Transactions of the Illinois State Academy of Science
(1983), Volume 76, 3 and 4, pp. 343-346

Photodocumentation of the Loss of Hill Prairie Within Pere Marquette State Park, Jersey County, Illinois

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ABSTRACT

Comparisons of 1937 and 1974 aerial photographs indicate that five hill prairies within Pere Marquette State Park have been reduced in size by 61.9 percent due to woody plant invasion. This study confirms the reports of other investigators and indicates that many of the hill prairies in Illinois will disappear within the next 20 to 25 years unless prescribed burning is implemented.

INTRODUCTION

In Illinois, hill or bluff prairies are prominent features of the landscape along most of the major river systems. Although these hill prairies were often large and conspicuous, they were not mentioned in the early scientific literature, or mapped by the Government Land Office Surveyors during the 1820's and 1830's. Worthen, a geologist with the Illinois Geological Survey, was the first to describe these grass-covered bluffs (Worthen 1868). Since the initial description by Worthen, numerous authors have studied the hill prairies in various geographic regions of the state, but the publication of Evers (1955), who studied hill prairies of the Illinois and Mississippi Rivers and compiled annotated listings of their vegetation, is the most comprehensive paper on the hill prairies in Illinois.

In Jersey County, Illinois, loess hill prairies are prominent on many of the south-facing ridges along the Illinois and Mississippi Rivers. Although hill prairies were mentioned by Hamilton (1919), the first scientific studies of these prairies were not completed until the 1960's (Kilburn and Ford 1963, Kilburn and Warren 1963, Bland and Kilburn 1966, Ranft and Kilburn 1969). These studies provided considerable information on the soils, vegetation, and environment of the hill prairies near Elsah in Jersey County. Their research also indicated that many of the hill prairies were being invaded by woody vegetation.

For many years, ecologists have observed the gradual deterioration of hill prairies due to woody plant invasion. This phenomenon has been described by Kilburn and Warren (1963), Reeves, Zimmerman and Ebinger (1978), and Ebinger (1981), but no data are available on the extent of the invasion or the amount of time required for a hill prairie to be overgrown with woody plants. Consequently, a study was initiated to determine the extent of woody invasion on five hill prairie remnants within Pere Marquette State Park using 1937 and 1974 aerial photography.

DESCRIPTION OF THE STUDY AREA

The five hill prairies that were studied are located in Township 6N, Range 13W, Sections 9 and 10, Brussels Quadrangle, U.S.G.S. 7.5 minute series. This portion of the park lies within the Driftless Section of the Middle Mississippi Border Division (Schwegman 1973). This geographic region is characterized by steep topography and numerous outcrops of dolomite, limestone, and shale, particularly within Pere Marquette State Park. The most widespread and exposed geologic formation in the area is the Pleistocene loess which forms a thick mantle which varies in

The soil of the hill prairies is Hamburg silt which is essentially unaltered loess (Fehrenbacher and Downey 1966). This soil is limey throughout and grass-covered rather than forested like most of the soils within Pere Marquette State Park. The upper horizon of these soils is very friable and grayish-brown to brown in color (Fehrenbacher and Downey 1966).

With the exception of the hill prairies, the ravines and ridges within Pere Marquette State Park are forested. An examination of the Government Land Office Survey Records indicates that the area was forested during presettlement times. Since the time of settlement in the 1820's and 1830's, the forests have been used as a source of lumber and fuel.

Due to its exceptional scenic features and the interests of local citizens, land was purchased in 1932 for the purposes of establishing a state park. Fire was excluded from the park until 1973 when it was introduced by Department of Conservation personnel in their prairie management program.

METHODS

The peripheries of five hill prairies within Pere Marquette State Park were defined on 1937 (Scale = 1: 19,385) and 1974 (Scale = 1: 24,375) black and white aerial photographs. The peripheries as defined on these photographs were measured to the nearest one-hundreth of an acre using a Lasico Series 40 Electronic Planimeter. The results were tabulated and comparisons were made with the 1937 and 1974 data to determine the extent of woody invasion.

RESULTS AND DISCUSSION

Comparisons of the 1937 and 1974 acreages for the five hill prairies indicate that they have been greatly reduced in size due to woody plant invasion (Table 1). With the exception of the First Lookout Prairie, all others show a reduction in size with the prairie at Twin Mounds most reduced (Table 1). When the totals of all five prairies are combined, the figures indicate that the prairies have been reduced in size by 61.9 percent in the 37 year period from 1937 to 1974.

The primary invaders on these prairies are gray dogwood (*Cornus drummondii*), smooth sumac (*Rhus glabra*), and flowering dogwood (*Cornus florida*). Despite the more xeric nature of the prairie as compared to the forest, woody plants easily establish themselves (Reeves, Zimmerman and Ebinger 1978).

Ebinger (1981) in the study of glacial drift hill prairies in east central Illinois, regarded the prairies as "transient communities" that are "commonly completely overgrown with woody vegetation". Kilburn and Warren (1963) concluded that hill prairies, in the absence of fire, will be permanently converted to forest. This study of hill prairie remnants within Pere Marquette State Park supports these conclusions and indicates that the entire acreages of small hill prairies or significant portions of large hill prairies can be permanently converted to forest in 35 years or less. The rate of decline of the prairies is dependent upon slope, soil moisture and size of the prairie. Under present climatic conditions and without the use of prescription burning, it seems likely that a great majority of the hill prairies in Illinois will be lost to woody invasion within the next 20 to 25 years unless vigorous management plans are devised and implemented.

ACKNOWLEDGEMENTS

Special appreciation is extended to Dr. Peter J. Roberts for determining the acreages of the hill prairies on the 1937 and 1974 aerial photographs.

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Table 1. A comparison of 1937 and 1974 acreages for five hill prairies within Pere Marquette State Park.

	Size In Acres	
Name of Prairie	1937	1974
Goat Cliff	2.00	1.00
McAdams Peak	2.51	0.90
Twin Mounds	14.00	2.42
Twin Shelters	5.00	3.46
First Lookout	1.50	2.00
Totals	25.01	9.78