

# Prairie Preserves: Valuable Relicts?

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Natural prairies, like other broad expanses of ecosystem types such as deciduous or coniferous forests, have been taken for granted over the decades because man had the idea that prairie resources were inexhaustible. During and after the years of western expansion in North America enough regeneration of exploited forests and grasslands occurred to give the impression that depletion was impossible. The last 50 years, however, have made us painfully aware that this is not true. The powerful machines of modern agriculture have enabled farmers to utilize most of the available land for production, with the result that of all the natural landscape types, none has been so subtly destroyed as the grasslands.

The prairie ecosystem developed in continental regions where climates are harsh. Temperature extremes, extended droughts, an inverse precipitation-evaporation ratio, fire, and occasional overgrazing interact to produce the vegetation types that comprise the grasslands of North America. But because of these complex variables, the native prairie is a fragile life form which is easily upset and destroyed. Except for the dominating grasses species, many prairie inhabitants are perennials that are relatively rare and cannot withstand farming or excessive grazing without becoming threatened with extinction.

The prairies of North America are fast disappearing. Preservation of these valuable relicts NOW is imperative.

## The North American Prairie

The grassland province of North America occupies the entire central continental region from the coniferous forests of Canada south to the deserts of Mexico. The Rocky Mountains border the Great Plains grasslands to the west. The eastern boundary reaches to the Great Lakes and beyond. The grassland province is a broad belt where grasses and patches of forest form a mosaic. Geologic history indicates that when climates were drier and somewhat warmer, the prairie reached east into Ohio.

The grassland province is broadly divisible north to south into three types of prairie: the tall-grass or true prairie to the east, the short-grass, or plains, to the west, and the mixed-grass or mid-grass prairie in between. The boundaries between these three broad strips are gradual and highly irregular. The zonation from east to west is a function of increased aridity, which results in a gradual change in species of grasses and forbs that dominate any particular area.

As might be expected, the true or tall-grass prairie in the east is now some of the richest agricultural land in the world. Receiving from 27 to 32 inches of rainfall per year, it has a deep, dark, fertile soil that now forms the corn belt. The plains, or short-grass prairie to the west, are dominated by short grasses: buffalo grass (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*). They grow to only a few inches in height as compared to the tall

blue stem, *Andropogon gerardi*, or Indian grass, *Sorghastrum avenaceum*, which in the true prairie reaches over 6 feet in height.

The long-term climatic elements of rainfall and air flow patterns across the continental region of North America have had a dominant effect on the development of the grassland province. Rainfall varies from 10 inches per year in the west to 30 or more inches in the east. Extended periods of drought may occur in the prairie at any time, occasionally of 3 to 5 years in duration. Almost every year during the growing season, a drought of 35 days or so occurs someplace in this region, with a 60- to 70-day drought at least once every 10 years. Paleoecologists estimate that of the past 400 years, 154 were drought years in the grassland province.

Prevailing winds are generally from the west, although polar air masses from Canada and maritime tropical air from the Gulf Coast influence the precipitation pattern. The diverging westerlies from the higher elevations produce a bulge in the eastern boundary of the prairie, modifying the usual north-south lines of similar precipitation/evaporation ratios.

Frequent fires, either of natural origin or man-made, maintained the prairie as an essentially treeless area before white men, fences, and plows were part of the landscape. When drought conditions occurred, the prairie litter was tinder dry, and high winds could spread a prairie fire at speeds that only the fastest of wildlife could escape. This natural occurrence of fire was beneficial to the prairie economy. The above-ground litter was reduced to ash by the fire, releasing minerals to the already rich topsoil. Meanwhile, neither the prairie sod, with its below-ground inhabitants (the rootstocks and rhizomes of the perennial plants), nor the teeming animal life was injured in the least.

Fossil excavation in the grassland province attest to the fact that the ancestors of the great herds of bison, antelope, elk, deer, and other ruminant animals roamed the plains up to 50 million years ago. Oreodonts, ruminating pigs that chewed their cuds, were especially common. Titanotheres, slightly smaller than today's elephants, were also common on the Oligocene plains. Ancestors of the modern horse, not much larger than a collie dog, were also present on these plains. Their skeletons, teeth, and other physical features leave little doubt that they were grazers of grasses and other forbs. Biologists firmly believe that the evolution of grazing animals is closely linked with the availability of a food source that was not unlike the prairie of today. Most of the larger animals moved in great numbers, migrating from wintering regions of lesser food to regions of more abundant grasses. Their grazing of the prairie, however, was always intermittent, allowing the overgrazed areas to recover.

Early explorers and settlers of the New World had little knowledge of prairie. European man came from a natively forested region and first forged a civilization in a similarly forested region in New England. Most of the Scotch, Irish, and German immigrants who encountered the treeless plains in their west-

ward march considered it a wasteland. They soon discovered, however, that it was much easier to turn the prairie sod to provide a seed bed for their crops than to saw and chop trees from the forests. After the Civil War, the rush for land made available by the 1862 Homestead Act, the perfection of the moldboard plow, the relegation of most Indian tribes to reservations, and the use of barbed wire fences altered the prairie. When the prairie became crisscrossed with fences, the free movement of cattle was restricted. Invariably, cattle were kept in enclosures in greater numbers than the range could adequately support. They could not move on when the grasses were depleted. The grasses and forbs had no chance to manufacture reserve foods for storage in the roots. This gradual weakening of the existing grasses and other plants utilized by the cattle caused an imbalance in the dominant life forms. Weedy annuals and less palatable grasses replaced the native grasses. In addition, the prevention of prairie fires allowed shrubs and trees to invade the essentially treeless grassland.

Has the prairie been permanently altered? In a way, yes.

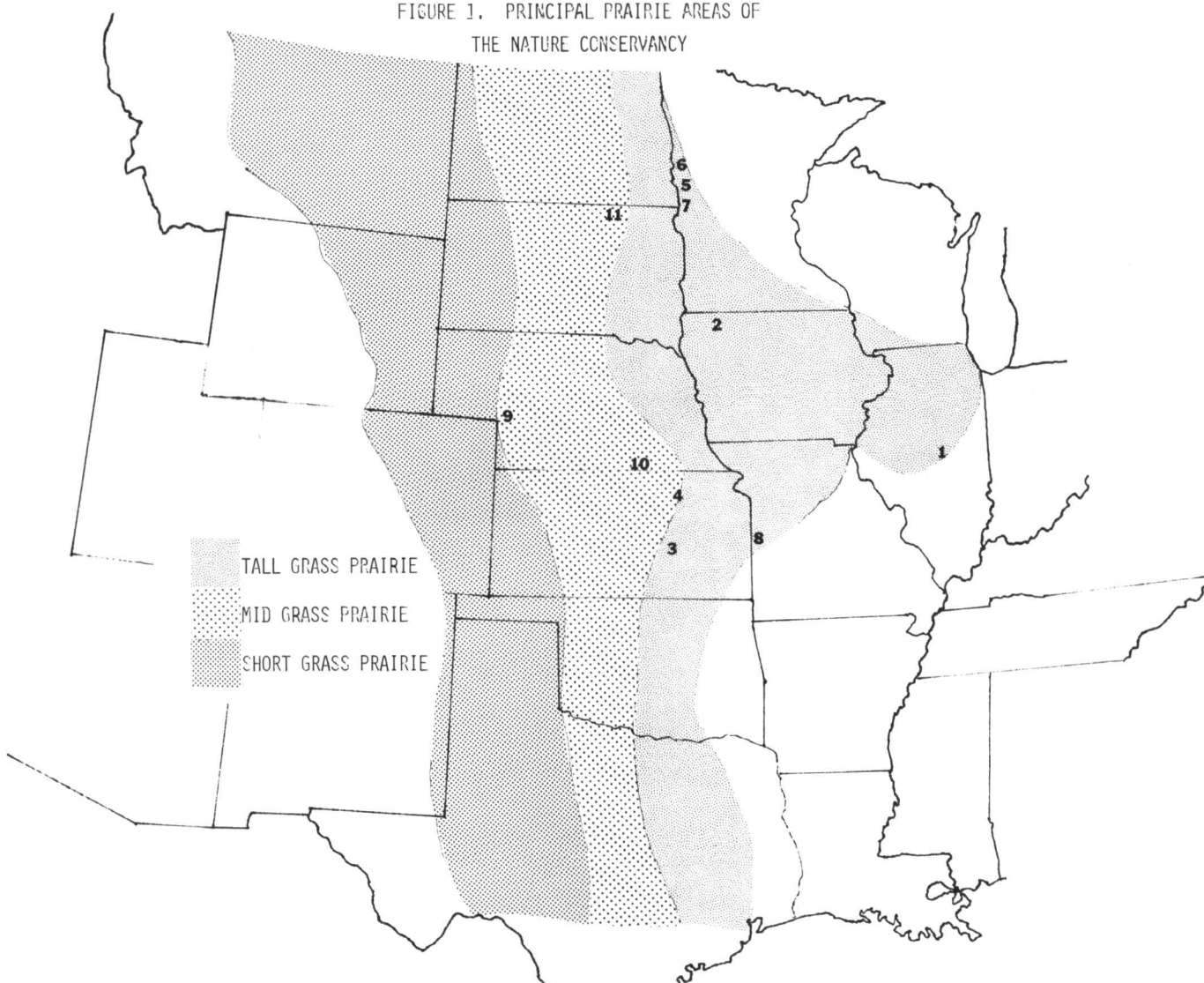
### Preserving Prairie

All of us, in one way or another, practice preservation. The Dead Sea Scrolls, the Declaration of Independence, grandfather's spade or butter churn—all have some significance in terms of preservation. The prairie is part of our heritage. Many of our ancestors lived their entire lives on the ragged edge of civilization in "soddies," primitive places of protection where masses of prairie turf literally formed the walls and ceilings of their homes.

The Great Plains prairie has a permanent place in the cultural life of the heartland of North America. The prairie belongs to all of us. It is a natural environment that young children should see and enjoy. Students of science and history should study it. Artists and farmers should be awed by its aesthetic beauty as well as its utility.

As a scientist, I marvel at the sight of a bobolink or red-winged black-bird swaying in the wind on a native compass plant in the prairie. The pasque flower in spring, the red-orange of prickly pears flowering in summer, and the many white and blue asters

FIGURE 1. PRINCIPAL PRAIRIE AREAS OF THE NATURE CONSERVANCY



1. Illinois:	<i>Prairie Grouse</i>	1,600 acres
2. Iowa:	<i>Freda Hafner</i>	110 acres
3. Kansas:	<i>Flint Hills</i>	2,188 acres
4. Kansas:	<i>Konza</i>	8,036 acres
5. Minnesota:	<i>Bluestem</i>	1,200 acres
6. Minnesota:	<i>Pembina Trail</i>	1,600 acres

7. Minnesota:	<i>Western</i>	600 acres
8. Missouri:	<i>Osage</i>	1,195 acres
9. Nebraska:	<i>Arapaho</i>	1,280 acres
10. Nebraska:	<i>Willa Cather</i>	610 acres
11. South Dakota:	<i>Samuel H. Ordway</i>	7,600 acres

of autumn have an attractiveness that is unmatched. The bronze hue of maturing big blue stem, towering over as many as 20 different species of grasses in a 50-foot radius of prairie, is a thrilling sight to the student, the rancher, or the farmer who appreciates our roots and the reasons for our existence.

Only a few of the relict prairie areas that are acquired for preservation are in a pristine or truly native condition. After 150 years of farming, very little natural grassland prairie remains. Rocky soils, steep hillsides, wet meadows and railroad/roadside embankments comprise most of the areas which were not plowed. Over the years these areas have been identified by conservationists, biologists, or amateurs as possessing characteristics that are worthy of preservation. Most relict prairies are overgrazed, some severely so. In hilly areas overgrazing usually resulted in erosion, and the gullies that formed were a deterrent to plowing. Some prairies have large boulders that were left behind by the masses of ice and glacial till that slowly moved southward during the Pleistocene. Smaller stones were removed from the surface by homesteaders during pioneer days with the use of "stone boats," but manual labor and horse-drawn vehicles were inadequate where the boulders were 3 or 4 feet in diameter. Those prairie areas strewn with large boulders protruding from or immediately below the surface were almost impossible to plow. Thus the prairie environment was preserved unless excessive overgrazing occurred. Other prairies worth preserving, especially in the eastern part of the true prairie, have encroaching woody vegetation in draws and swales and on north and east facing slopes. The moist eastern edge of the prairie, which gives way to tree-covered lands to the east, is a continual struggle between grasses and trees for domination. Protection from fires, either natural or man-made, permits shrubs and trees to invade. However, because the prairie is very old and in a state of dynamic equilibrium, overgrazing or the invasion of trees are but temporary changes of its face which are rectified with proper management techniques. Only deep moldboard plowing, which turns the sod over, slicing all roots and rhizomes, completely destroys the prairie.

Prairie preserves are managed to simulate natural conditions. Some are carefully grazed during certain periods of the growing season, usually in early summer and early autumn. Late summer mowing every 2 or 3 years with a harvest of hay is also desirable. In the eastern tall grass prairies, a late winter or early spring controlled burn is beneficial to remove excess litter and to recycle the minerals. Controlled burning also serves to remove woody shrubs and trees that would otherwise "take over" the prairie.

### Uses of Prairie Preserves

Perhaps the best long-term use of prairie preserves is the scientific and practical value they have in serving as sites for baseline monitoring of the prairie environment. The well-known principles of experimental control are possible when an area in a natural state can serve as the control, or as a comparison to the experimental plot. Without the natural prairie, the "control" would not be there as a sensible or practical way to evaluate the changes in the experimental plot. Such monitoring studies may relate to erosion, use of fertilizers or pesticides, soil texture, tillage practices, plant vigor, soil microorganisms, water runoff, or any number of quantitative or qualitative measurements that can be made which compare the results of adapting the natural prairie to man's use.

The diversity of plant and animal organisms inhabiting the natural prairie serves to compliment the baseline monitoring value of natural prairie. These species are the source of genetic material which may be crossed with domestic species to produce

offspring with the potential of adapting to changing cultural practices, resisting disease, or increasing production. Perhaps native prairies are of more value as a storehouse of wild species that show promise for domestication. Consider the total assemblage of wild plants known to occur in the temperate world in areas that principally were original prairie or grassland. Conservative estimates number up to several thousand species of grasses, forbs, and shrubs. These same temperate grassland regions are responsible for most of modern agriculture's production of food, fiber, and livestock. Yet today the entire agricultural economy is precariously perched on the genetic bases of less than 20 different grass and forb species. The greatest benefit for a starving world might be to preserve a small corner of native prairie rather than destroying the diversity of species present for the sake of growing a few more bushels of grain.

The diversity of organisms in native prairie also serve as indicators of how soil, plants, and animals interrelate in an ecological way. One of the most immediate and practical ways in which this type of information is used is in the reclaiming of western land destroyed by strip mining. Intelligent and efficient methods of restoring prairie are now taking place because seeds and other plant parts, along with their small animal and micro-organism "fellow travelers," are transplanted from prairies that are either preserved or in a relatively natural state.



*This 22-acre prairie is owned by the Nature Conservancy. Access by student groups, researchers, and visitors of all ages is encouraged.*

Plant scientists can utilize prairie preserves for the study of long-term prairie/plant interactions. The soil binding capacity of prairie plants is well known to the soil conservationist, the rancher in the sandhills of Nebraska, and those who remember the dust bowl of the dirty thirties. For example, it has been determined that the topsoil in native prairie is twice as thick as that in adjacent land that has been farmed for 100 years. In spite of the efforts to conserve soil, wind and water erosion continues to be the most serious threat to midwestern croplands.

In these days of concern for endangered species, natural prairie preserves are obvious communities which harbor plant species that are either endangered or threatened by extinction. We cannot preserve the species of plants or animals without preserving the habitat in which the plants or animals exist. It must be realized, however, that sometimes, no matter how extensive the efforts to protect individual species, they cannot be saved. However, the availability of suitable habitats has given rare forms their best chance for continued survival.





*Author enjoying taking pictures of many plants including green milkweed, green needleandthread grass, Junegrass, and purple prairie cone flower.*

### **The Prairie Preserve System**

A limited number of federal, state, and private agencies, as well as local communities are active in promoting the acquisition and maintenance of prairie preserves. Many thousands of acres of prairie managed by federal agencies are found in national parks, national monuments, and national forest lands in the grassland province. The Soil Conservation Act of 1935 was instrumental in reclaiming grasslands ruined by drought and misuse during the dirty thirties. Presently over three million acres of grasslands in eight states extending from North Dakota to Texas comprise the National Grasslands. These were sub-marginal farms and depleted rangelands which were purchased by the Federal Government for the restoration of grassland agriculture. They now serve as demonstration areas for prairie restoration, to show how lands unsuitable for cultivation may be converted to grass for the benefit of both land and people. Much of the National Grasslands is now leased to ranchers for controlled grazing.

Recently conservationists have inventoried and identified 21 areas in the National Grasslands for possible inclusion into the Wilderness System. Although the total acreage, less than 300,000 acres, is a small fraction of the entire Grassland, it represents a significant amount that may ultimately be preserved as prairie wilderness. The important aspect of this action is not so much the acreage involved as is the incorporation of the concept of preserving prairie permanently and designating it as prairie wilderness.

The Nature Conservancy is an organization that has become very active in acquiring prime relict prairies. By the end of 1977 this organization owned just under 40,000 acres of grassland, in tracts ranging in size from five to over 8,000 acres, in 12 midwestern states. The map shows some of the principal locations of prairie acquired by the Nature Conservancy. Receiving its support from the public, the Nature Conservancy is a national conservation organization whose primary objective is to preserve and to protect ecologically and environmentally significant land and the diversity of life it supports. The Conservancy

purchases lands using its revolving fund, which is then replenished through local fund-raising efforts. A unique capability of the Conservancy is to move quickly by acquiring land for purchase in advance of government agencies' ability to do so.

Many people have bequeathed tracts of prairie or provided funds for purchase of prairie to be preserved and managed by the Nature Conservancy. Ownership of the area is placed in trust, under restriction, limiting its transfer in the future. This prevents purchase of the land by the highest bidder or by the profit-minded corporation to "develop." An outstanding example is that of Miss Katharine Ordway, who in 1971 established the Ordway Prairie system as a memorial to pioneer environmentalist Samuel H. Ordway, Jr., a founder of the Conservation Foundation. The present Ordway Prairie system totals over 20 sanctuaries in five states, consisting of almost 24,000 acres.

The Nature Conservancy works with local, state, and federal agencies in acquisition and management. In Missouri the Conservancy's prairies are leased to and managed by state agencies. The Konza Prairie in Kansas, the largest presently owned by the Conservancy, is leased to Kansas State University as a research station. In Illinois the Natural History Survey and the state's Department of Conservation have joined forces to assist in management of their prairie preserves. In South Dakota the Nature Conservancy operates the 7600-acre Samuel H. Ordway Memorial Prairie Research Station with a full-time manager who is a wildlife and range management graduate. In Minnesota, local chapters are instrumental in managing over 33 tracts of the Conservancy's prairies. Techniques of management, results of research, and educational benefits are shared to foster an effective and continuing stewardship of the prairie.

The Vermillion Prairie, only 22 acres in size, in southeastern South Dakota, was a boulder-filled, overgrazed hillside that overlooks the Missouri River flood plain. Help from the Nature Conservancy resulted in a local fund-raising effort that brought in enough money to purchase the tract. Our appeal to people to support the project brought some unusual responses. A number of those who contributed felt a special kinship to the land because of their homesteading ancestors. Others stated that the prairie project made possible tangible participation in something that dealt with their cultural heritage.

### **The Preserves of Tomorrow**

Although each new spring brings with it the farmers' and ranchers' assessment of the need to place more of the already marginal prairie land into production, a good start has been made to preserve some of the quiet corners of all kinds of prairie in the heartland of the United States. Do you have in mind a prairie area you think should be preserved? It need not be larger than an odd corner of a ranch; it may be a hillside filled with boulders, or it may be an abandoned railroad right-of-way.

The Nature Conservancy, cooperating with like-minded federal, state, and private organizations, has achieved recent success toward its goal of having a network of prairie preserves in the Midwest. It deserves to be vigorously supported. If you are interested write the *Nature Conservancy, 1800 Kent Street, Arlington, Virginia 22209*. Get involved! Our children, and their children, perhaps a hundred years from now, will find cause to thank us for our foresight and the heritage we have left them.