

## PRAIRIES IN THE PRAIRIE STATE

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ABSTRACT. — A map of the former prairies of Illinois, based on the original land survey records, is presented and compared with two earlier maps (Gerhard, 1857; Vestal, 1931). The new map shows more prairie than the two previous maps and more clearly delineates forested areas along major waterways.

A discussion of the major literature references that pertain to Illinois prairies is given. Evidence is given for the importance of fire in helping to maintain prairies in Illinois before white settlement.

The black prairie soils of Illinois have helped to make her one of the richest states in the nation. The biotic community of the prairie contributed to the making of this productive land. For over a half century scientific studies have been made of its plant life. This paper summarizes some of the relevant findings of these investigations and presents a new map of the prairies of Illinois. Early historic accounts have also been included inasmuch as they contribute to our understanding of the prairies.

White settlement in Illinois began in the southern part of the state with most of the settlers coming from Kentucky and Tennessee. These early settlers were hunters rather than farmers and in 1820 most of the people were located in the forested southern portion of the state. They were familiar with the problems associated with life in the forest but were inexperienced with the prairie.

Their advance northward was primarily along wooded stream banks. Prairies were generally shunned by the earlier settlers for various reasons: the absence of trees was thought to mean that the soils were infertile, timber was needed for fuel and building material, running water was unavailable for livestock or mills, prairie lands lacked protection from winter storms, and the tough prairie sod presented an almost insurmountable problem to early agriculturalists.

Slowly, settlers encroached on to the prairie, but as late as 1836 those who thought the prairie habitable were considered part of the lunatic fringe. Log cabins were built along the edge of forested areas in preference to locations within the central parts of the prairies. Usually, the smaller prairies were inhabited before the larger. The extensive grasslands remained essentially unoccupied until 1850, even though the settlers had learned how to successfully break the thick prairie sod and obtain high crop yields. The lack of efficient transportation systems, however, prevented the movement of crops profitably to distant markets. With the establishment of railroads in the decade 1850 to 1860, the prairies were rapidly settled. (Barrows, 1910).

Maps of the prairies of Illinois are available from several sources.

One of the earliest is that of Gerhard (1857). While showing the major prairies, his map is otherwise sketchy in detail. Vestal's (1931) map of the vegetation of Illinois, on the other hand, is more precise than Gerhard's and was based largely on information obtained from the State Soil Survey Reports (which include information on the distribution of prairie soils) and Telford's (1926) map of the forest for some Illinois counties.

The present research, based on the original land survey records, is intended to further contribute to our understanding of the prairie-forest boundaries in Illinois as they existed at the time of its initial settlement. Land survey records have been used by several investigators to determine presettlement vegetation patterns of other regions (Bourdo, 1956; Wucueher and Valiuna, 1967). A detailed map of the original prairie limits in Illinois may be of great value in solving phytogeographical problems, and will undoubtedly serve as a sound base for further ecological studies.

#### *Methods*

In the original land survey records, maps are available showing the extent of prairies and timbered areas within each township. These maps were drawn under the direction of the Surveyors General in the 1850's, although the original surveying in Illinois was completed before 1820. A complete set of township maps for this study was obtained on microfilm from the state Archives at Springfield. Many county courthouses also have copies of the survey records, as well as of the township maps.

Vegetation data was transferred to a base map of the state on which the townships were drawn in approximately one-half inch squares. Some of the non-forested areas in the original records were designated "barrens", "barrens or prairies", and "prairies." Both "prairies" and "barrens or prairies" were included on the map. While barrens are classified as grasslands, they are unique in floristic composition and lack some prairie plants such as *Silphium*. They are apparently established on forest soils rather than typical prairie soils, suggesting that at one time they were covered with forest (Vestal, 1936).

#### RESULTS

Greater detail is shown by the present map of the prairie based upon original land survey records (Fig. 1) than by the two earlier maps (Barrow, 1910 (modified from Gerhard, 1857; Fig. 2) and Vestal, 1931; Fig. 3). Nonetheless, the broad outline of the three maps are similar. All depict the same major areas of prairie and timber along the larger rivers and streams. However, the new map (Fig. 1) not only shows many more prairie stands of exceedingly local distribution, but also tends to give more precise definition to the wooded areas along the waterways. Thus, the drainage patterns are more accurately delineated. The maps by Barrow and Vestal, on the other hand, show significantly less prairie in the south, southwest, and southeastern portions of the state. The southern boundary of the prairie as given in the new map, for example, approximates the limit of the

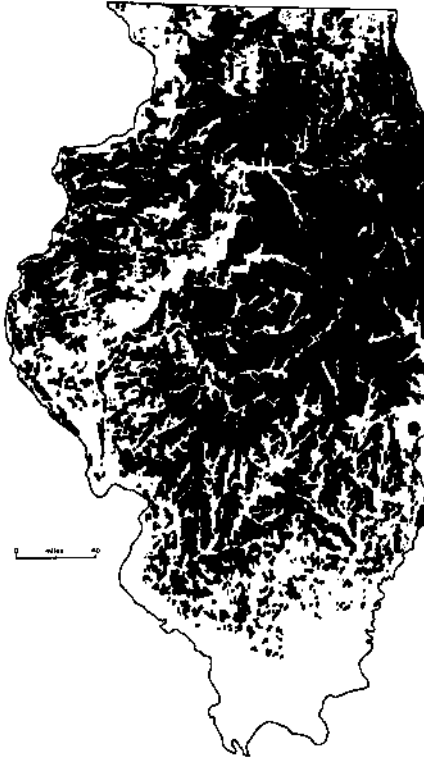


FIGURE 1. The location of prairies in Illinois at the time of settlement, 1810-20, based on the original land survey records.

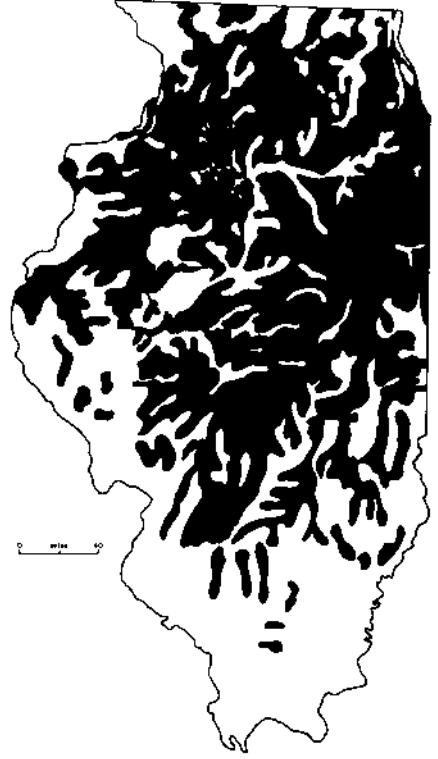


FIGURE 2. Prairies in Illinois modified from Gerhard, 1857 (Barrow, 1910).

Illinoisan glaciation with no prairie occurring on unglaciated landscapes. None of the maps show hill prairies (cf. Evers, 1955).

It hardly needs to be emphasized that the new map presents the location of prairies during one time period only. Illinois has been the battle ground between the forest and the prairie for thousands of years (Gleason, 1923). It is thus easy to understand why Vestal's map, even though fairly detailed, shows less prairie than the present one based upon survey records. The boundary

between the prairie and the forest is not static, but has continually shifted throughout the long history of these two major plant formations.

It may very well be that certain small areas of prairie had completely grown up to forest by the time Telford did his mapping, or possibly were completely destroyed by cultivation so that little evidence of the former prairie vegetation has remained. Areas that once supported small stands of prairie or very open savannas were probably converted to closed forest within a fairly short

period of time after the cessation of annual fires (Vestal, 1931; Curtis, 1959; Vogl, 1964; Muir, 1965).

According to Gerhard (1857), "The first efforts to convert prairies into forest land were usually made on the part of the prairie adjoining timber . . . , three furrows were plowed all around the settlement to stop the burning of the prairies . . . , whereupon the timber quickly grows up. . . ."

It may never be possible to authenticate all of the small areas of prairie shown on the map based on surveyor's records. However, in southern Illinois there are historic accounts of small prairies in Williamson County (Allen, 1963); moreover, there are a few remnant prairie plants growing in some of these locations, although most of them have been destroyed by the plow or by urban expansion.

Several investigators have reported on the vegetation of the prairies of Illinois. According to Vestal (1914) and Sampson (1921), *Andropogon gerardi* was the dominant grass on the black soil upland sites, with *Andropogon scoparius* more important on the drier sites. Wet depressions supported *Spartina pectinata*, *Calamagrostis canadensis*, *Phragmites communis*, *Liatris spicata*, *Eryngium yuccifolium* and other species (Vestal, 1914; Sampson, 1921). Sand prairies along the Illinois River supported such xerophytic grasses as *Koeleria cristata*, *Bouteloua hirsuta* and *B. curtipendula* in prominent bunch grass communities (Gleason, 1919; Vestal, 1913). The hill prairies of Illinois were investigated by Evers, 1955; Kilburn and Ford, 1962; Kilburn



FIGURE 3. Vestal's (1931) map of the prairies in Illinois.

and Warren, 1963; and Bland and Kilburn, 1966.

Gleason (1923) speculated about the history of the midwest prairie before the arrival of white settlers. During the xerothermic period species of the dry western regions, as well as many southeastern species adapted to the arid winter, became established. Among these southeast immigrants were numerous grasses that had the same vegetative form as the western grasses and easily mingled with them.

The increase in moisture associated with the close of the xerothermic period (Sears, 1942) was probably

more favorable to the spread of grasses of southeastern derivation than of western origin, and hence the latter were probably restricted to more arid sites. Gleason also notes that the four most important grasses in the Illinois prairies, *Andropogon gerardi*, *A. scoparius*, *Sorghastrum nutans*, and *Spartina pectinata* are still present today in the forested regions of the eastern states.

Tree growth was favored as the climate became more moist. Gleason hypothesized that much of the prairie of Illinois and the adjacent states would have grown up to forest cover if it were not for the aboriginal burnings that favored the grassland. The many accounts of the nearly annual burning of the prairie by Indians support his conclusions (Gerhard, 1857; Brendel, 1887; Muir, 1965). Carl O. Sauer (1950), recognizing the importance of man and his burning activities in influencing the distribution of the grasslands of the world, concluded that the grassland was a fire climax, and that man was responsible for most of these fires.

Gleason (1923) established the importance of prairie fires in determining the distribution of the forest along the major waterways of Illinois. Grass fires were generally swept from west to east by the prevailing westerly winds. Thus, the western borders of lakes and streams generally had less timber than the eastern sides.

That forest can invade prairie and prairie can invade forest is well documented by research studies and mid-western historic accounts (Vestal, 1918a; 1918b; Curtis, 1959; Sheldford and Winterringer, 1959; Vogl,

1964). What is not well established is how important are factors other than fire in maintaining grassland areas within climatic regions that are also capable of supporting forests.

Transeau (1935) and Borchert (1951) point out that the climatic patterns of the prairie peninsula are clearly different from those of both the eastern deciduous and northern forests. Significantly, studies of the soil moisture conditions in this region during the drought period of 1933-34 by Britton and Messenger (1969) indicate that such dry periods are unfavorable for tree growth. Undoubtedly, periodic droughts coupled with repeated burning allowed the prairie to encroach into forest areas.

The effect of fire on the grasslands of the high rainfall areas of the mid-west has been studied by several workers (Curtis and Partch, 1948; Ehrenreich and Aikman, 1957; Kucera and Ehrenreich, 1962; Kucera and Koelling, 1964; Hadley and Kiekhefer, 1963; Kucera *et al.*, 1967). Some found that productivity of the major prairie grasses was greater on burned than on non-burned areas (Hadley and Kiekhefer, 1963; Kucera *et al.*, 1967). Curtis and Partch (1948) report that burning aids the establishment of an artificial prairie by reducing bluegrass competition. Burning while the native grasses are still dormant, but while the introduced bluegrass is still green, retards the growth of native species. The work of Hadley and Kiekhefer (1965) also supports their findings. The flowering of the dominant prairie grasses is also enhanced by burning (Curtis

and Partch, 1948; Ehrenreich and Aikman, 1957; Hadley and Kieckhefer, 1965).

The black ash surface resulting from fire increases the rate of spring warming on the burned prairie compared to non-burned areas. Removal of the mulch also increases the rate of warming, as well as reducing light and moisture interception, and aids in seedling establishment (Kucera and Ehrenreich, 1962; Lemon, 1967). However, the loss of the protective mulch layer can increase evaporative losses so that in arid regions of the grassland the beneficial effects of the fire are offset by low soil moisture conditions (Anderson, 1953; Dix, 1960). But in the high rainfall areas of the eastern arm of the prairie this does not seem to be the case. Kucera *et al.* (1967) reported a greater amount of production on burned than on unburned areas of Missouri prairies during periods of below normal rainfall.

Evers (1955) in his study of the hill prairies of Illinois concluded that these small grassland areas because of their exposure and topographic position will remain as prairies without fire, the xeric nature of the site being sufficient to curtail tree growth while favoring the xerophytic grasses.

Further work needs to be done on the effects of fire on the prairies of these xeric sites. Dix and Butler (1954), for example, showed that on a similar kind of prairie in Wisconsin burning decreased the cover of the dominant grasses the first year after they were burned. However, at least one study concluded that hill prairies will grow up to brush if they are not burned (Kilburn and

Warren, 1963).

The extensive prairies of Illinois are now all but gone. There are, however, small strips of prairie still existent throughout the state along the railroad rights of way. In the past, these small areas of prairie remained because they received the same treatment they had before white settlement, annual burning (Leopold, 1948; Cottam, 1964). Many of these are beginning to disappear as they are put under cultivation, disked to control brush, or treated with herbicides. Some of these are beginning to grow up to woody vegetation.

The use of herbicides to control the "weeds" along the railroad rights of way would not appear to be a sound practice, especially in those locations where native prairie still remains. Because the prairie plants constitute a closed community, they prevent the growth of troublesome weeds along the railroad rights of way. Spraying destroys the established community and permits the invasion of weedy species. Native plants rarely become noxious weeds. A single season of cultivation will remove most of these species. Maintaining the prairies along the railroad and highway rights of way protects and improves the soils, provides a diversity of scenery, and helps to control weeds.

#### CONCLUSIONS

Previous maps of prairies in Illinois have failed to include many of the smaller prairies. Even though Vestal's map is fairly detailed it is incomplete in many areas, especially in the southern portions of the state.

Many of the smaller prairies disappeared after white settlement as a result of cultivation or the cessation of the nearly annual fires that retarded the growth of the forests, and thus are not shown on his map.

Many articles suggest that the prairie owes its origin to such factors as drought, soil conditions, exposure, grazing animals, and fire. While probably all contribute to the stability of the grassland, the evidence suggests that, for most of the flat land prairies of Illinois, fire was perhaps one of the major factors in presettlement times that contributed to its maintenance.

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