

# The Disappearance of an Area of Prairie in the Cook County, Illinois, Forest Preserve District<sup>1</sup>

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Typical prairie and characteristic forest occur within a few feet of each other. Climatic factors cannot be used to explain the differences. Drainage, fire, and grazing are factors in determining which shall be present, forest or prairie; but taken separately or together, they do not give the answer to the question. Cowles (1929) states that the presence of forest or prairie rests on factors starting in the past and continuing to the present with cumulative differences, especially in soil. This is only a partial truth. In his lectures Cowles often pointed out that tree seeds do not germinate and seedlings survive in prairie. Soil studies have afforded evidence that over long periods of time with climatic changes, forest has invaded prairie and prairie has invaded forest. Devious patterns of forest and prairie soil occur in areas from which forest has been removed. Speaking in terms of a few centuries, prairies are doubtless as persistent as Cowles (1929) assumed.

There was no evidence of any invasion of prairie by woody plants in 1905 through 1915 in the area shown in Fig. 1, and there is no reason to assume that there had been any appreciable change in the wood's edge for at least a century, or perhaps much longer. The area is a part of a practically continuous prairie, reaching west nearly to the Mississippi River, interrupted only by stream-skirting forest and groves. The tract, shown in the photographs, out to the tip of the forested parts contains about three acres of prairie. It is located east of the Chicago Zoological Park (Brookfield, Illinois), between First Avenue and the Des Plaines River, and south of Thirty-first Street. Approximately two acres of the prairie area were purchased by the Cook County Forest Preserve in 1917. The limits of the original forest can be determined by the location of the large old oaks and other trees along the south and east, but not the north, margin of

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what was once prairie (Fig. 1). The forest at the left (SW) of Fig. 1 was continuous with the flood plain forest of Salt Creek. A photograph, looking northeasterly from the location of the line marking the short transect across the edge vegetation (Fig. 3), shows a good forest edge vegetation on the north and in the northeast corner (Shelford 1920, Fig. 10). At the point on Fig. 3 marked for a dogwood shrub there was almost none of the forest edge plants. Light tolerant forest floor plants merged with the prairie vegetation. How far north this extended is not known. Likewise there are no known records of any kind of quantitative study or mappings of plants in the area.

The important plants of the prairie vegetation are: big bluestem (*Andropogon furcatus*)—common; little bluestem (*A. scoparius*)—less common than *A. furcatus*; June grass (*Koeleria cristata*)—in patches; dropseed (*Sporobolus heterolepis*)—common; Indian grass (*Sorghastrum nutans*) and wheat grass (*Agropyron repens*). These occur throughout the local prairies. The list is by Paul C. Lemon from observations made Oct. 4, 1935 in the area to the right of center in Fig. 1 where the Silphiums are absent. Probably an examination of this spot in 1907 would have shown it to be high prairie, which has abundant little bluestem, few Silphiums and several species of Solidago and Aster; *Stipa spartea* is commonly present. In the low



Figs. 1 and 2.—1. (Left) Portion of a photograph looking in a northwesterly direction from the location of the square black dot in Fig. 3, taken in June 1907; located due west of the center of Riverside, Illinois near  $41^{\circ} 50' N.$ — $87^{\circ} 50' W.$ , and known locally as the Riverside prairie. One-third of the length of the photograph is cut off at the right; it showed solid forest in the background but no additional features in the prairie, (See Shelford 1920, Figs. 10 and 12). 2. (Right) Photographed in June 1947, looking in the same general direction from the same spot. The trees shown in Fig. 1 were removed, probably about 1926, and since that date the area has been overgrown with hawthorn. The lower part is the second exposure to show what is left of the prairie vegetation—compass plant and prairie onion are nearly absent. There is only a little grass. By 1955 this area was materially reduced to size.

prairie appears compass plant (*Silphium laciniatum*) whose divided leaves face the rising sun, rosin weed (*S. terebinthinaceum*) and wild onion (*Allium cernuum*) which provides the ball-like white flowers (Fig. 1). There is usually much big bluestem and sometimes cord grass (*Spartina pectinata*).

Vestal's studies (1914), made six miles northwest from the area being considered, contributed much of the information on northern Illinois prairie and forest edges. An edge is composed of small trees, outside of which there are shrubs, followed by forbs adjacent to the grasses. The small trees are *Malus*, *Crataegus*, and *Prunus*.

The invasion of the prairie has taken place in two main ways: (a) by scattered growth of trees and shrubs in the grass area, and (b) by invasion of the grass by the edge organisms. The latter is a mass movement of plants and animals into the grassland and has taken place perhaps only in the southeast corner of the area. Here it appears that it has been caused by reduced sunlight due to shade of the hawthorn thicket to the south and increased height of the surrounding trees. The hawthorn thicket was a completed invasion at least twenty years ago.

A rough transect about one meter wide was studied as indicated by the black line in the lower left corner of Fig. 3. The first tree in the edge of the woods outside the oaks is a black cherry (*Prunus serotina*). Beginning near the cherry tree, a distance of 28 meters was censused. The first 7 meters contained small hawthorn trees (*Crataegus mollis*), a small crabapple tree (*Malus ioensis*) small white ash trees, and some hazel (*Corylus americana*). The second 7 m was nearly pure hawthorn which ended the first 14 m. The next 3 m (15th - 17th) contained 32 sunflowers (*Helianthus grosseserratus*), 32 goldenrods (*Solidago glaberrima*), 10 tall tickseed plants (*Coreopsis tripteris*), 2 *Aster* spp. and 1 rosin weed (*Silphium terebinthinaceum*). The 18th - 24th m were almost pure *Aster prealtus*. The 25th m was almost pure tickseed (*Coreopsis tripteris*). The 26th - 28th m contained willow, some rosinweed, and scattered plants of the prairie. Here the transect ended (Sept. 28, 1953).

In the final remaining prairie there were fewer plants of Indian grass (*Sorghastrum nutans*) than of switch grass (*Panicum virgatum*). Rosin weed, or the entire leafed silphium, was a predominant species. One compass plant was found; *Solidago rigida* was scattered throughout; there was also a single plant of rattlesnake master (*Eryngium yuccifolium*) and tall tickseed (*Coreopsis tripteris*). There were non-fruited clumps of grass, probably one or both of the andropogons, American feverfew (*Parthenium integrifolium*), and black-eyed susan (*Rudbeckia hirta*). Many of the plants mentioned were found near Elmhurst by Vestal (1914). This group has been invading the prairie area which was obviously smaller in 1954 than in 1947 when Fig. 2 was photographed. The surrounding hawthorns have grown considerably since 1947.

The cause of the row of even-aged hawthorns suggests that a



stray deer, a heavy man, or a horse and rider crossed the area of the row of hawthorns, and pressed hawthorn seeds through the sod, so that some of them could germinate and grow. The late Professor F. C. Gates stated (personal communication) that he found seedlings of forest edge shrubs growing in cow tracks in Kansas prairie. The growth of trees among the grasses was evidently not due to soil disturbance. Part of this area and the land to the north was laid out in curvilinear streets about 1870. One of these entered the prairie and the grading of a narrow road can be seen; but by 1907 it had grown up to prairie so completely as not to show in the photograph. The 1870 sewers and drains north of Thirty-first Street evidently did not seriously affect the prairie.

The change in the prairie began in the late 1920's, with general disturbance. The years 1926 to 1930, 1933 and 1937 were characterized by the construction of the Chicago Zoological Park, the building and widening of the First Avenue pavement, and the building of the Thirty-first Street bridge (1931). Mosquitoes were numerous in 1926 and mosquito abatement began and continued undirected for several years. The large trees shown in Fig. 1 were removed and are in part replaced by sprout trees 4 to 5 inches in diameter in 1956. In 1905 First Avenue was a dirt road which was macadamized some time later. This was replaced by a pavement which sloped to the west and drained into a catch basin near the south side of the prairie area; the basin drained into the river. On or before 1934 the mosquito abaters made a ditch about two feet deep east of the shoulder of the First Avenue pavement. The ditch drained to a point a little south of the prairie and thence to the river. There is some evidence that a shallow mosquito ditch was made across the area soon after 1934.

In 1927 the main body of the original prairie was in good condition, but a very few hawthorns were noticeable along its north edge. By 1937 these or other woody plants were generally distributed except in the sparsely invaded area and the southeast corner. It is evident that the prairie soil was gradually dehydrated between the early 1920's and the early 1950's. The southeast corner suffered least because the surface of the small prairie-covered area is a depression perhaps 2-4 inches below the surrounding area, not found by the mosquito abaters. The invasion of the prairie by scattered trees and shrubs was without doubt largely due to a general lowering of the water table and weakening of the grasses.

When there are young trees and shrubs in a prairie area, more mammals can reside there and birds can perch; their effect is increased and the invasion becomes an autoaccelerated process. David Thompson reports mammals and birds are abundant in the present hawthorn grove. We found a quail dusting site and abundant raccoon signs. Birds and mammals often eat seeds, and Krefting and Roe (1949) point out that the seeds of hawthorn are rendered more viable by passing through alimentary tracts of turkeys. These authors report better germination in smooth sumac (*Rhus glabra*) and wild rose

after ingestion by birds, but dogwood and cherry seeds are injured.

Where the invading trees were sparse (Fig. 3), the plants listed below were present in 1954. This area is separated from the remaining prairie by a tongue of forest trees. In the sparse area the scattered trees were *Crataegus* and *Malus* and a very few sumac. In the lower story there was scattered *Rosa blanda*, some blue grass (*Poa pratensis*), bottlebrush grass (*Hystrix patula*), tall tickseed (*Coreopsis tripteris* probably common in north-facing edges) and *C. palmata*, American feverfew (*Parthenium integrifolium*), flowering spurge (*Euphorbia corollata*), cup plant (*Silphium perfoliatum*), spreading dogbane (*Apocynum androsaemifolium*), and a few scattered lead plants (*Amorpha canescens*).

The officials of the Cook County Forest Preserve are positive that there has been no fire in the area since 1930. Young hawthorns are killed completely by intense fire, and larger well-established ones are killed above the ground but commonly send up new plants sometimes 12 to 15 feet away (R. W. Lorenz, personal communication). There is no evidence that root sprouts were a factor in this case. The officials also believe that frequent burning of the prairie would have saved it. This may be true, especially if the mosquito ditch had not been dug. If fire had been applied, the lowering of the water table which took place to some extent before the ditch was made would probably have resulted in a prairie with goldenrod and *Stipa spartea*.

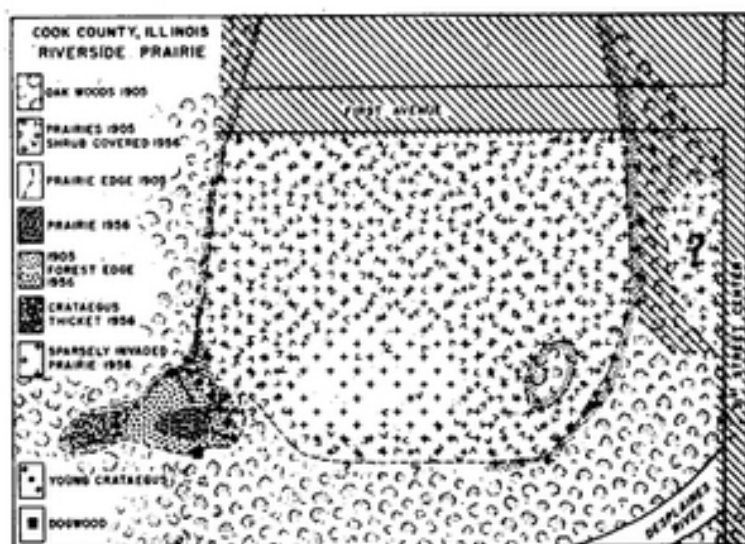


Fig. 3.—A diagram of the prairie area; to the right is north. The oblique ruling shows where the natural vegetation of both forest and prairie has been destroyed or greatly modified; outside this area, the forest remains as in 1905. Nearly all the prairie is taken over by crab apple and hawthorn (vaguely suggested by the crosses) and sumac and bur oak (more vaguely by the Vs). The black line near the 1956 prairie is the transect described in the text. The crataegus circles are those noted in the text and conspicuous in 1953. The dogwood is important as a very late edge arrival on the camera site of 1907 and 1947. The prairie is shown as of 1953, much smaller than in 1947.

There is a consensus of opinion among those who are planning on protecting prairie that burning should take place about every three years. This should be one third each year to retain and protect the animals. The purpose in general is to remove the accumulated plant material. The pulling of tree seedlings in their first spring, while the grass is brown and the seedlings green, is easy.

The deciduous forest edge is a type of vegetation characteristic of regions in the westward fingering of forest along streams into the western plains (Aikman, 1926; Weaver, Hanson and Aikman, 1925). The edges of northern Illinois were doubtless in the same position for a very long period before white settlement. In northeastern Nebraska none of the small trees of the edges under consideration are of any importance in edges. There the edges are usually of hazel next to the woods with smooth sumac well out next to the grasses and some coralberry (*Symphoricarpos orbiculatus*) between the two. In the area of study where drainage is most intensive near the First Avenue mosquito ditch, the area is covered with smooth sumac, a disturbance plant, probably not in natural forest edges in Illinois. In the probably former grassland area near Thirty-first Street (Fig. 3), there are a number of depressions a few inches deep and about 10 m in diameter. There is a circle of hawthorns with another circle of sumac inside on the lower ground. This suggests a lowering of the water table and the initiation of a more arid condition. This peculiar arrangement of sumac and hawthorn probably represents two stages in dehydration of the soil. Two midwestern plants, wild hyacinth (*Camassia scillioides*), and yellow pimpernel (*Taenidia integerrima*) were present (May, 1956). Bur oak has invaded the hawthorn-crab apple area along with one or more individuals of other forest trees.

Study of the interactions of the edge plants in eastern Nebraska shows that hazel is the aggressive species (Clements, Weaver and Hanson, 1929). Studies of natural edge vegetation in Illinois are inadequate for definite conclusions but hawthorn appears to be the aggressive species. Lack of edge study is unfortunate as it can throw much light on the migration of communities. Under human occupation there appears to be a widespread tendency for forest to invade prairie (Fitch and McGregor, 1956).

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