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Prairie Dog Empire: A Saga of the Shortgrass Prairie

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Prairie Dog Empire

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Prairie Dog Empire

A Saga of the Shortgrass Prairie

PAUL A. JOHNSGARD

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Dedicated to the people and groups who have long and valiantly worked to preserve our native grassland heritage

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Preface

In early July of 2002 I attended a hearing at the Lincoln headquarters of Nebraska's Game and Parks Commission. The main agenda item at this hearing was whether the State of Nebraska would begin to take steps toward conserving the black-tailed prairie dog. As a result of a 1998 petition from the National Wildlife Federation, followed up later by one from the Biodiversity Legal Foundation, the species had been legally proposed as a candidate for listing as nationally threatened. Nebraska is one of eleven states within the species' current range and had been previously notified by the U.S. Fish and Wildlife Service that such a listing, with all its associated required conservation measures, could be averted only if these states individually and collectively began concerted efforts to begin preserving the species.

An hour or more of oral testimony by conservationists, biologists, and representatives of various environmental groups ensued, which uniformly favored initiating a modest conservation program, including some supportive testimony from biologists of the Game and Parks Commission itself. Then a group of ranchers who had been bused in from across the state took the floor, condemning the prairie dog with all the usual vituperation that has been associated with rancher–prairie dog relationships of the past century or more. At the end of the meeting the commissioners unanimously voted not to provide any conservation efforts whatsoever toward prairie dogs and furthermore voted to terminate all state-supported research on the species' status and biology that was then being undertaken or planned by the commission's staff biologists. The ban on future prairie dog studies was later rescinded, but no steps toward producing a conservation management plan were taken.

As a result of that meeting, I decided that enough interest exists in prairie dogs, including strongly held attitudes both pro and con, to warrant a book centered on this controversial animal. Such a book would also describe and document the semiarid grassland ecosystem of the western plains within which the prairie dog evolved and in which it has historically played a pivotal, or "keystone," ecological role. In many ways, by the late 1900s the black-tailed prairie dog was providing a reprise of the sad history of the North American

bison, whose genocidal destruction during the late 1800s spelled the end of the American frontier and likewise brought an end of the entire culture that had been represented by the bison-dependent Dakotas and other Native Americans of the western plains. Now, roughly a century later, many ranchers who had displaced the Native Americans were themselves being threatened, as a combined result of prolonged droughts, long-depressed cattle markets, and ranges so badly overgrazed and weed infested that most of the small operators could not provide the numbers of livestock needed to make a living.

This book is a result of these experiences and related concerns. As an ornithologist I have become increasingly worried about the decline and often regional disappearance of the burrowing owl, a commensal associate of the prairie dog. I also fear for the ferruginous hawk, whose nest sites and winter distributions in the Great Plains and American Southwest often center on prairie dog "towns," and for the tiny swift fox, an agile and beautiful little carnivore that once also was common but now is largely confined to areas of prairie dog towns. The swift fox is presently so rare (as of 2004 it is a federal candidate species for a listing as threatened) that I have yet to see one in the wild. By the time I began my writing, it was already perhaps too late to save the black-footed ferret, another prairie dog–dependent carnivore that is already federally listed as endangered and that is surviving only by the thinnest of life-support threads. The ferret, one of America's rarest mammals, was one of the first mammal species to be placed on the nationally endangered list. Nevertheless, the North American bison was also once reduced to perhaps no more than a hundred or so animals surviving in the wild. Yet the species has rebounded and now numbers several hundred thousand animals, mostly in captive herds.

All of these symbols of the western plains have close ecological ties to prairie dogs. If prairie dogs are not to be saved, we have little hope of preserving some of the others either, to say nothing of affecting the dozens of additional animals that are also part of and variously dependent on the prairie dog–bison–buffalo grass ecosystem of the American plains.

I have relied on the help of many people in assembling the information needed for this book. Among them are Craig Knowles of FaunaWest Wildlife Consultants, who provided me with several valuable unpublished reports on the status of three species of prairie dogs. Robert Luce, interstate coordinator, Prairie Dog Conservation Team, also provided me with some important references and an advance copy of the proceedings of a Conservation Team workshop meeting held in late 2003. Tyler Sutton of the Great Plains Conservation Alliance sent me various unpublished reports on prairie dogs and plans for establishing a high plains ecological preserve south of the Black Hills. "Buffalo" Bruce MacIntosh and Gerald Jasmer provided me with valuable un-

published materials on the prairie dog and the swift fox. Al Steuter of the Nature Conservancy's Niobrara Valley Preserve loaned me materials on bison biology and bison rearing. Joe Truett of the Turner Biodiversity Fund also provided me with unpublished information on the foundation's important conservation and restoration programs, and Francis Moul gave me a manuscript copy of some of his graduate research on the history of the national grasslands. Barbara Voeltz of the Nebraska Game and Parks Commission helped me with Internet searches of the extensive biological literature of the western plains grasslands. I also wish to thank the three anonymous persons who reviewed the manuscript for the University of Nebraska Press.

I decided that before I finished writing I needed to visit some of the remaining natural grassland regions within the vast Great Plains range of the black-tailed prairie dog, and especially the major National Grassland reserves that are at the heart of the species' remaining range. For advice or help with fieldwork, providing reference materials, and other assistance, I am indebted to Doug Backlund, Linda Brown, Jackie Canterbury, Bob Gress, Josef Kren, Bob Luce, Al Steuter, Tom Shane, and Scott Wendt. All of these people helped me understand the often neglected and invariably sad histories of all of the historic residents of our western American prairies, from prairie dogs, wolves, and bison to our Native American kin, whose lives and fortunes were fatally and inexorably intertwined with the prairie.

In a broader sense I owe a special debt of gratitude to the organizations that are fighting to preserve the prairie dog and its associated prairie ecosystem as part of our American heritage and that have helped to document their status. These groups include such diverse public interest organizations as Biodiversity Associates, the Biodiversity Legal Foundation, the Center for Native Ecosystems, the Conservation Alliance for the Great Plains, Forest Guardians, the Fund for Animals, the Humane Society, the National Wildlife Federation, The Nature Conservancy, the Prairie Dog Coalition, the Predator Conservation Alliance, Rocky Mountain Animal Defense, and the Turner Biodiversity and Endangered Species Funds. Without the documented information and related historic materials these groups have assembled, and without their legal maneuvering against entrenched federal agencies and powerful opposing private interests, this book might not have been written. Without their efforts, not enough of the prairie dog ecosystem would be left to bother to preserve, and the story of the prairie dog would have to be told only in the past tense.

Prairie Dog Empire

1

The Western Shortgrass Prairie

A Brief History

There was nothing but land. Not a country at all, but the materials out of which countries are made. – *Willa Cather,* My Antonia

Like the animals and plants that now live on it, the land composing the surface and substrate of the North American Great Plains nearly all came from someplace else. Some of the region's parts were carried by westerly winds as volcanic ash from mountains a thousand or more miles to the west, while others were blown in as dust-sized particles from areas up to several hundred miles to the northwest. Most of what geographers call the Great Plains was carried in and deposited by rivers and streams originating in the Rocky Mountains or was randomly strewn as glacial-carried materials from the north. Only in a few areas, such as the igneous and metamorphic Precambrian core of South Dakota's Black Hills and the 300 million-year-old (Paleozoic) Wichita Mountains of Oklahoma, are the remnants of the earth's early violent history exposed in the form of ancient and eroded mountains (Trimble 1990).

In its simplest form, the present-day Great Plains region may be thought of as a poorly constructed tabletop that is slightly tilted downward toward the east-southeast. Its western limits are formed by the towering Front Range of the Rocky Mountains, cresting at the Continental Divide, and grading into their outlying piedmonts, which end indecisively at about 5,000 to 6,000 feet of elevation. From there the Great Plains take over, gradually losing altitude eastwardly. At roughly 1,000 feet of elevation, the Great Plains merge invisibly with the Central Lowlands, a region massively shaped by glaciers at the northeastern end and forming a shallow basin made up of the Missouri, Mississippi, and Ohio river valleys toward the southeast. These river valleys were cut and repeatedly reformed by the immense meltwaters of several glaciations, carving broad, fertile valleys as they slowly traveled to deposit their silty cargoes along the way or dump them into the Gulf of Mexico.

The southern parts of the Great Plains become increasingly flat and arid, including the treeless and so-called Staked Plains of the Texas Panhandle and eastern New Mexico, a land so flat and barren that early explorers reputedly

drove tall wooden stakes into it at intervals to keep from becoming lost. The southern terminus of the Great Plains is decisively marked in New Mexico by the Mescalero Escarpment and the associated Pecos Valley, and in Texas the Plains are also abruptly terminated southwardly by the Edwards Plateau. The northern end of the Great Plains disappears quietly somewhere near Great Slave Lake in Canada's vast transcontinental coniferous forest, an enormous area largely scraped down by glacial action nearly to ancient bedrock, the Precambrian Shield of the earth's earliest crust.

Within the Great Plains region, the higher, more arid western portions that now support only shortgrass and mixed-grass prairies dominated by perennial herbs of low to middle stature can be geologically and biologically distinguished as the High Plains. Geologically speaking, the northern edge of the High Plains is the Pine Ridge Escarpment of northwestern Nebraska and southwestern South Dakota. From there south, most of the High Plains consists of a nearly flat surface, covered by sandy materials called the Ogallala formation, a layer up to several hundred feet thick of water-transported materials that were deposited in Pliocene times. The upper part of this layer is commonly a thick zone of very hard carbonates, producing a "caprock" of rocklike material (caliche) that is almost impervious to water. This zone, not very evident in the northern part of western Nebraska's western plains, becomes thicker southwardly and is up to 30 feet thick at the southern end of the western plains in Texas. The conspicuous Caprock Escarpment, extending in a general north-northeast to south-southwest direction from western Oklahoma through the Texas Panhandle, marks the southeastern edge of the caprock zone and provides a convenient southern bookend to the High Plains (Thornbury 1965).

North of the Pine Ridge Escarpment and the nearby Black Hills is the Missouri Plateau of eastern Montana, northeastern Wyoming, and the western Dakotas, and the Missouri River valley itself. Eastward and northward from the Missouri River in the Dakotas is a fertile region of glacial drift and till deposited by the last glaciation, forming a soil substrate for the biologically rich prairie wetlands region of the northern plains. Although technically not a part of the High Plains as they have been geologically defined, these portions of the western and central Dakotas, eastern Montana and Wyoming, and the southernmost prairie-covered portions of Alberta and Saskatchewan share most of the same semiarid and grassland-adapted plant and animal life that is now found in the more southern parts of the Great Plains, including a keystone species, the black-tailed prairie dog. For this book's purposes these areas are included in the general region here informally recognized as the western plains, or "shortgrass prairie ecosystem."

A GEOLOGICAL TIME LINE

To understand the current overall patterns of plant and animal distributions in the western plains, one must think backward a few million years. Until about 70 million years ago, all of what is now the Great Plains lay beneath a vast inland sea. At its bottom were sediments up to 10,000 feet deep. Around 70 million years ago the North American continent began a gradual uplift, progressively exposing the sea bottom and producing a series of gentle basins and arches on the rising landscape. However, more extensive uplifting occurred in the Black Hills region, and the Rocky Mountains to the west began their much more extensive expansions, largely through folding and faulting. As rapidly as the western mountains rose, rivers formed to erode their surface layers, carrying sediments away to the more easterly vegetated plains, where a variety of plant-eating and carnivorous dinosaurs were dining on what would – by about 65 million years ago – became their final meals. The river sediments preserved the fossil remains of such impressive but now defunct animals as *Triceratops* and *Tyrannosaurus*.

About 50 million years ago volcanic activities in mountains far to the west added additional wind-carried materials, even as abundant tropical vegetation still flourished along the edges of the retreating seas. In places like the northern plains these lush forests of tropical evergreen vegetation were eventually buried to become the vast beds of lignite and coal that are being extracted today from Wyoming, Montana, and the western Dakotas.

Between about 45 million and 35 million years ago a pause in mountain-building occurred. Gradually drier and cooler climates and less-forestlike plant communities began to develop, only to be interrupted by a renewal of volcanism and mountain building near the end of this period. More river-related erosion brought new layers of sediments to the Plains, including the White River sediments that compose much of South Dakota's scenic badlands. By now the land east of the Rocky Mountains was mostly covered by a vast grassland and many large grazing mammals. Early horses and camels had displaced the dinosaurs and other dominant reptiles of the late Mesozoic era. Fossil remnants of some of these high-toothed grazing mammals were preserved in such places as Agate Fossil Beds National Monument in western Nebraska, among sediments more than 20 million years old.

Between 25 and 5 million years ago the Great Plains were affected by periodic phases of mountain building and volcanism, each episode adding layers of new sediments and windblown debris to the older materials progressively interred below. The oldest deposits of sediments occurred in the northern parts of the Great Plains, while more recent deposits of Oligocene, Miocene, and Pliocene

vintages extended progressively farther east and south, eventually reaching the southern edge of the present-day Great Plains. A rather late surge of volcanism in the western mountains occurred about 9 million years ago. This activity suffocated herds of rhinos and other large mammals under a cloud of volcanic dust, providing the fossilized base for what is now known as Ashfall Fossil Beds State Historical Park, in north-central Nebraska. By 5 million years ago the entire High Plains region was becoming a vast, eastwardly sloping tableland similar to its present shape, with numerous rivers – including the predecessors of the Missouri, the Platte, the Cimarron, and the Pecos – all cutting downward through the soft surface materials near the mountains and redepositing them farther downstream.

About 5 million years ago a new period of uplift occurred in western North America, causing new cycles of down-cutting and subsequent deposition, with rivers such as the Missouri eroding down to depths only a few hundred feet higher than their current elevations. Prior to the Pleistocene glaciations, the Missouri River had flowed northeastward into Hudson Bay, probably cutting across northern Montana and entering Canada in southeastern Saskatchewan. Its northern tributaries, including the Yellowstone, the Little Missouri, and the now isolated Souris, were part of this same general river system, as perhaps also were the Knife and the Cannonball rivers. Then, about 2 million years ago, the first of a series of continent-wide glaciations developed across most of northern North America, with roughly the northeastern fifth of the Great Plains becoming repeatedly covered with sheets of ice hundreds of feet thick. At maximum, the glaciers' southernmost limits in the Great Plains extended from the general vicinity of the Rocky Mountain foothills in present-day northwestern Montana eastward and southward along a line approximating the present southeastward-flowing course of the Missouri River, to eastern Nebraska and northeastern Kansas.

With the glaciers came a host of cold-adapted mammals, including mastodons, mammoths, bison, caribou, muskoxen, wolves, tiger-sized cats, bears, and many other cold-adapted species (Schultz 1934). Along the glaciers' southwestern edges in what is now the Dakotas, ridges of rock debris produced terminal moraines that are collectively called the Coteau du Missouri. Irregularities left by stagnant ice produced pockmarked terrains in northeastern Montana and the Dakotas that eventually would become the famous "duck factory" or "prairie pothole" region. The Missouri River began to form its present, generally southward flowing course, and rivers like the Platte and Niobrara also shifted their courses as they were variously influenced by glacial moraines and meltwater effects. The current channel of the Missouri closely follows the southwestern limits of the last (Wisconsinian) glaciation. Highly sculptured badlands in the

western Dakotas were also produced, mostly by water erosion from glacier-fed rivers that now sometimes are barely more than seasonal trickles.

The plant and animal life present during this broad swatch of North American history was probably an ever-changing tapestry, as climate patterns ebbed and flowed and as the land itself was reshaped. It is clear that the general pattern of climatic change in the Great Plains, as elsewhere in North America, has been one of general cooling and drying, at least since the end of the Age of Dinosaurs (the Cretaceous era) some 65 million years ago. As mentioned, the tropical forests that once covered the great interior lowlands of North America disappeared and were very gradually replaced by more drought- and cold-tolerant forms. Thus tropical evergreen trees were replaced by seasonably deciduous trees, deciduous trees by shrubs, and shrubs by herbs (broad-leaved herbaceous plants and grasses). Grasses, the plant type best adapted to short growing seasons, recurrent fires, and grazing by large animals, were destined to become the dominant plant type of the Plains. Somewhere between the middle Miocene epoch (about 15 million years ago) and historic times, the Great Plains were converted from a semiopen forest, with only scattered grassy areas, to a completely open grassland, with forests and woodlands limited to watercourses and other areas protected from fire and having access to surface or subsurface moisture (Axelrod 1985).

Plants living in northwestern Mexico, a region of long-term deserts and semideserts associated with the permanent high-pressure zones of these latitudes, probably provided a reservoir of plants and animals pre-adapted to an arid-zone pattern of existence. From this general region, especially the present-day Chihuahuan Desert, various grasses and other ecologically similar plants presumably moved north to occupy the increasingly significant rain-shadow effect of the Rocky Mountains, where most of the clouds carrying moisture from the Pacific Ocean were nearly squeezed dry as they passed eastward over the high western cordilleras.

The lowly but pervasive buffalo grass, which now extends from the southern tip of the Chihuahuan Desert north across the drier plains almost to the Canadian border, is one of the many arid-adapted grasses that probably had its origins here, and it has certainly been a foraging mainstay for such grazing mammals as bison and prairie dogs for uncountable millennia. The Mexican prairie dog is a southern representative of the keystone prairie dog assemblage of five grassland-dependent species and likewise is a part of this same longstanding semidesert community. It also is perhaps a Mexican relict of an original arid grassland distribution pattern of ancestral prairie dogs. It still survives in a southern corner of the Chihuahuan Desert, although it is now an endangered species. The coyote may have originated in the Mexican plateau too; in the

Aztec culture, Heuheucoyotl was a trickster deity and Coyolxauhqui was the moon goddess. Our English name for the coyote is thus derived from the Aztec *coyotl*, a fitting tribute both to its cunning nature and to its love for singing on moonlit nights. Likewise the kit fox, a close kin to the more northerly swift fox, has a semitropical desert grassland orientation, as do several jackrabbit species, such as the white-sided jackrabbit. The adjacent dry mountain slopes of the Sierra Madre Occidental and Oriental, where scrub oaks, mesquite, and similar arid-adapted woody plants still occur, probably provided various shrubs and deciduous trees to the mix of plant species that were slowly inching their way northward over the western plains.

The climate of the western plains gradually settled into a pattern characterized by dry, cold winters, with much of the cold-season precipitation falling as snow. Most of the annual precipitation occurred during the spring and summer growing season, often in the form of violent thunderstorms that occurred as moisture-laden warm air from the Gulf of Mexico met cooler and drier air currents coming southeast out of the northern interior. Increasingly short summers occurred northwardly, and increasing amounts of annual sunshine and associated evaporation occurred toward the south. However, periodic droughts and recurrent, lightning-caused prairie fires added to the complexities of life for organisms adapting to these demanding conditions for survival. The grasses and other plants of the developing shortgrass and mixed-grass prairies were ones that, like the desert and desert grassland plants of the Southwest, were mainly warm-season perennial species, whose photosynthetic processes operate well under conditions of high summer temperatures and extended periods of relatively little moisture, sometimes lasting for several years. Among these species are such important southern and western shortgrass and mixed-grass prairie genera as *Andropogon*, *Buchloë*, *Bouteloua*, *Chloris*, *Paspalum*, *Setaria*, *Schizachyrium*, *Sorghastrum*, and *Sporobolus*. Plants that evolved to form the tallgrass prairies at the northeastern, moister edges of the Great Plains have a higher proportion of cool-season grass genera. These include such typical prairie grasses as *Agropyron*, *Bromus*, *Elymus*, *Festuca*, *Hordeum*, *Poa*, and *Stipa* (Sims 1988). At the northernmost edge of the Great Plains, *Festuca* grasses became especially important in the transition zone toward the forests of the Rockies and the Canadian boreal forests. These tall, productive grasses are well adapted to cooler summer temperatures and greater precipitation than are most mixed-grass prairie grasses. As a result, bison of the Canadian plains historically moved west toward the Front Range of the Rocky Mountains, rather than migrating great distances southward, to obtain their fall and winter sustenance from this nutritious forage source.

THE LAND TODAY

The present climate of the western plains may be summarized relative to its geographically variable precipitation. At the western edge of the plains an annual precipitation of less than 16 inches is typical. The mixed-grass prairies merge eastwardly with the tallgrass prairies very roughly at the isohyet of about 28 inches of annual precipitation.

Various ways exist to represent the geography, climate, and associated biological communities of the Great Plains visually. One current and widely adopted method was first proposed by Robert Bailey. It recognized twenty-five separate ecological-geographic provinces in the United States south of Canada. Bailey's boundaries were refined by The Nature Conservancy (1999) into fifty-two ecoregions within the same forty-eight-state boundaries, of which five fall within the previously designated geographic limits of the western plains (Map 1). Of these five the Black Hills are not geologically a part of this region, leaving the Northern Great Plains Steppe, the Central Mixed-grass Prairie, the Central Shortgrass Prairie, and the Southern Shortgrass Prairie as constituent parts of the western plains. Some of the limits of these ecoregions have since undergone further minor refining, but the collective boundaries of these five ecoregions make for a convenient visualization of the entire western plains biological domain and will be used later in the book as a collective biogeographical definition of this region.

More recently a group of avian biologists formed the North American Bird Conservation Initiative Committee (NABCIC), which operates through regionally based, biologically driven, and landscape-oriented partnerships. A team from that group assembled a map of proposed Bird Conservation Regions (North American Bird Conservation Initiative Committee 2000). This map divides the Northern Great Plains Steppe into a more northerly "Prairie Potholes" component, which extends north into central Alberta and east into the tallgrass prairies of the Dakotas, Minnesota, and Iowa, and a more southerly and drier "Badlands and Prairies" segment. The other western plains elements recognized in the map are the southwestern Shortgrass Prairie region and the southeastern Central Mixed-grass Prairie segment. Three of these Bird Conservation Regions are mapped here (Map 2); the map excludes the Prairie Potholes segment, as it mostly falls outside the recognized geographic limits of the western plains.

The last map reproduced here includes the entire Great Plains and part of the Central Lowlands of North America (Map 3). It is largely based on a National Wildlife Federation historical vegetation-based map (Bachard 2001), which is geographically limited to the native perennial grasslands (tallgrass, mixed-grass, and shortgrass prairies) of interior North America. Additionally, the Nebraska

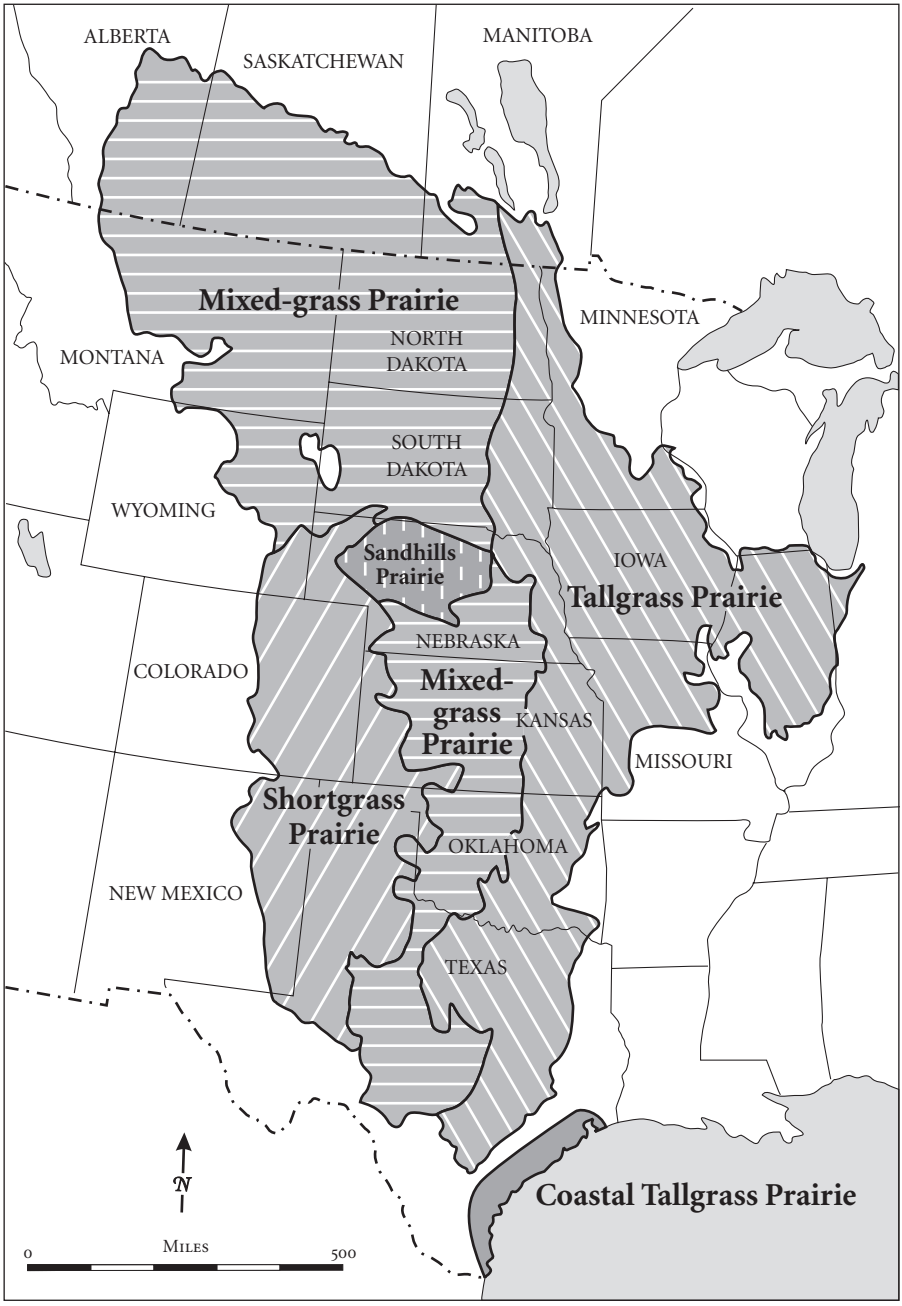
Sandhills are designated separately in Map 3; they are botanically and zoologically quite recognizable, and their separate inclusion provides a convenient geographic separation between the biologically distinguishable northern and southern segments of the mixed-grass prairies.

It is one thing to look at a map and try to visualize the kinds of landscapes represented therein, to say nothing of the diversity of plants and animals that might be implied in a simple map label such as "shortgrass prairie." For example, the native prairies of Buffalo Gap National Grassland in the southwestern South Dakota badlands region are known to support 230 species of birds, 58 mammals, 19 reptiles, and 8 amphibians as well as 92 grasses, 160 broad-leaved herbs (or forbs), 22 shrubs, and 11 trees. Beyond these are uncountable numbers of insects, other invertebrates, and soil microorganisms. Most of this very land was once ranched or farmed for only a few decades, from when it was first settled in the later 1800s until the Dust Bowl years of the 1930s, when bankruptcies became as common as summer dust storms. Plowing up such fragile lands to raise wheat or corn for a few decades, often until the topsoil blows away and the land is abandoned, is like throwing away a treasure trove of potential biological riches to raise a single species of grass that needs so much tilling, water, herbicides, and pesticides to survive that scarcely anything else of value can survive there.

One's native land is the most important thing on earth. Above all it is made holy by the ancestors, who pass it on. – *Louis Tiel*

Ecoregions of the Great Plains. After the Nature Conservancy (1999).

Bird Conservation Regions of the High Plains. After the North American Bird Conservation Initiative Committee (2000).



Biological regions of the Great Plains. Mainly after Bachand (2001) but with the Sandhills Prairie additionally designated.