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**THE OCCURRENCE AND DISTRIBUTION OF  
PRAIRIE-ASSOCIATED PLANTS AND  
REMNANT PRAIRIE COMMUNITIES  
IN THE NORTHERN KETTLE MORAINÉ STATE FOREST**

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ABSTRACT

This paper summarizes findings on the occurrence and distribution of native prairie grasses and forbs on non-forested sites in the Kettle Moraine State Forest - Northern Unit (KMSF).

Twelve remnant prairie communities were located. These twelve sites included a total of 5 prairie grasses and 46 forb species.

INTRODUCTION

Prairies in Wisconsin occur primarily south of Curtis' (1959) tension zone. This tension zone approximates the boundary between the prairie-forest floristic province to the southwest and the northern hardwoods province to the northeast. The KMSF is located in this tension zone where the presettlement vegetation oak and prairie floral elements were smaller and more scattered than farther south and west. Northern plant communities are also found within the KMSF. The KMSF is located very near the northeasterly extent of the original prairie range in Wisconsin (Finley 1976).

The area of the original prairies has shown a tremendous decline in recent history. From an estimated two million acres of open prairie in presettlement times, Wisconsin today has little more than 2,000 acres remaining (Department of Natural Resources 1983). From the early land surveys, Fond du Lac County was known to support approximately 25,000 acres of open prairie and another 110,000 acres of savannah (Finley 1976). Today, because of the agricultural suitability of the prairie soils and expanding land development projects, there are probably less than ten acres remaining in the entire county (Volkert, unpublished). Because of the prevention of disruptive land uses within the state forest, the KMSF harbors the largest remaining tracts of native prairie vegetation in Fond du Lac County. This survey is restricted to the KMSF, which occupies parts of Fond du Lac, Washington and Sheboygan Counties.

METHODS

The KMSF covers nearly 30,000 acres. Casual surveys of the area were conducted from 1976 to 1980. From 1980 to the summer of 1983 a systematic approach

was used to survey the prairie flora of the KMSF. Using topographic and vegetation maps, nonforested areas that fell within the boundaries of the presettlement range of prairie were surveyed as well as surrounding nonforested sites. Presettlement prairie areas were determined using original government land surveys.

Field studies were conducted during the summer and fall from 1980 to 1983 when the prairie flora was in bloom. All area roads were traveled to survey the surrounding countryside. All KMSF recreational trails (over 125 miles) were hiked and large power transmission lines within the KMSF were followed. In addition, nonforested areas were traveled cross country as were fire lanes and other limited access areas.

#### RESULTS AND DISCUSSION

A fair variety of prairie-associated plants and 12 remnant communities was found distributed throughout the state forest. These remnants appear to represent the majority of the only remaining prairie vegetation in all of Fond du Lac County (two stretches of roadside right-of-way outside of the forest, a small area at Eldorado Marsh, and the Ripon Prairie Scientific Area contain the only other significant stands of prairie vegetation known for the county). Detailed locations and site descriptions of the remnant prairie areas are given in Table 1. Remnant areas are mapped in Figure 1.

Prairie areas are often characterized by their grass species. Five prairie grasses were found in the KMSF. These are:

Big Bluestem (Andropogon gerardi) - uncommon throughout the forest. Found on eight remnant sites, where its distribution is limited in area. It appears as an abundant grass only on two of these sites. It also is present on roadsides along Kettle Moraine Scenic Drive and County Highway "A", north of Highway 67.

Little Bluestem (Andropogon scoparius) - uncommon throughout the forest. Found on eight remnant sites. It appears to be more aggressive and persistent than Big Bluestem. It is also found in other areas in the state forest, but is nowhere very common outside of the remnant community sites.

Sideoats Grama (Bouteloua curtipendula) - uncommon; appears to be entirely restricted to five remnant sites. On none of these sites does it appear to be widespread, and is abundant in only one area. Its short, sparse growth does make it difficult to detect and, therefore, there is some chance that it is growing unnoticed in other areas of the KMSF.

Switchgrass (Panicum virgatum) - rare; found only on the New Fane site. Other introduced varieties have been planted for use as dense nesting cover; however, this local genotype should be protected.

Indiangrass (Sorghastrum nutans) - rare; found only on the Mud Lake and Bear Lake peninsula sites. No other signs of this grass have been observed in the forest.

Table 1. Locations and descriptions of remnant prairie sites in the Northern Kettle Moraine State Forest. Sites are ordered from south to north and site numbers are the same as those used in Figure 1.

Site No.

- 1 Kewaskum site.  
Washington Co. T12N R19E sec. 11, north of Hwy. 28, ½ mile on glacial trail. Dry-mesic site on thin morainic soils. Approximate size 60' x 80'. Shows signs of invasion by sumac.
- 2 New Fane site.  
Fond du Lac Co. T13N R19E sec. 26, east of New Fane on glacial trail, north of Co. Hwy. DD. Dry prairie on morainic slope. Approximate size ½ acre. Shows little potential invasion due to thin soils and topography.
- 3 Mud Lake site.  
Fond du Lac Co. T13N R19E sec. 12, south of Co. Hwy. SS on dry slope overlooking Little Mud Lake. Wet-mesic prairie plants are found along lake shore. Approximate size 150' x 100'. Shows signs of invasion by sumac.
- 4 Dundee Mountain site.  
Fond du Lac Co. T14N R19E sec. 25, on southwest side of kame near the top. Approximate size 60' x 80'. Invasion by brush threatens all but the steepest slope. Many prairie species are to be found beneath the encroaching shrubs.
- 5 Parnell Tower site.  
Sheboygan Co. T14N R20E sec. 10, south of Parnell tower parking lot. Approximate size 120' x 150'. Invasion by brambles and brush is noteworthy. This is a dry-mesic site on morainic soils.
- 6 Greenbush site.  
Sheboygan Co. T15N R20E sec. 28, ¼ mile southwest of the Greenbush kettle on south-facing morainic slope. Approximate size 1½ acres. This site remains as the finest example of prairie in the Kettle Moraine State Forest.
- 7 Greenbush West site.  
T15N R20E sec. 28, about 150 yards west of the previously listed site. It is also located on a south-facing morainic slope, but is less diverse in species composition. Approximate size ½ acre. This site consists mostly of dense stands of bluestem grasses. An oldfield area between these two sites shows establishment of several prairie species and could help expand the locally occurring prairie community through proper management.

Table 1 contd.

Site No.

- 8 Greenbush Kettle site.  
Sheboygan Co. T15N R20E sec. 28, a small area found at the Greenbush Kettle geological site, at the upper rim along the nearby roadside. Approximate size 35' x 85'.
- 9 Greenbush Power lines site.  
T15N R21E sec. 28, adjacent to the glacial hiking trail west of trail shelter #5. Found on morainic slope of the Green Bay moraine. A small dense stand of big bluestem remains next to an old fenceline with a variety of forbs expanding out into an oldfield area. Approximate size 100' x 250'.
- 10 Greenbush Bridle Trail site.  
Sheboygan Co. T15N R20E sec. 28, west of Kettle Moraine Scenic Drive  $\frac{1}{2}$  mile where the high tension lines cross the bridle trail. Approximate size; scattered throughout a  $\frac{1}{2}$  acre with interspersed oldfield.
- 11 Bear Lake Peninsula site.  
Sheboygan Co. T15N R20E sec. 32, north peninsula of kettle lake east of Bear Lake Marsh. Dry prairie grading into wet-mesic along the shore. Approximate size 60' x 230'. Aspen, sumac and other brush is encroaching on this site from the north. A good deal of prairie vegetation is to be found in the understory of the surrounding woods. This site contains the most diverse collection of prairie species of any remnant site in the Northern Kettle Moraine State Forest.
- 12 Sheboygan Co. Power lines site.  
Sheboygan Co. T15N R20E sec. 36, on Co. Hwy. S, south of Hwy. 67 on west side of road along the high tension power lines. Dry-mesic prairie becoming wet-mesic at the bottom of the slope. Approximate size 80' x 150'. This site also is not located within the state forest, but is near to the presettlement range and significant in its plant diversity in an area with such few remnants. This site is being heavily invaded by the surrounding brush.

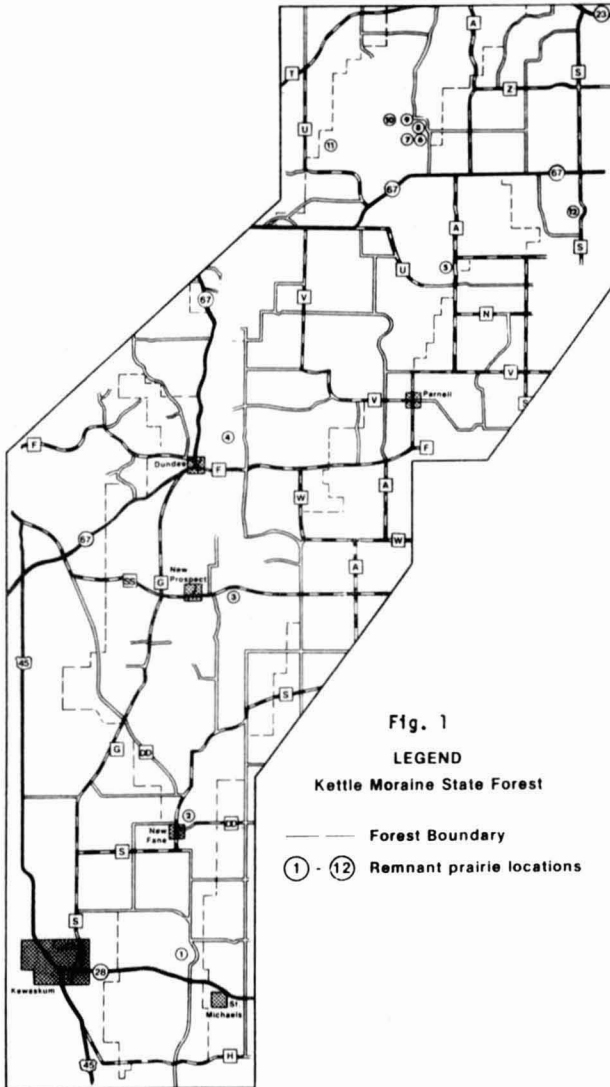


Fig. 1

LEGEND

Kettle Moraine State Forest

— Forest Boundary

① - ⑫ Remnant prairie locations

Table 2. Prairie species found on 12 remnant prairie sites in the Northern Kettle Moraine State Forest. Symbols: A, abundant; C, common; U, uncommon; P, present.

	Kewaskum	New Fane	Mud Lake	Dundee Mountain	Parnell Tower	Greenbush	Greenbush West	Greenbush Kettle	Greenbush Power lines	Greenbush Bridle Trail	Bear Lake Peninsula	Sheboygan Co. Power lines
<u>Grasses</u>												
<u>Andropogon gerardi</u> Big Bluestem.....	C		C	C	A	A	U		C	C		U
<u>Andropogon scoparius</u> Little Bluestem.....			C	C		A	A	A			A	C
<u>Bouteloua curtipendula</u> Sideoats Grama.....				P		A	C	U			C	
<u>Panicum virgatum</u> Switchgrass.....		A										
<u>Sorghastrum nutans</u> Indiangrass.....			U								U	
<u>Forbs</u>												
<u>Amorpha canescens</u> Leadplant.....											U	
<u>Anemone cylindrica</u> Thimbleweed.....			C	U		U	U		U	U	U	U
<u>Antennaria neglecta</u> Pussy Toes.....			U						U			
<u>Asclepias incarnata</u> Swamp Milkweed.....											U	
<u>Asclepias syriaca</u> Common Milkweed.....	U		C	C		U			P	U	U	
<u>Asclepias tuberosa</u> Butterfly Weed.....									P			
<u>Asclepias verticillata</u> Whorled Milkweed.....	U	C	C	A		A	U	U	U	U	C	U
<u>Aster ericoides</u> Heath Aster.....		U		U		C	C					
<u>Aster laevis</u> Smooth Aster.....			U	P	C	C	P	U	C		C	
<u>Aster lateriflorus</u> Calico Aster.....				C		U						U
<u>Aster sagittifolius</u> Arrow Aster.....	U	U		U	C	C					C	C
<u>Aster sericeus</u> Silky Aster.....	P	U				U						
<u>Bidens cernua</u> Beggarstick.....			C									
<u>Campanula rotundifolia</u> s Harebell.....	C	C		C		C						
<u>Ceanothus americanus</u> New Jersey Tea.....					A							
<u>Desmodium canadense</u> Canada Tick Clover.....				U	P					U	P	U
<u>Equisetum</u> sp. Horsetail.....				U				U				
<u>Eupatorium perfoliatum</u> Boneset.....			C								U	
<u>Euphorbia corollata</u> Flowering Spurge.....	C	A				C		C	U	U	C	A

<u>Gnaphalium obtusifolium</u> Sweet Everlasting.....														U	
<u>Helianthus grosseserratus</u> Saw-tooth Sunflower.....															C
<u>Iris shrevei</u> Wild Iris.....			U											U	
<u>Lespedeza capitata</u> Roundhead Bush.....	C		A	C											
<u>Lithospermum canescens</u> Hoary Puccoon.....			U											U	
<u>Lobelia siphilitica</u> Great Blue Lobelia.....			U												
<u>Lycopus uniflorus</u> Water Horehound.....			P												
<u>Monarda fistulosa</u> Bergamot.....	A	U	C	A	U	U	U	U	U	U	C	U	C	C	A
<u>Oenothera biennis</u> Evening Primrose.....	P		U	U	U	U	U	U				U	U	U	
<u>Petalostemum purpureum</u> Purple Prairie Clover.....			A			C	A	C		P		C	C		
<u>Phlox pilosa</u> Downy Phlox.....									P						
<u>Potentilla arguta</u> Tall Cinquefoil.....				P		U									
<u>Pycnanthemum virginianum</u> Mountain Mint.....														A	
<u>Ratibida pinnata</u> Prairie Coneflower.....	C	C													A
<u>Rosa carolina</u> Wild Rose.....				P	A									U	
<u>Rudbeckia hirta</u> Black-eyed Susan.....	C		C	U	U	U	U					C	U	U	A
<u>Silphium terebinthinaceum</u> Prairie Dock.....						U	C								
<u>Solidago graminifolia</u> Grass-leaved Goldenrod.....						U	U	U						C	
<u>Solidago missouriensis</u> Missouri Goldenrod.....						U	U	C						U	P
<u>Solidago nemoralis</u> Dyer's Weed.....	A	A	A	C	C	A	A	C	A					A	C
<u>Solidago rigida</u> Rigid Goldenrod.....						U	U					U			
<u>Solidago speciosa</u> Showy Goldenrod.....			P		A										A
<u>Teucrium canadense</u> Germander.....														U	
<u>Verbena stricta</u> Hoary Vervain.....	P														
<u>Verbena simplex</u> Narrow-leaved Vervain.....			U												
<u>Veronicastrum virginicum</u> Culver's Root.....														U	
<u>Vicia sp.</u> Vetch.....					C										



Forty-six species of prairie forbs were found in remnant prairies in the KMSF. These species are listed in Table 2 and the sites in which each occurs are indicated. In addition to those species occurring in the remnant prairie sites, many prairie associated forbs occur outside of the remnant stands. Those prairie species occurring in the KMSF but not found in any of the discrete, concentrated prairie communities are listed in Table 3.

Table 3. Prairie associated forbs found only outside of the remnant prairie stands of the Northern Kettle Moraine State Forest.

<u>Aster novae-angliae</u>	New England Aster	Common
<u>Aster puniceus</u>	Red-stem Aster	Common
<u>Coreopsis palmata</u>	Coreopsis	Present
<u>Dodecatheon meadia</u>	Shooting Star	Present
<u>Eupatorium maculatum</u>	Joe-pye Weed	Common
<u>Gentiana andrewsii</u>	Bottle Gentian	Uncommon
<u>Gentiana flavida</u>	Cream Gentian	Present
<u>Helopsis helianthoides</u>	Oxeye Sunflower	Present
<u>Lilium superbum</u>	Turk's Cap Lily	Present
<u>Lobelia kalmii</u>	Brook Lobelia	Present
<u>Pedicularis lanceolata</u>	Lousewort	Uncommon
<u>Thalictrum dasycarpum</u>	Tall Meadowrue	Uncommon
<u>Verbena hastata</u>	Blue Vervain	Uncommon

No true wet-mesic or wet prairies were found in the KMSF. The associated grasses of this community, Bluejoint Grass (Calamagrostis canadensis) and Prairie Cordgrass (Spartina pectinata) apparently do not occur in this area. The forb species associated with wet prairie communities are found in association with the locally occurring wetland communities, dominated by the sedges.

Across the state, and throughout the entire range of the original prairies, only small remnants of the original vegetation remain today. Many factors have worked to restrict the distribution of prairies. Some of the apparent factors which have influenced the decline of the prairies in the KMSF are:

1) Agricultural land uses have certainly been the major reason for the tremendous decline of our prairie vegetation. Because of the deep, rich prairie soils, most have been converted to cropland. In the midst of the presettlement prairie range of the KMSF, there stand today the South Prairie Farm and the Prairie View Farm. However, all of the surrounding land is farmed and no prairie remnants are to be found nearby.

2) Fire suppression and the resultant elimination of wild fires and lack of controlled burns have allowed the woodland vegetation to encroach on areas not otherwise kept open by agricultural practices. From the original land surveys,

this area contained some large tracts of savannah or oak openings. When the wild fires ceased, these areas slowly grew up into oak forest, which today surrounds most of the farmlands in the KMSF.

3) The state program for establishing large tracts of pine plantations has further reduced the opportunity for prairie vegetation to re-establish itself throughout its original range in the KMSF. When farmlands were taken out of production and incorporated into the state forest, many old fields were planted in Red Pine (*Pinus resinosa*) and White Pine (*Pinus strobus*) stands. Two of the remnant sites border large pine stands which certainly suppress the re-establishment or expansion of the prairie community.

#### SUMMARY

The 12 stands of prairie vegetation described in this paper encompass the majority of what remains of a once vast community in the area of the Northern Kettle Moraine State Forest. The original range of the prairies has been severely diminished and today is very scattered and fragmented. These sites are sparse in composition and diversity and represent only the dry-mesic prairies. Taken together, however, the total list of prairie species in the state forest is quite large. If it were not for the protection afforded by the state forest, the prairies of Fond du Lac County and other surrounding counties might well have all disappeared. The reintroduction of prairie grasses and forbs into this area is noteworthy and commendable, but it will not fully replace the existing prairies. These remaining stands need to be managed for their local eco-types and should be considered as an important and integral part of the state forest ecosystem.

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