

Vascular Plants of Barker Woods Nature Preserve, LaPorte County, Indiana

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Barker Woods Nature Preserve, the generous gift of Miss Margery Barker and her mother to the Indiana Chapter of The Nature Conservancy in December 1974, lies within the rapidly developing southeastern edge of Michigan City, Indiana (SW1/4, NE1/4, Sec. 4, T 37 N, R 4 W, Michigan City West, U.S.G.S. 7.5' Quadrangle). The 12 ha preserve is bounded on two sides by roads and housing developments. The north boundary has some development at the northwest and the northeast corners while the eastern boundary is undeveloped forest land similar to the preserve.

The preserve is located on the Calumet Lacustrine Plain about 4 km from Lake Michigan. The plain formed during the latter part of the Pleistocene Epoch when meltwaters of the retreating Lake Michigan lobe of the Wisconsin ice sheet formed a huge lake (Lake Chicago) behind the Valparaiso Moraine. Lake Chicago initially stabilized at an elevation of 195 m above sea level (Glenwood Stage) which corresponds to the elevation at the base the dune like ridge along the southern boundary of the preserve. Later as the outlet channel eroded, the lake level decreased and finally stabilized at 189 m above sea level approximately two km north of the preserve. The major topographic features and surface materials were formed and deposited during this interval.

A majority of the soils of the preserve are poorly drained except the well drained Oakville fine sands on the dune ridge along the southern border and the moderately well drained Brems fine sands of a lower parallel ridge in the northern third. Along the northern edge is a strip of the poorly drained Newton loamy fine sands while the large central lowland is a complex of the Saugatuck and Pipestone series. These two soil types are unique to LaPorte County in Indiana. All of the soils are medium to strongly acid and highly permeable in the upper layers except Saugatuck soils which have an iron cemented layer within 60 cm of the surface (3).

The early land surveyors described the area as swampy along the western, southern and eastern boundaries of section four and the northern boundary as mostly wet and level. The northwest corner of the section was marked by a mound in prairie but all other boundary locations were marked by witness trees that included beech, black ash, elm, hickory, maple, pepperage, pine, popular and white oak. At the time of settlement, the poorly drained soils of the preserve were seasonally ponded. During the early years of settlement, the surface drainage systems were expanded through ditching and a network of shallow ditches still exists in the preserve. Seasonal ponding has rarely occurred during the last ten years.

The preserve area was purchased in 1833 and title transferred several times before the land was purchased by Mr. Norton Barker in 1902. The records available recorded little of the disturbance history except that some of the land was probably cleared and farmed between 1866 and 1902. Shortly after they purchased the land, the Barkers built a house and outbuildings on approximately two ha along the southern boundary (now owned by the National Audubon Society). State Forester, Charles Deam, visited

the property on July 24, 1928 to determine the land's suitability for Classified Forest designation. He described the forest as white, black and red oaks, sugar maple, hickory and elm with some basswood, beech, aspen, sassafras and yellow birch. Based on his recommendations the Barkers planted about two ha to spruce, white and red pine (Dr. LaTourette Stockwell, personal communication). With the exception of one or two fires, the forest has received little disturbance since the 1930s.

Methods

Data collection on the flora of the preserve was initiated in 1979 with periodic visits to the preserve and the recording of species present in various locations. Later, north-south compass traverses were made at approximately 30 pace intervals. Also, a few east-west traverses were made at 50 pace intervals. As each new species was encountered, the associated species were recorded as well as comments on its relative abundance. Additional notes were made while laying out permanent plots and during the mapping of the endangered and threatened species by Reed (6). Voucher specimens have been collected for the Graminae and Cyperaceae and a few other species.

Results and Discussion

An alphabetical list of the species recorded for the preserve is presented in Table 1. The 161 species represent 110 genera and 46 families based on family classification by Gleason and Cronquist (4). Twenty-three families are represented by only one species. Eleven species are considered alien to Northern Indiana. The top five families include: Cyperaceae with 15 species, Compositae with 12 species, Rosaceae with 11 species, Ericaceae with 10 species and Graminae with 9 species. Members of the Ericaceae more than any other family are responsible for giving a northern aspect to the shrub and herb levels of the preserve.

Swink and Wilhelm (7) have assigned to each taxon in the Chicago region a numerical value that “. . . expresses a taxon's relative autecological value with respect to all other taxa in the flora.” For native taxa, the values range from 0 for taxa that are nearly ubiquitous under a broad set of synecological conditions to 10 for plants that typify stable or near climax conditions and exhibit relatively high degrees of fidelity to a narrow range of synecological conditions. Plants rare to the Chicago area were given a value of 15 and plants threatened or endangered in the region were assigned a value of 20. Introduced taxa were given ratings from -3 to 2 with the lower rating given those that detract from our landscape.

The rating column in Table 1 provides the Swink and Wilhelm value for each of the taxa listed in their book. The average value for all taxa is 7.1 and 18% (27 taxa) have values of 15 or 20. A frequency plot of the number of species versus rating values results in a bimodal distribution with peaks at values of 5 and 15. Along with their rating system they present a formula for a natural area index. The index value is obtained by multiplying the average taxon rating by the square root of number of taxa. A rating of 50 or better is considered a high quality natural area. The index value for Barker Woods is 90.8 which indicates the quality of the flora and the value of the area as a nature preserve.

Eight of the species, *Betula papyrifera*, *Carex arctata*, *C. folliculata*, *C. interior*, *Epigaea repens*, *Melampyrum lineare*, *Pyrola rotundifolia* var. *americana* and *P. elliptica*, are either state threatened (ST) or state endangered (SE) (1). The first two species are abundant in the preserve (Table 1). *Epigaea repens* and *Pyrola elliptica* are limited to a few individuals or colonies (6). *Carex interior* exists as single clump in the central lowland. Most of these populations are disjuncts with no other populations close enough to maintain gene flow with species distribution centers.

TABLE 1. Alphabetical list of vascular plants of Barker Woods Nature Preserve, LaPorte County, Indiana including relative abundance and numerical rating for Chicago region.

Species	Rating	Abundance
1. <i>Acer rubrum</i> L.	7	A
2. <i>Agrimonia gryposepala</i> Wallr.	2	C
3. <i>Agrostis scabra</i> Willd.	5	U
4. <i>Amelanchier arborea</i> (Michx. f.) Fern.	8	C
5. <i>Amphicarpa bracteata</i> (L.) Fern.	4	U
6. <i>Antennaria plantaginifolia</i> (L.) Hook	6	U
7. <i>Aquilegia canadensis</i> L.	5	R
8. <i>Aralia nudiculis</i> L.	8	A
9. <i>A. racemosa</i> L.	15	R
10. <i>Arisaema atrorubens</i> (Ait.) Blume	5	U
11. <i>Asclepias exaltata</i> L.	10	R
12. <i>Aster cordifolius</i> L.	5	C
13. <i>A. lateriflorus</i> (L.) Britt.	4	C
14. <i>A. macrophyllus</i> L.	10	U
15. <i>Athyrium filix-femina</i> (L.) Roth	6	U
16. <i>Berberis thunbergii</i> DC.	-2	C
17. <i>Betula lutea</i> Michx.f.	15	C
18. <i>B. papyrifera</i> Marsh	15 ST	C
19. <i>Boehmeria cylindrica</i> (L.) Sw.	2	C
20. <i>Botrychium dissectum</i> Spreng.	15	U
21. <i>Brachyelytrum erectum</i> (Schreb.) Beauv.	15	U
22. <i>Carex arctata</i> Boot.	15 SE	A
23. <i>C. crinita</i> Lam.	10	U
24. <i>C. cristatella</i> Britt.	4	U
25. <i>C. digitalis</i> Willd.	20	U
26. <i>C. festucacea</i> Schkuhr.	10	
27. <i>C. folliculata</i> L.	20 SE	R
28. <i>C. hirtifolia</i> Mackenz.	4	C
29. <i>C. interior</i> Bailey	10 SE	R
30. <i>C. intumescens</i> Rudge.	15	R
31. <i>C. laxiculmis</i> Schwein.	15	R
32. <i>C. laxiflora</i> var. <i>blanda</i> (Dewey) Bott.	1	U
33. <i>C. longii</i> Mackenz.	8	
34. <i>C. mesochorea</i> Mackenz.	10	
35. <i>C. pennsylvanica</i> Lam.	5	A
36. <i>C. swanii</i> (Fern.) Mackenz.	10	C
37. <i>Carya ovata</i> (Mill.) Koch	5	R
38. <i>Chelone glabra</i> L.	8	R
39. <i>Chimaphila maculata</i> (L.) Pursh.	20	R
40. <i>Cicuta maculata</i> L.	6	R
41. <i>Circaea quadrisulcata</i> (Maxim) French. & Sav. var. <i>canadensis</i> (L.) Hara	0	C
42. <i>Coptis groenlandica</i> (Oedar) Fern.	15	R
43. <i>Cornus florida</i> L.	10	C
44. <i>C. obliqua</i> Raf.	5	U
45. <i>C. racemosa</i> Lam.	1	U
46. <i>Corylus americana</i> Walt.	2	U
47. <i>Danthonia spicata</i> (L.) Beauv.	5	C
48. <i>Dentaria laciniata</i> Muhl.	5	R
49. <i>Desmodium nudiflorum</i> (L.) DC.	10	R
50. <i>D. paniculatum</i> (L.) DC.	5	R
51. <i>Dryopteris noveboracensis</i> (L.) Gray	15	U
52. <i>D. spinulosa</i> (O.F.Muell) Watt	6	C
53. <i>Epigaea repens</i> L.	15 ST	R
54. <i>Euonymus alatus</i> (Thunb.) Sieb.	0	U
55. <i>Euphorbia corollata</i> L.	2	U
56. <i>Fagus grandifolia</i> Ehrh.	10	R
57. <i>Fragaria virginiana</i> Duchesne	1	R
58. <i>Fraxinus americana</i> L.	5	U

TABLE 1.—Continued

Species	Rating	Abundance
59. <i>Galium aparine</i> L.	1	C
60. <i>G. pilosum</i> Ait.	10	U
61. <i>G. triflorum</i> Michx.	5	U
62. <i>Gaultheria procumbens</i> L.	10	C
63. <i>Gaylussacia baccata</i> (Wang.) K. Koch	9	U
64. <i>Geum canadense</i> Jacq.	0	U
65. <i>Glyceria striata</i> (Lam.) Hitchc.	4	U
66. <i>Goodyera pubescens</i> (Willd.) R. Br.	20	R
67. <i>Hamamelis virginiana</i> L.	8	A
68. <i>Helianthus divaricatus</i> L.	5	R
69. <i>Hieracium gronovii</i> L.	6	R
70. <i>H. scabrum</i> Michx.	7	R
71. <i>Hydrophyllum virginianum</i> L.	5	R
72. <i>Ilex verticillata</i> (L.) Gray	9	R
73. <i>Iris</i> sp.		R
74. <i>Lindera benzoin</i> (L.) Blume	7	C
75. <i>Liriodendron tulipifera</i> L.	10	U
76. <i>Lonicera japonica</i> Thunb.	-2	U
77. <i>L. tatarica</i> L.	-1	U
78. <i>Lycopodium lucidulum</i> Michx.	15	R
79. <i>Lycopus virginicus</i> L.	6	R
80. <i>Lysimachia ciliata</i> L.	4	R
81. <i>L. terrestris</i> L.	8	R
82. <i>Maianthemum canadense</i> Desf.	15	A
83. <i>Medeola virginiana</i> L.	10	C
84. <i>Melampyrum lineare</i> Desr.	15 ST	U
var. <i>pectinatum</i> (Pennell) Fern.		
85. <i>Mitchella repens</i> L.	15	C
86. <i>Monotropa hypopithys</i> L.	15	R
87. <i>M. uniflora</i> L.	15	U
88. <i>Morus alba</i> L.	-1	R
89. <i>Nyssa sylvatica</i> Marsh.	8	C
90. <i>Oenothera laciniata</i> Hill.	3	R
91. <i>Onoclea sensibilis</i> L.	8	U
92. <i>Osmorhiza claytoni</i> (Michx.) C.B. Clarke	3	U
93. <i>Osmunda cinnamomea</i> L.	6	U
94. <i>O. regalis</i> L.	8	U
95. <i>Oxalis europaea</i> Jord.	0	R
96. <i>Panicum dichotomum</i> L.	20	U
97. <i>P. lanuginosum</i> Ell.	3	U
var. <i>implicatum</i> (Scribn.) Fern.		
98. <i>P. latifolium</i> L.	7	C
99. <i>Parthenocissus quinquefolia</i> (L.) Planch	2	C
100. <i>Pedicularis canadensis</i> L.	10	R
101. <i>Penstemon digitalis</i> Nutt.	4	R
102. <i>Phytolacca americana</i> L.	2	U
103. <i>Pinus banksiana</i> Lamb.	20	U
104. <i>P. resinosa</i> Ait.	—	U
105. <i>P. strobus</i> L.	20	C
106. <i>P. sylvestris</i> L.	—	U
107. <i>Poa compressa</i> L.	0	U
108. <i>Podophyllum peltatum</i> L.	5	U
109. <i>Polygonatum pubescens</i> (Willd.) Pursh.	7	U
110. <i>Polygonum punctatum</i> Ell.	6	R
111. <i>Potentilla simplex</i> Michx.	4	U
112. <i>Prenanthes altissima</i> L.	10	U
113. <i>Prunella vulgaris</i> L. var. <i>lanceolata</i> (Bart.) Fern.	1	U
114. <i>Prunus serotina</i> Ehrh.	1	C
115. <i>P. virginiana</i> L.	1	U

TABLE 1.—Continued

Species	Rating	Abundance
116. <i>Pteridium aquilinum</i> (L.) Kuhn	5	C
117. <i>Pyrola rotundifolia</i> L. var. <i>americana</i> (Sweet) Fern.	15 ST	U
118. <i>P. elliptica</i> Nutt.	10 ST	R
119. <i>Pyrus melanocarpa</i> (Michx.) Willd	7	C
120. <i>Quercus alba</i> L.	4	A
121. <i>Q. bicolor</i> Willd.	8	R
122. <i>Q. palustris</i> Muench	8	A
123. <i>Q. rubra</i> L.	7	A
124. <i>Q. velutina</i> Lam.	6	C
125. <i>Ranunculus abortivus</i> L.	0	U
126. <i>Rhamnus frangula</i> L.	-3	U
127. <i>Rhus copallina</i> L. var. <i>latifolia</i> Engler	6	R
128. <i>R. glabra</i> L.	1	R
129. <i>R. radicans</i> L.	1	U
130. <i>Ribes cynosbati</i> L.	5	C
131. <i>Robinia pseudo-acacia</i> L.	-3	U
132. <i>Rubus allegheniensis</i> Porter	3	U
133. <i>Rubus hispidus</i> L. var. <i>obovalis</i> (Michx.) Fern.	9	A
134. <i>Rumex obtusifolius</i> L.	0	R
135. <i>Sambucus canadensis</i> L.	1	U
136. <i>Sassafras albidum</i> (Nutt.) Nees	6	A
137. <i>Scutellaria lateriflora</i> L.	5	R
138. <i>Smilacina racemosa</i> (L.) Desf.	2	C
139. <i>Smilax rotundifolia</i> L.	15	A
140. <i>Solanum dulcamara</i> L.	-3	U
141. <i>Solidago caesia</i> L.	7	C
142. <i>S. juncea</i> Ait.	5	R
143. <i>S. nemoralis</i> Ait	4	R
144. <i>S. rugosa</i> Ait.	6	C
145. <i>Spiraea tomentosa</i> L. var. <i>rosea</i> (Raf.) Fern.	9	R
146. <i>Symplocarpus foetidus</i> (L.) Nutt.	6	U
147. <i>Tradescantia ohioensis</i> Raf.	2	R
148. <i>Trientalis borealis</i> Raf.	15	C
149. <i>Triodia flava</i> (L.) Smyth	2	R
150. <i>Ulmus rubra</i> Muhl.	4	U
151. <i>Vaccinium angustifolium</i> Ait. var. <i>laevifolium</i> House.	5	C
152. <i>V. corymbosum</i> L.	8	A
153. <i>Verbascum thapsus</i> L.	1	U
154. <i>Viburnum acerifolium</i> L.	9	A
155. <i>V. recognitum</i> Fern.	10	U
156. <i>Viola pallens</i> (Banks) Brainerd	15	R
157. <i>V. papilionacea</i> Pursh.	0	U
158. <i>V. sagittata</i> Ait.	7	R
159. <i>V. sororia</i> Willd.	3	U
160. <i>Vitis aestivalis</i> Michx.	10	U
161. <i>Woodwardia virginica</i> (L.) Sm.	15	R

1. Species nomenclature is based on Fernald (2). Rating is based on values given by Swink and Wilhelm (7). A dash indicates no value given for that species. The state endangered and threatened species are identified by SE and ST adjacent to rating value. Abundance values are the subjective estimates of the two authors. Letters indicate relative abundance as follows: A—species abundant throughout the preserve, C—species is common in most of the preserve, U—species is limited in its distribution and/or abundance, R—species is found in only one small area of preserve or restricted to a few individuals.

One curious note is the relatively recent appearance of *Chimaphila maculata* in the flora. During many visits to the preserve, we normally travel a loop path that probably served as fire access road during the 1967 fire. On the north loop of this trail there presently exists five plants of this species which was first recorded in 1983 as two plants present. Since this species is considered rare in the Chicago area (7), the possible migration to and establishment in a new area gives hope for its continued survival in the regional flora.

A majority of the alien species are limited to disturbed areas on the perimeter of the preserve. However, three species (*Lonicera japonica*, *L. tatarica* and *Euonymus alatus*) appear to be increasing numbers and distribution within the preserve and should be monitored to determine their impact on native taxa.

Conclusion

Barker Woods has proven to be an excellent addition to the State Nature Preserve System and exemplifies how much present and future Hoosier generations owe a debt of gratitude to those who protected remnants of our natural heritage.

The preserve protects eight state threatened and endangered species and many other species considered rare in the Chicago Region. In addition, one of the soil mapping units is uncommon in the state and much of the mapping unit is threatened by urbanization. The unique combination of plants, soils and lake affected climate provides an excellent opportunity for gaining a better understanding of our Indiana flora.

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