USDA 2007).

As noted earlier, oil and gas development is fragmenting the land and threatening water quality in some areas, with coal-bed methane development in the Powder and Tongue River basins of northeast Wyoming and southeast Montana the most serious. On a smaller but rapidly growing scale, wind farms are raising concerns about habitat fragmentation and effects on migrating birds and bats. Wind energy is a potentially important sustainable energy source in the NGP and proper placement of wind farms could largely avert environmental problems (Martin et al. 2009). A review of energy-development impacts and mitigation is beyond the scope of this report, but close attention needs to be paid to managing the growth and environmental effects of these energy sectors.

Cooperative Management among Private Landowners

Large-scale conservation in the NGP will often require collaboration among local landowners to achieve sufficiently large acreages. Whether to enhance marketing, to create a larger land base for effective management, or to share information and create a stronger political voice, a few examples of such cooperation have emerged. All include, at some level, the need to manage for and (or) market the biodiversity values of the land. For example, the goal of the nonprofit Sandhills Task Force in Nebraska is "to enhance the sandhill wetland-grassland ecosystem in a way that sustains profitable private ranching, wildlife and vegetative diversity, and associated water supplies" (www.sandhillstaskforce.org). The Thunder Basin Prairie Ecosystem Association is a coalition of ranchers, federal and state agencies, and industry dedicated to the effective stewardship of the Thunder Basin Grasslands (http://www.nebraskahighcountry.com). With more of a marketing purpose, the web site of Northwest Nebraska High Country (http://www.nebraskahighcountry.com) states that it is "a group of local farmers and ranchers [24 were listed as of October 2008] offering lodging, hunting and recreation on their beautiful properties in the scenic Pine Ridge area of northwest Nebraska."

How economic trends and land ownership changes reviewed earlier affect land management and biodiversity conservation is unclear (Brunson and Huntsinger 2008). However, potential counterweights to the troubling land use trends outlined above are growing interest and investments in biodiversity conservation and in businesses based on native prairie and abundant wildlife. Some traditional agriculturalists are trying to diversify and (or) enter niche markets through organic production, agri- and ecotourism, and wildlife and other natural-amenity markets. Many bison producers and organic/natural beef producers tout the benefits of their operations for healthy rangelands and wildlife. And some landowners are securing payments for environmental services produced by their land. As explained in the next section, this diversification of land uses and values provides new opportunities for linking rural economic development with biodiversity conservation.

Who will manage the land?

Whether a 4th generation ranch owner or a manager hired by a trust company that owns the ranch, today's ranch manager needs a broad range of business and resource management skills. A study conducted by the Rural Landscape Institute noted widespread concern about the shortage of well-qualified ranch managers. The Institute's recent survey of 23 universities in 17 western states "found that even though ag management programs are offered, coursework was 'almost without exception' not packaged in a way that effectively trained individuals for the challenges of contemporary ranch management….Many of today's ranchers, particularly those in scenic landscapes supporting healthy fish and wildlife populations, are gleaning value beyond the production of agricultural commodities. The management challenge in those cases is to operate a profitable enterprise which accommodates or complements features such as open space and wildlife habitat" (Rural Landscape Institute 2008).

U.S. Fish and Wildlife Service

Darren Green / PhotoSpin

NATURE-BASED ECONOMIC CONDITIONS AND TRENDS

Significant economic, demographic and land use changes are underway in the NGP. Many of these changes raise both needs and opportunities for viewing the land and its value through a different lens. In this section our lens focuses on the values and uses of the region's native ecosystems and wildlife, and how a nature-based economy may provide new, mutually beneficial pathways for conservation and economic development.

The diverse renewable products and services that ecosystems provide are often referred to as "ecosystem services" (Costanza et al. 1997). Our interest here is in nature-based products and services, that is, those generated by largely natural (e.g., rangeland) as opposed to man-made (e.g., cropland) ecosystems. Four conditions involving nature-based values and activities are notable in the NGP:

1. Although the NGP has captured a relatively small share of the national ecotourism market—less than 1% of hunting, fishing and wildlife viewing, for example—the last two decades have seen a rapid increase in ranch-based, ecotourism (including hunting) businesses.
2. Ecolabeling of grassland products has great potential in the NGP because of the extensive cover of native grasslands. However, such labeling is poorly developed and therefore almost no market differentiation exists for biodiversity-friendly beef production or other grassland products.
3. The per-acre estimated values of ecosystem services generally exceed per-acre commodity rental values of the land; the estimated value of selected ecosystem services in the NGP is $40.4 billion annually.
4. Government programs aimed at conserving important ecosystem services through direct payment, conservation easements, and fee-simple acquisition are seriously underfunded and failing to meet conservation needs and targets.

Dennis Jorgensen

For our purposes, the economic benefits of nature can be separated into three major categories.

Natural amenities: We define natural amenities as those natural features of the landscape that make a place attractive for visiting or living. Thus, ecotourists are attracted to high natural-amenity places for wildlife watching, hunting and fishing, enjoying the natural and semi-natural landscape, and similar nature-based activities. Residents remain in, or immigrants move to, an area because of the economic opportunities generated by ecotourism and (or) because of its natural amenities and associated aesthetic values and recreational opportunities.

Ecosystem products: This includes commercial products that are harvested from a native or semi-native ecosystem. The two main products in the NGP are native plant seeds harvested for commercial sale, and native vegetation, whether harvested directly as hay or indirectly via livestock grazing.

Other ecosystem services: This includes many services from healthy ecosystems for which no or only quasi-markets exist, such as provision of clean water, prevention of soil erosion, and carbon sequestration. This category also includes non-use values such as "existence values," which refers to people's willingness to pay for simply knowing that native prairies, their wildlife, and other native features of the NGP landscape exist, whether they ever see or use them or not, and "bequest values," the desire to conserve natural amenities for future generations.

Given that roughly two-thirds of the NGP is in native or semi-native habitat with substantial wildlife populations, one could argue that the region is currently dominated by a nature-based economy. The primary land use, livestock grazing, depends largely on native plants which livestock convert into marketable protein. Irrigated cropland depends on water largely supplied by ecologically intact watersheds. And the region's natural landscape and rich wildlife offer both cultural and economic benefits for many who live there. The challenge is to build on and diversify these nature-based services for the mutual benefit of biodiversity and of local landowners, communities and businesses.

NATURAL AMENITIES

NGP communities are getting a small fraction of the multi-billion-dollar national market for ecotourism. In 2006 nearly 105.9 million people six years of age and older in the United States, more than one-third of the total population, participated in hunting, fishing and wildlife watching. Those 16 years and older—87.5 million—spent $122.3 billion on these wildlife-based activities, accounting for 1% of the gross domestic product. Within the five NGP states expenditures totaled $1.1 billion, less than 1% of the total. These numbers do not include people who participated in and spent money on activities such as hiking, camping, and visiting scenic natural areas such as national parks and wilderness areas (USDI and USDC 2006).

Data for seven federal protected areas in the NGP suggest that visitors have a significant impact on local economies (Table 2). A large majority of visitors to the Huron Wetland Management District, which consists of numerous wetlands sites, and to the C.M. Russell Refuge were hunters, whereas visitors to the other five areas were almost entirely, or entirely, non-consumptive users. With so few protected areas across the NGP, however, their total economic impact in the region is relatively small.

The demand for non-consumptive wildlife recreation from ranch-based businesses appears significant and growing. In a recent marketing survey of people from various regions of the United States to assess their interest in agritourism in the seven-state region of Idaho, Montana, North Dakota, South Dakota, Colorado, Wyoming and Utah, 50% replied that wildlife watching was one of the most interesting activities to participate in and, among the wealthiest respondents, that figure rose to 77% (Markitecture 2007). In North Dakota, a state-wide survey of outdoor-recreation businesses reported that 85% had started since 1991 (Figure 19), and a large majority owned or leased private land used in their operation. Hunting and fishing were the primary sectors, with their gross business volume during the 2001-2002 season totaling $1 billion (Hodur et al. 2004).

Table 2. Visitor expenditures in NGP protected areas (Sources: Caudill and Henderson 2005, Carver and Caudill 2007, Stynes 2007).

Protected Area (data year)	Acres	Visitor Expenditures ($)	Exp/acre ($)
Benton Lakes NWR, MT (2006)	12,383	149,500	12
Huron Wetland Management District, SD (2006)	17,518	1,004,000	57
Ft. Niobrara NWR, NE (primarily 2004)	19,131	3,905,500	204
C.M. Russell NWR, MT (2006)	1,100,000	14,230,300	13
Badlands N.P., SD (2007)	244,000	18,149,000	74
Theodore Roosevelt N.P., ND (2007)	70,447	21,612,000	307
Wind Cave N.P., SD (2007)	28,295	41,967,000	1,483

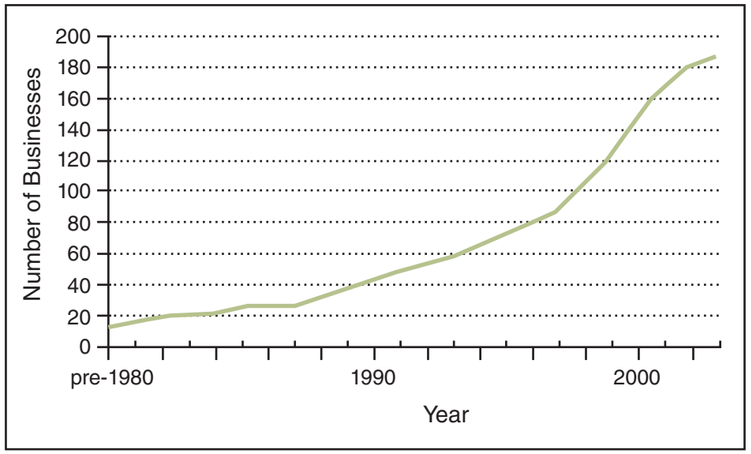


Figure 19. Number of outdoor-recreation businesses created by year according to 788 survey respondents in North Dakota, 1980-2003 (Source: Hodur et al. 2004).

The growing importance of non-resident hunters for outdoor-recreation businesses has met with resistance from resident-hunter interest groups in North Dakota who blame outfitters and wealthy out-of-state hunters for leasing and buying some of the best hunting lands. Partly in response to this, the North Dakota legislature placed restrictions to limit the number of non-resident hunters and greatly increased funding for a program that provides incentive payments to private land owners for maintaining public access for hunting (Hodur et al. 2006). Other NGP states have created similar incentive programs to encourage landowners to provide public access.

Some western states, but none in the NGP, offer what are generally called "ranching for wildlife" programs which aim to improve wildlife habitat and (or) public access through a profit-based incentive mechanism (Leal and Grewell 1999). In Colorado, for example, landowners can earn extra income from fee hunting as long as they allow some public hunting and adhere to state-issued guidelines for habitat management for game and non-game species (CDW 2009). This conditionality for habitat management is important because profits from fee hunting alone do not necessarily lead to improved habitat management by landowners (Benson 2001, Butler et al. 2005) and landowners may skew management toward economically important game, including exotic species, to the detriment of biodiversity (Freese 1998). The creation of private nature reserves in the NGP, certified according to rigorous standards and guidelines, has been proposed as a way to help ensure that ecotourist dollars from fee hunting and non-consumptive uses yield conservation benefits on private lands (Freese et al., in review).

As the North Dakota experience demonstrates, fee hunting's role in a nature-based economy introduces controversy because of "The North American Model of Wildlife Conservation," which is based on "the principle that wildlife are property owned by no one and held in trust by the government for the benefit of present and future generations of people" (Organ and Batcheller 2009:161). Despite resistance to commercialization of wildlife, more than half of all hunters in the United States are willing to pay for hunting access (Benson et al. 2003) and the money spent by hunters to lease land doubled from 1989-2000 to $625 million (Aiken 2005). We can expect the debate about fee hunting versus public access to intensify as NGP landowners seek to diversify their incomes and affluent hunters seek good places to hunt.

Outdoor recreational amenities are also an important factor, among others such as cultural amenities and transportation connections, in attracting and retaining residents and small businesses in the West (Rasker and Hansen 2000, Rasker 2006). In a recent Nebraska

Ecotourism in Southwestern North Dakota

Outdoor recreation seems particularly important in the eight counties of the rangeland-dominated southwest corner of North Dakota. A 2004 survey of 38 outdoor-recreation businesses found that 70% had begun since 1991 and 62% planned to expand. Hunting was the primary attraction, 74% of clients were from out of state, and visitor numbers were growing. The outdoor-recreation operation was the primary source of income for 22% of respondents compared to 19% reporting that a farm/ranch operation or other business was most important. During the five-year period 1998-2002, economic activity from tourism grew by 50% so that in 2002 it tied agriculture, at 23%, in the share it contributed to the eight-county region's economic base (Hodur et al. 2004, Leistritz et al. 2004).

Ecotourism Lessons from Southern Africa

The grassland/shrubland-dominated landscape of semi-arid southern Africa, where scores of livestock ranches have been converted to private game reserves since 1990, may offer insights to the diversification of ranch operations into ecotourism in the Northern Great Plains. In South Africa's Eastern Cape Province, for example, a 2003 survey found that seven private reserves, ranging in size from about 4,000-66,500 acres, annually contributed more than $11.3 million to the regional economy and yielded gross revenues of $105/acre. In the transition from agriculture to wildlife-based ecotourism, employment numbers increased by a factor of 3.5, the average annual salary increased 5-fold, and total wages paid per reserve increased 20-fold (Sims-Castley et al. 2005). In Namibia, where private and communal nature reserves have also grown rapidly in recent years, the number of ecotourists (nearly all foreign) has grown from around 100,000 in 1989 to more than 800,000 in 2006 (Chris Weaver, WWF, personal communication, 2009).

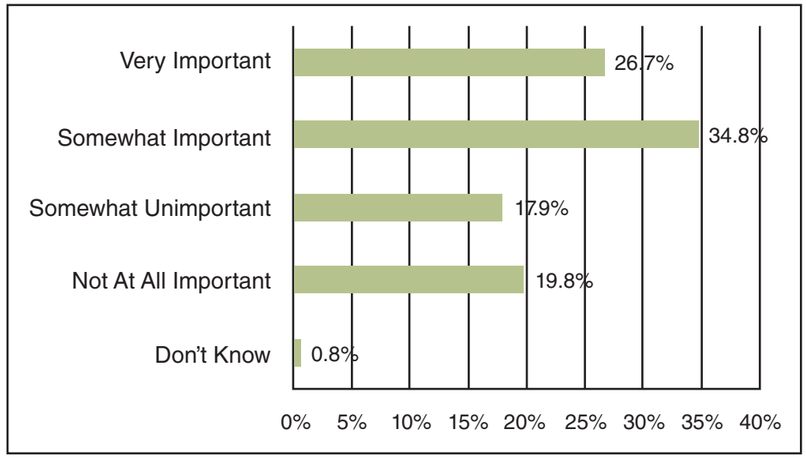


Figure 20. Response from a survey of Nebraska residents to the question: "When choosing a location to live, how important is having nearby fish and wildlife resources in making that decision?" (Source: ECONorthwest 2006).

survey, 60% of residents responded that fish and wildlife resources were a "very important" or "somewhat important" factor in deciding where to live (ECONorthwest 2006) (Figure 20). Improving fish and wildlife resources and access to native prairie, rivers and wetlands of the NGP could be an important economic- and community-development tool.

U.S. Fish and Wildlife Service

Courtesy of Sarah Sortum

Switzer Ranch and Nature Reserve

"My family owns and operates the Switzer Ranch & Nature Reserve as well as Calamus Outfitters in Loup County, Nebraska (eastern Sandhills). My parents, Bruce and Sue Ann Switzer, have run the ranch as a traditional cattle operation for over 30 years, while the ranch itself has been in our family for 105 years. My brother Adam, in partnership with my parents, founded Calamus Outfitters, a hunting service, in 2001 as a means to continue to live and work on the ranch by diversifying the operation. In 2008, I began an ecotourism business as a way for my family to also stay on the ranch.

"We are committed to this land that we hold very dear and are continually searching for ways to conserve and protect it while continuing our way of life. I'm working to develop a plan to manage our land as a private nature reserve. This is a big challenge because by necessity we are grappling with the difference between the way we manage the land now for our cattle and the way an ecologist would manage the land to meet the definition of a private nature reserve. For the foreseeable future (probably forever) our cattle will remain part of the operation, but we are looking at how we can manage them to not only produce quality beef, but also to restore some of the ecological processes on our land that have disappeared over time.

"We think this can be a win-win because if we manage our land as a nature reserve it will complement our ecotourism business; so really, we get the best of both worlds. We hope the combination of these enterprises—livestock production and nature tourism—will make the difference financially so the next generation can stay on the land" (Sarah Sortum 2009).

Diane Hargreaves

ECOSYSTEM PRODUCTS

Two types of commodities can be produced on a large scale from native NGP grasslands: plant products and livestock. To the extent that native-grassland commodities provide economic incentives to landowners for maintaining native habitat, they are of value to conservation as well as for the landowner's bottom line. From a conservation perspective, native range, even if poorly managed, is better for biodiversity than the alternative of cultivated land. Thus, conservationists and ranchers often share common ground in wanting profitability from native-range ranching to out-compete the profitability of crop production. For lands that remain in native range the challenge is to manage the land and market its products in ways that improve both profits and biodiversity.

Such a market-based approach is being used for marine fisheries and forest management and may offer lessons for grasslands. The Forest Stewardship Council and Marine Stewardship Council are designed to give ecologically responsible producers a marketing advantage through ecolabeling (FSC 2008, MSC 2009). In the United States, FSC has certified nearly 25 million acres of private and public forests representing 103 landowners. Landowners and retailers are able to apply the FSC stamp of approval on their products, with major retailers such as Home Depot and Staples now participating (FSC 2008).

In the NGP, some livestock producers attempt to distinguish their products by various labels—"organic," "natural," "grass fed", "free range," and so on. None of these labels necessarily means that the animals were raised on native prairie or, if they were, that the prairie was managed with biodiversity conservation as a goal. Thus, market differentiation for biodiversity-friendly livestock production in the NGP appears virtually non-existent.

As a native ungulate of the Great Plains, bison offer ranchers a special niche for contributing to prairie conservation. The number of bison in private herds has grown dramatically over the last 20-30 years though, at around 400,000 head in the United States and Canada combined, it is still a very small market compared to beef cattle. Nevertheless, bison is one of the fastest growing meat markets in the United States, with sales increasing by 17% in 2005 and 21% in 2006 (Yablonski 2008). Some bison producers cite the conservation benefits of their operations for bison and prairie conservation and use it as a marketing tool. Although ecologically managed bison herds can yield major benefits for conservation, no ecolabeling system is in place to certify such herds (a certification scorecard for bison, however, has been proposed) (Sanderson et al. 2008). Many bison operations focus on domesticating bison, with potentially negative consequences for conserving the wild bison genome (Freese et al. 2007). Also noteworthy is the growing interest in restoring bison on Indian reservations, an effort coordinated by the InterTribal Bison Cooperative, a nonprofit organization with 57 tribal members dedicated to "reestablishing buffalo herds on Indian lands in a manner that promotes cultural enhancement, spiritual revitalization, ecological restoration, and economic development" (ITBC 2009).

Whether cattle, bison or other livestock, managing rangeland for meat production versus management for biodiversity may involve trade-offs. The traditional rangeland management guideline of "take half, leave half" may work for production purposes, but not for grassland biodiversity which evolved under a different grazing regime of large bison herds, prairie dogs, and other native grazers, as well as periodic fires. For example, some grassland bird species thrive best in intensively grazed (what rangeland managers would call "overgrazed") areas while other species do best in areas with tall grass that result from little or no grazing, but traditional rangeland management methods avoid these extremes (Knopf 1996).

Native hay and native seed are harvested in the NGP (Janssen and Pflueger 2003, MSU 2009), but we found little information about markets. Native hay management guidelines have been developed with the aim of meeting productivity goals while maintaining native biodiversity (e.g., Tunnell 2001). Some grass-fed beef and bison producers note the conservation value of native haying in their operations, but the use of "native hay" as an ecolabel for marketing appears almost non-existent. According to a recent extension service report from Montana State University, "sales and prices of native grass seeds have risen dramatically in recent years" (MSU 2009). Requirements for native species in new CRP contracts, revegetation of public lands, and poor production years leading to low supplies were cited as major reasons.

The only certification system that includes biodiversity conservation criteria for rangeland products in the West of which we are aware is the Portland, Oregon-based Food Alliance, which certifies a variety of agricultural products

Cheyenne River Ranch

"It has taken me forty years to realize that successful ranching on the Northern Great Plains depends on keeping expenses as low as possible. One way to do that is to invest in the indigenous plants and animals that have evolved to thrive in this rugged climate. An economically pleasant coincidence is the fact that the consuming public is very interested in what 17th century explorers found when they first set foot on the Great Plains. And they are willing to pay for it.

"We cannot duplicate the experience of Lewis and Clark of course, but on our ranch we try. The natural wonders that fascinated the Corps of Discovery have become our revenue base. We have re-seeded native grass into abused pastures and sold easements to preserve pristine views to the extent possible. We have re-introduced bison, keeping them wild and aloof. We slaughter our bison in the pastures where they are at ease and sell the meat over the Internet to people who long for a healthy taste of the Northern Great Plains. We have renovated a tiny prairie house that our guests rent when they need a shot of what the Northern Great Plains does best. Our business today is more complicated than raising cattle, but it holds the possibility of allowing us to stay on the land" (Dan O'Brien 2009).

Jill Maguire

(Food Alliance 2009). Several producers in the West, including two or three in the NGP, are certified. But, to our knowledge, no certification system with biodiversity conservation requirements for nature-based products from grasslands has yet been developed on any notable scale and therefore there is little market incentive to manage for biodiversity.

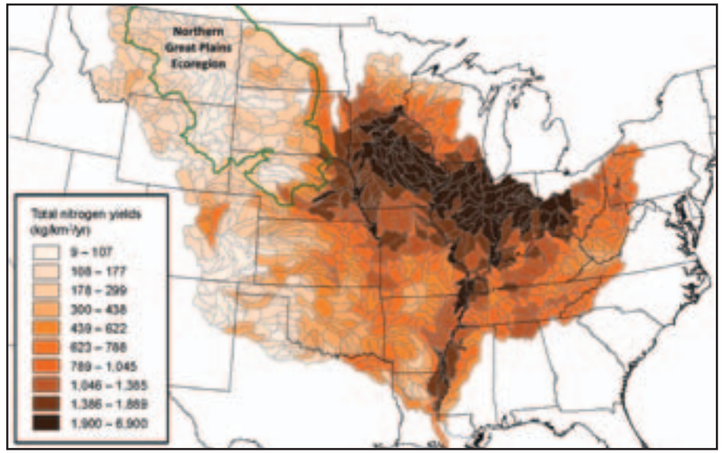


Figure 21. Distribution (deciles) of incremental yields of total nitrogen from 818 watersheds in the Mississippi/ Atchafalaya River Basin for conditions similar to 2002 (Source: adapted from Robertson et al. 2009).

OTHER ECOSYSTEM SERVICES

Not fully captured by the previous categories of natural amenities and ecosystem products are several other services provided by intact or well managed NGP ecosystems. Among these are:

- Good water quality
- Watershed and wetlands services such as flood control and recharging aquifers
- Carbon sequestration
- Pest control by birds both within the NGP and in areas they migrate to
- Noxious weed control
- Pollination
- Better wildlife habitat, more abundant wildlife, and richer biodiversity

Many of these services, in the language of economists, are public goods that yield "positive environmental externalities," meaning their economic values are difficult or impossible for markets to capture. The result is that the producer of the service (e.g., a rancher whose rangeland supplies clean water) receives no payment from the user (e.g., someone downstream who uses the water) and thus may have little incentive to continue providing the service.

Ecosystem service benefits operate at multiple scales. At the local scale, one landowner's wetland conservation practices that recharge a water table may benefit neighboring landowners. An example of a lost ecosystem service that once benefitted distant communities is the delivery of quality water through the Mississippi River system to the Gulf of Mexico where, because of poor watershed management, nitrogen levels flowing into the gulf tripled over the last 50 years and resulted in a dead zone of approximately 8,000 square miles, with severe negative effects for the fishing industry (NOAA 2008). Compared to areas of extensively cultivated land in the eastern NGP and Midwest, NGP areas of largely intact prairie release very little nitrogen (and phosphorus) into the system (Figure 21) (Robertson et al. 2009). At the global scale, intact prairies contribute to controlling climate change through the sequestration of carbon.

Based on a study of U.S. national wildlife refuges that estimated values for ecosystem services according to different land cover categories and levels of net primary productivity (Ingraham and Foster 2008), we estimated the ecosystem service values for various land covers in the NGP.[1] Because of different estimates of net primary productivity for the Sandhills and non-Sandhills portion of the NGP (Costanza et al. 2007, who call the non-Sandhills portion the Northern Mixed-Grass Prairie Ecoregion), we estimated values for each of these regions (Table 3).

These estimated values have potentially a large margin of error and they do not include biodiversity, non-use, and natural-amenity values (e.g., see Table 2), which could significantly increase per-acre values. Also, the National Land Cover Database may not accurately distinguish land cover categories, such as grasslands versus shrublands (particularly the sage-brush steppe areas of the NGP).

The total estimated value of the selected ecosystem services and land cover categories exceeds $40 billion annually in the U.S. portion of the NGP. Although wetlands constitute only 4% of the total acreage, they account for more than half of the total value. In contrast, though grasslands represent 76% of the land covers analyzed, they account for just 10% of the total value. Ingraham and Foster (2008:614) note, however, that because of insufficient studies of grassland services the true per-acre value of this land cover category "is likely much higher" than shown here.

The total estimated value of the selected ecosystem services and land cover categories exceeds $40 billion annually in the U.S. portion of the NGP.

Table 3. Estimated annual value of carbon sequestration, freshwater regulation and supply, waste assimilation and nutrient regulation, disturbance prevention, and habitat provision for various land cover types in the Sandhills and non-Sandhills regions of the Northern Great Plains in the United States (2004 dollars)(see text for sources). Land cover acreages from National Land Cover Database (Source: MLRC 2009).

		Grasslands	Shrublands	Forests	Open water	Wetlands	Totals
NGP w/o Sandhills (U.S.)*	acres	77,237,048	14,789,022	5,762,373	2,218,379	4,217,837	104,224,659
	$/acre/yr	44.61	560.61	845.54	160.89	4,652.49	
	$/yr	3,445,544,711	8,290,873,623	4,872,316,866	356,914,997	19,623,444,464	36,589,094,661
Sandhills	acres	11,045,887	393	40,039	156,247	532,378	11,774,944
	$/acre/yr	56.42	572.42	845.56	203.50	5,874.23	
	$/yr	623,208,945	224,389	33,855,377	31,796,264	3,127,310,819	3,816,395,794
Total Value ($/yr)		4,068,753,656	8,291,098,012	4,906,172,243	388,711,261	22,750,755,283	40,405,490,455

* Called Northern Mixed-Grass Prairie Ecoregion in Costanza et al. (2007).

[1] Ingraham and Foster (2008) employed the benefit value transfer method, which uses available estimates of the economic value of an ecosystem service in one or more areas to estimate values in other areas of similar cover type, adjusted for net primary productivity (NPP). NPP is used because it is correlated with spatially fungible ecosystem services. We used their methods and analyses by first looking up the NPP for the Nebraska Sandhills (342.07 gm/m2/yr) and Northern Mixed-Grass Prairie Ecoregions (270.46 gm/m2/yr) in Costanza et al. (2007, appendix 1). We then went to Table 1 in Ingraham and Foster which gives estimated transfer values by land-cover class for the selected ecosystem services according to the average NPP of 11 ecoregion groups, and estimated the value of each land cover type in the Sandhills and Northern Mixed Grass Prairie by interpolation. For example, in their Table 1, the NPP and thus transfer value for grassland cover in the Sandhills falls between ecoregion group 4's average NPP of 325.99 gm/m2/yr and value of $53.77/acre/yr and ecoregion group 5's average NPP of 365.21 gm/m2/yr and value of $60.24/acre/yr. By interpolation, the estimated value of grassland cover in the Sandhills is $56.42/acre/yr.

Valerie Bruchon

Table 4. Estimated economic value of ecosystem services compared to commodity-based rental rates of NGP lands (Sources: Pasture and cropland rental rates from Janssen and Pflueger 2008 and Johnson 2007).

	Pasture rental $/acre/yr	Dry cropland rental $/acre/yr	Grassland services $/acre/yr	Shrubland services $/acre/yr***	Wetland services $/acre/yr
NGP w/o Sandhills*	18	37	45	561	4,652
Sandhills**	14	39	56	572	5,874

*Pasture and cropland rentals are the averages from 2007 for South Dakota's Northwest, North Central, West Central, Central, Southwest, and South Central districts.
**Pasture and cropland rentals are the averages for 2005-2007 for the Nebraska Department of Agriculture's "North" Statistics District, which falls almost wholly within the Sandhills.
***Shrublands includes sagebrush steppe habitat.

Our estimated per-acre ecosystem service values are generally greater than the average rental values for pastures and croplands in the NGP (Table 4). If rangelands (pastures) are well managed, their rental and other ecosystem service values are generally additive; thus, in the Sandhills the value of pasture rental ($14/acre/yr) can be added to the value of other ecosystem services ($56/acre/yr) for a total of $70/acre/yr. In contrast, cropland often yields greatly diminished ecosystem services and thus the two are not additive (Gleason et al. 2008).

In December 2008, USDA took an important step toward implementing section 2709 of the 2008 Farm Bill by establishing the Office of Ecosystem Services and Markets. Section 2709 requires the Secretary of Agriculture to "establish technical guidelines that outline science-based methods to measure the environmental services benefits from conservation and land management activities in order to facilitate the participation of farmers, ranchers, and forest landowners in emerging services markets" (USDA 2008). Though the creation of markets for ecosystem services is difficult, various mechanisms are being tested because their importance for improving land management is increasingly recognized.

Many studies have shown that people are willing to pay for ecosystem services from agriculture if a fair price can be determined (Ribaudo et al. 2008). Public demand and willingness to pay are implicit in the numerous state and federal programs that pay landowners to provide these services. Recently, for example, a program was designed to pay cattle ranchers in Florida for water storage and nutrient retention on their lands (Bohlen et al. 2008). The most notable USDA programs include the CRP, Wetland Reserve Program (WRP), Grassland Reserve Program (GRP), Wildlife Habitat Incentive Program (WHIP), and Environmental Quality Incentive Program (EQUIP). From 1995-2006, the average total payments under the USDA's conservation programs in the 125 NGP counties was $195 million per year. This constituted, however, less than 0.5% of the annual total estimated value of $40.4 billion in ecosystem services (Table 4). Ninety-five percent of these payments in the NGP states were for CRP (EWG 2009).

Conservation easements and fee-simple acquisition under various state, federal and nonprofit sector programs provide another mechanism to pay for environmental services. For example, in Montana, South Dakota and North Dakota, the U.S. Fish and Wildlife Service has purchased 1.2 million acres in wetland easements and 400,000 acres in grassland easements, primarily funded by Duck Stamp purchases. Landowners are generally paid 30-50% of the land's full value for a conservation easement (USFWS 2009b). The Small Wetlands Acquisition Program, administered by the USFWS, has a goal of protecting 1.4 million acres of wetlands and 10.4 million acres of grasslands in the prairie pothole region (about half of which is in the NGP). However, a recent study by the Government Accounting Office concluded that at the recent pace of acquisitions it could take the USFWS 150 years to meet these goals. The report cautions that the USFWS may have only decades before these habitats are converted to agricultural use and suggests that more government funding is needed to speed up the process (GAO 2007b) . The Land and Water Conservation Fund, funded by offshore gas and oil leases, is a potentially major source of funding for this program and many other federal and state land acquisition needs, but from 2006-2008 an average of

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$145.5 million was approved annually, just 16% of the $900 million authorized by Congress in 1977 (Pope 2009) and less than 5% of the inflation-adjusted figure of $3.2 billion that the authorized level represents today (ORRG 2009). The current administration has indicated a commitment to increase LWCF funding to the original authorized level by 2014 (USDOI 2009).

Non-profit organizations provide another quasi-market for ecosystems services. The most common market mechanism, used by Ducks Unlimted, American Prairie Foundation, WWF, The Nature Conservancy and others, is the fee-simple purchase and management of lands and the purchase of conservation easements. The Nature Conservancy has acquired several ranches in the NGP region of Montana, North and South Dakota, and Nebraska. Ducks Unlimited reported in 2008 that, under their "Grasslands for Tomorrow" Program, which has the goal of conserving 2 million acres of wetlands and grasslands in the Missouri Coteau of Montana and the Dakotas by 2017 in cooperation with the U.S. Fish and Wildlife Service, they had secured 697,837 acres in perpetual conservation easements and held title to another 17,366 acres (DU 2009). In north-central Montana the American Prairie Foundation (APF 2009) is acquiring ranches as part of its mission to build the American Prairie Reserve on lands adjacent to the Charles M. Russell National Wildlife Refuge. In this same area is a program by WWF and the National Wildlife Federation to pay landowners to forgo applying for annual cattle grazing permits on the refuge, a market tool that has been used to improve biodiversity conservation on public lands elsewhere in the West. As is the case with many nonprofit programs, local community development is an important component of the American Prairie Reserve and thus the overall socioeconomic impact goes beyond payment for ecosystem services.

The newest market for environmental services is carbon credits. The Chicago Climate Exchange recently produced a "Sustainable Rangeland Management Soil Offset" market that encompasses the NGP region (Farmers Union 2009). When the program was established South Dakota landowners could apply for carbon credit payments through the South Dakota Farmers Union, with carbon sequestration rates from .012-.040 ton per acre per year, depending on location and range condition and management. In September 2008 prices were averaging around $3.70 per ton, which would yield about $0.50-$1.50 per acre per year. Contracts were for four or five years and eligibility required the landowner to follow strict grazing management guidelines (Farmers Union 2009). In 2008 Ducks Unlimited was offering a one-time payment of at least $30/acre for carbon credits for native prairie enrolled in the USFWS's Grassland Easement Program in North and South Dakota. However, because of uncertainties in the carbon market, including proposed cap-and-trade legislation, in 2009 Ducks Unlimited had suspended such payments and was acquiring options to buy greenhouse gas rights and credits from landowners enrolled in the easement program. Once market conditions clarify, Ducks Unlimited will exercise these options at a negotiated price (Jim Ringelman, DU, personal communication 2009).

THE WAY FORWARD

"Let's face the facts—rural policy in America is unfocused, outdated, and ineffective….A recent review of the literature revealed not a single study supporting the efficacy of current federal agricultural policy…as a basis for rural development….In fact, current federal agricultural policies are actually hurting communities—by absorbing the vast majority of the resources directed to rural areas, by continuing the myth that rural and agriculture are the same, and by making it difficult for rural communities to develop new areas of competitive advantage"(Stauber 2001:34).

The NGP exemplifies, as much as any region of the country, this observation by former U.S. Undersecretary of Agriculture and rural development expert Karl Stauber. The question that conservationists and rural development specialists alike need to ask is: Can the region's vast and diverse natural amenities and ecosystem services be one of those "new areas of competitive advantage" to which Stauber refers?

Current projections for the NGP indicate that "business as usual" is a prescription for failure. For highly rural regions of the NGP, except some Indian reservations, there is every indication that their populations will continue to decline. The remaining population will be ever older and local entrepreneurial and business capacity will suffer because of out-migrating, educated youth. Agriculture will probably continue its long-term decline in contributing to the region's economy. The economic challenges facing many Indian reservations and tribal peoples are in some ways unique and require special attention. Meanwhile, major population centers and a few areas with a comparative advantage in terms of natural resources—whether recreational or fossil fuels—are likely to experience relative prosperity. In the process, the population distribution across the NGP will become increasingly skewed toward metropolitan areas that are separated by a sparsely-populated, vast landscape of rangelands and farmlands.

Metropolitan areas within and near the NGP, however, offer opportunities for linking rural development and prairie conservation. The growing populations of Denver, Omaha, Bismarck, Rapid City, Billings, and other cities are potential major markets for property owners and communities that offer outstanding nature-based and outdoor recreational experiences, as well as local foods and other products produced under ecologically sound management. Programs such as the USDA's Cooperative Conservation Partnership Initiative are needed to foster cooperative action among landowners (private and public) and communities in areas of high conservation and recreational value, and to encourage small-scale entrepreneurs and micro-enterprises that link urban centers with rural communities and natural landscapes (Preston and Bailey 2007).

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The growing prominence of metropolitan populations in the NGP will also influence land and biodiversity policies and management. A more urban-based population can be expected to elect officials and policy makers who pay less attention to rural constituents and more attention to urban dwellers who desire rural landscapes with abundant recreational opportunities. The consolidation of ranches and farms into larger holdings, coupled with a transition to nontraditional landowners whose motivations no longer derive principally from agricultural production, portends changes on the land as well as in the economy and character of local communities. Below a certain population and economic threshold, more rural areas will lose basic services such as health care, retail goods, and maintenance of public infrastructure. This creates a negative feedback loop that drives further economic decline and out-migration.

The effects of these changes on biodiversity are hard to predict. Efficiencies of scale and the upfront costs of new agricultural technologies may favor buyers with deep pockets. Industrial-scale agriculture may become more prominent with the worrisome scenario, from the conservation perspective, that the plow-up of native prairie will continue and even accelerate to make way for crops that are being genetically engineered for ever-greater profitability when planted on the semi-arid lands of the NGP. Current crop and biofuel subsidies, if unabated, magnify this threat.

Before these changes sweep across the land in the next decade or two, we have the opportunity to forge a mutually beneficial linkage between urban and rural people and a healthy landscape that produces diverse agricultural products, natural amenities, and other ecosystem services. Abundant wildlife, intact prairies, and a system of private and public nature reserves across the NGP are not a panacea for reviving the rural economy of the region. They are, however, one way to diversify the region's economy. Other ways are also needed.

RECOMMENDATIONS

To foster the convergence of locally vibrant communities—both economically and culturally—and the conservation of wildlife and ecosystems in the U.S. region of the NGP, we offer 12 recommendations:

1. **Fundamentally reform agricultural and biofuel policies:** The U.S. government's agricultural and energy policies and programs must be transformed to foster agricultural practices that are sustainable both economically and ecologically. At the most fundamental level, a major overhaul is required so that federal policies fully recognize the value of native rangelands and the communities, ecosystem services, and biodiversity that depend on them. To level the playing field between rangeland and cropland, we need to wean crop production and biofuels from subsidies that encourage sodbusting, homogenize agro-ecosystems, and erode ecosystem services. Among farm subsidies, a top priority should be to bar federal crop insurance and disaster payments for landowners who plow native prairie. We need to expand funding for EQUIP, GRP, WHIP, WRP and CRP and other conservation measures and develop more targeted and integrated approaches among these programs to ensure that funding goes to areas that have the biggest impact on biodiversity and ecosystem services.

2. **Foster markets for biodiversity-friendly grazing management:** With two-thirds of the NGP in native range, we need to find market-based mechanisms that reward ranchers who practice ecologically sound range management that supports native biodiversity. Standards and guidelines and a certification system for biodiversity-friendly range management for livestock are needed. Consumer awareness and product differentiation should be developed so that biodiversity-friendly operations are rewarded. The federal programs noted in recommendation 1 should be strengthened to maintain and support good management of native rangeland.

3. **Create ecotourism markets that reward landowners who conserve biodiversity:** States should develop policies and programs that enable landowners involved in ecotourism (both consumptive and non-consumptive) to be rewarded economically, through certification, marketing assistance, increased quotas for fee hunting, payment for public access, and (or) other

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mechanisms, for restoring and maintaining biodiversity on their lands. For this to work, nature-based recreation businesses and landowners who manage for biodiversity must be distinguished from those who do not. At a broader level, more investment by and better coordination among landowners, communities, nonprofit organizations, and local, state and federal agencies are needed to create the wildlife and natural-area amenities that attract ecotourists, to develop the associated service industries and skilled workers, and to market the region's natural amenities regionally, nationally and internationally.

4. **Greatly increase payments for ecosystem services from private lands:** Payment for ecosystem services needs to be greatly expanded through both federal- and state-funded programs and the creation of market-based mechanisms such as has occurred for carbon credits. More funding is needed for the various USDA conservation programs, to meet USFWS conservation easement and land acquisition targets (see next recommendation), and through other government programs. A 20-fold increase in the USDA's conservation programs to roughly $4 billion annually for the NGP would take us toward 10% of the annual value of $40 billion we estimated for selected ecosystem services in the region. To wisely target the use of these funds, more research and experimental approaches are needed to assess the importance and management of ecosystem services, their economic values, and how to develop effective markets and payment mechanisms for them. The USDA's new Office of Ecosystem Services and Markets should be given the direction and support needed to spearhead this work for the agency.

5. **Greatly expand the system of grassland reserves:** We need reserves ranging in size from small ones that meet particular biodiversity needs and local community interests to large ones of millions of acres where the prairie's biodiversity can flourish and be enjoyed by local and distant visitors alike. We recommend a long-term goal of having at least 10% of the NGP in reserves managed primarily for biodiversity values. This will require programs and incentives that encourage nonprofit and for-profit private landowners, tribes, public land agencies, and local communities to cooperate in managing land and wildlife across jurisdictional/ownership boundaries. Because of their potential importance for the NGP, recommendation 6 specifically addresses private nature reserves.

6. **Foster a system of private nature reserves:** We recommend the development of a qualified system of private nature reserves in the NGP. Private nature reserves could be for-profit or non-profit enterprises, or a blend of both, and might often involve partnerships—using innovative contracts and other legal instruments—among private landowners and cooperative management agreements with public land agencies to create large prairie reserves of hundreds of thousands or millions of acres. Standards and guidelines for recognizing and certifying private nature reserves might best be developed and administered through a federal-state partnership, or through a nonprofit consortium. Landowner investment in nature reserves could be supported

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through state and federal policies, such as tax incentives, public finance mechanisms to provide capital for new investments, assistance for biodiversity restoration, payment for ecosystems services, and educational and outreach programs for reserve managers.

7. **Expand support for tribal interests in biodiversity conservation:** Although we have not examined the complicated socioeconomic and policy issues confronting Indian reservations and tribes, at the broadest level we believe much more should be done to nurture the interest and potential that tribal lands have for linking biodiversity conservation to economic development and fulfillment of cultural goals. The traditional intertwining of tribal cultures and economies with prairie wildlife would seem to present exceptional opportunities for linking conservation with socioeconomic development.

8. **Assure federal lands are well managed for biodiversity and ecosystem services:** We need to ensure that the 15 million acres of federal lands in the NGP, particularly those of the National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and U.S. Forest Service (national forests and national grasslands), are being well managed for biodiversity and other ecosystem services. A clear-eyed review should be undertaken of BLM lands and national grasslands to determine where local communities and the public interest may be better served by managing them primarily for their biodiversity values. Better cooperation between federal agencies and local communities is needed to take advantage of the natural amenity values of federal lands for attracting tourists and making the communities attractive places to live.

9. **Accelerate state and federal land acquisition and exchanges to improve management and protection of high priority areas:** A concerted effort is needed, through land exchanges and acquisition, to consolidate and (or) expand federal and state conservation lands to improve management for biodiversity and recreational uses. For example, the USFWS's wetland acquisition and easement programs in the prairie pothole region should be fully funded so that these wetlands can be protected in perpetuity before they are drained or plowed. The management challenges posed by the fragmented nature of many of the region's wildlife refuges, national parks, national grasslands, and BLM lands could be resolved through land exchanges and acquisitions. To help fund these needs, the Land and Water Conservation Fund should be immediately fully funded at its 1977 authorized level, adjusted for inflation, to $3.2 billion, and then doubled to at least $6 billion by 2014.

10. **Build a new rural development initiative:** We need a new approach to rural development in the NGP, tailored to the needs of local communities, that recognizes the importance of wildlife and healthy ecosystems for the well-being of local residents and economies. Indian reservations will require often distinctly tailored approaches and offer special opportunities for integrating wildlife conservation with socioeconomic development. Improving the natural amenities of, and public access to, both public and private lands can make rural communities attractive places to visit and to live. For the NGP, this initiative must address the linkage between rural and urban areas—locally grown foods, regional recreational opportunities for urbanites, educational opportunities for urban people about rural life and the land, and so on. Support of small-scale entrepreneurs and of programs such as the USDA's Cooperative Conservation Partnership Initiative is needed to build these linkages and create unified approaches to community development and grassland conservation.

11. **Provide education and extension services for the modern private land manager:** We need a new and expanded approach to providing the information and skills that today's landowners and managers need to manage their land and businesses in ways that are profitable and sustainable and that nurture ecosystem services and their economic benefits. Education and outreach programs must now expand far beyond teaching traditional livestock and range management to include, for example, managing for wildlife and ecosystem services, marketing ecotourism and carbon credits, and providing top-notch services ranging from fine food and lodging to expert bird watching and outfitting. The front line for this should be the region's universities, particularly land-grant institutions, the USDA's Natural Resource Conservation Service, and county-level sources of extension and educational support. Nonprofit organizations and landowner/business cooperatives also have major roles to play.

12. **Redirect and expand research and monitoring for private land management:** To provide the management information and education called for in recommendation 11, we need new and expanded lines of research by public and private institutions on how to manage for the diverse values of NGP ecosystems. We also need more comprehensive programs for monitoring changes in land management and indicators of land and biodiversity health to better assess how the land is managed, identify changes and problems that need attention, and adjust research, education and extension programs to address emerging needs. A much more cooperative, integrated approach between state and federal natural resource agencies is required for this to be most effective.

CONCLUSION

We hope our analyses in this report and our recommendations help stir discussions and creative thinking about the future of the Northern Great Plains. “Business as usual” is not an answer for the region’s future. We envision a concerted effort over the next four years to bring together landowners, local community and business leaders, conservationists and rural development specialists, state and federal agencies, and elected officials and other policy leaders to design and implement new and innovative approaches to rural development, land management, and biodiversity conservation in the Northern Great Plains. This needs to happen at various scales and levels—from community-based forums and county commissioner meetings to regional workshops and conferences—and it requires moving out of our comfort zones to create new partnerships and to be open to new ideas. WWF looks forward to working with others to make this happen.

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WWF is the world's leading conservation organization, working in 100 countries for nearly half a century. With the support of almost five million members worldwide, WWF is dedicated to delivering science-based solutions to preserve the diversity and abundance of life on Earth, halt the degradation of the environment and combat climate change.

About WWF Northern Great Plains Program

WWF has been working in the Northern Great Plains for over a decade, playing an integral role in charting a sustainable future for the region by bringing together local communities, landowners, governments, scientists and conservation experts to achieve lasting results in the conservation and restoration of the region's natural heritage.

Our vision is a healthy and well-managed landscape that conserves all native species through a combination of conservation areas and ecologically sustainable agriculture.

WWF is committed to making this vision a reality by restoring large areas of intact native habitats, protecting keystone species and working with local communities to create economic opportunities linked to conservation.

To learn more, visit www.worldwildlife.org/ngp/

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