

Vascular Plants of Bendix Woods Nature Preserve St. Joseph County, Indiana

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A floristic inventory of the Bendix Woods Nature Preserve was undertaken by the authors as part of a larger study (3). The study began in March 1981. The natural area, 4.8 km south of New Carlisle, Indiana, is located in the east one-half of the south portion of Bendix Woods County Park, Section 11, Township 37 North, Range 1 West, Lydic Quadrangle. The Preserve and surrounding area are part of the kame facies of the Largo Formation of the Wisconsinan Glacial period. The soils are of the Hillsdale type, well drained, sandy loam, level to strongly sloping (5). The original vegetation was mixed hardwoods.

A 12.2 ha natural area in the Park was identified by Lindsey et al. (2) as a unique, old growth, hardwood forest. Subsequently, 10.9 ha was dedicated as a State Nature Preserve in 1971, owned and administrated by the St. Joseph County Parks and Recreation Department. The Preserve and peripheral environs has been protected since 1926.

Methods

During the growing seasons of 1981 and 1982 the authors divided the Preserve into 50 m X 50 m, quarter hectare quadrats. All woody species greater than 4 cm dbh were recorded for each quadrat (3). Sedges, grasses, ferns and herbs in flower were also recorded.

Additionally, 100 random circular ($r=60$ cm) herbaceous study plots were established. The plots were surveyed either in the spring or fall, or in both seasons of 1981 and 1982. All taxa less than 1 meter in height were recorded.

Species were also noted and, if in flower, collected whenever the authors hiked the Preserve's trails. Information recorded included canopy condition (open or closed), associated species, and location relative to a corner of a quadrat or herbaceous plot.

Results and Discussion

To date, 119 species, representing 90 genera, have been identified in the Preserve. Of this total 6 taxa are ferns and fern allies, 11 grasses and sedges, 59 species of flowering herbs, 14 shrub and woody vine taxa, and 29 tree species. Native taxa number 114; 5 are introduced (4).

To properly evaluate the quality of natural areas within the 22 county Chicago Region, Swink and Wilhelm (4) have developed an Evaluation Checklist and a Rating Index. Taxa found in the Region have been assigned numerical values—ratings—based upon the taxon's frequency and faithfulness to various synecological parameters. The 0 rating implies that a species grows under a variety of conditions; they are omnipresent. A 5 rating means the taxon is less common and typical of more advanced seral stages. A 10 rating is assigned to those taxa associated with near-climax conditions and a restricted set of synecological parameters. Taxa that are quite rare or endangered in the Region are assigned values of 15 and 20 respectively.

To determine an area's natural quality, a Rating Index is calculated. The Rating Index is determined mathematically using the following formula: $I = R/\sqrt{N}$, where I =Rating Index, R =the sum of the numerical ratings for all native taxa recorded for the area, and N =the number of recorded taxa (4). In the Chicago Region, Swink and Wilhelm (4) considered areas with an Index of 50 or higher as "extremely rare". The Index for the Bendix Woods Nature Preserve is 69.45, using $R = 739$ and $N = 113$ (native species).

According to the Evaluation Checklist of Swink and Wilhelm (4), seventeen species found in Bendix Woods are rated as endangered or rare. The endangered species are (follows the nomenclature of Swink and Wilhelm) *Aplectrum hymale*, *Dentaria diphylla* and *Hydrophyllum canadense*. In Bendix Woods, *D. diphylla* is thriving in several locations and *H. canadense* is abundant.

The 14 taxa classified as being rare are: *Asimina triloba*, *Athyrium pycnocarpon*, *A. thelypteroides*, *Carex careyana*, *C. hitchcockiana*, *C. plantaginea*, *Dryopteris goldiana*, *Monotropa uniflora*, *Morus rubra*, *Orchis spectabilis*, *Panax quinquefolis*, *Sanicula trifoliata*, *Stylophorum diphyllum* and *Viola canadensis*.

Rated as 10—taxon indicative of an advanced seral to climax stage and of a narrow range of ecological conditions—are 9 taxa. Included in this group are *Carex albursina*, *Fagus grandifolia*, *Geranium robertianum* and *Sambucus pubens*.

Carpinus caroliniana, *Cornus alternifolia*, *Floerkea proserpinacoides*, *Gymnocladus dioica*, *Hydrophyllum apendiculatum*, and *Juglans cinerea* are some of the 19 species rated as 8 or 9. Another 38 taxa are rated as 5, 6 or 7. A complete list of species is presented in Table 1. However, we are continuing our studies of Bendix Woods Nature Preserve. Individuals may write the authors for a current list.

Two taxa are on the "Preliminary List of Endangered and Threatened Vascular Plants in Indiana" (1): *Geranium robertianum*, endangered, and *Dentaria diphylla*, threatened.

Actaea pachypoda, *Athyrium pycnocarpon*, *Dentaria diphylla*, and *Dryopteris goldiana* are new species records for St Joseph County. Voucher specimens have been collected and will be deposited in the Indiana University Deam Herbarium.

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TABLE 1. *Vascular Plants of Bendix Woods Nature Preserve*

1. *Acer nigrum* Michx.f.
2. *Acer saccharum* Marsh.
3. *Actaea pachypoda* Ell.
4. *Ailanthus altissima* (Mill.) Swingle
5. *Allium tricoccum* Ait.
6. *Amphicarpa bracteata* (L.) Fern.
7. *Aplectrum hyemale* (Muhl.) Torr.
8. *Arisaema atrorubens* (Ait.) Blume.
9. *Asarum canadense* L.
10. *Asimina triloba* (L.) Dunal.
11. *Aster lowrieanus* Porter
12. *Athyrium pycnocarpon* (Spreng.) Tidestr.
13. *Athyrium thelypteroides* (Michx.) Desv.
14. *Berberis thunbergi* DC.
15. *Botrychium virginianum* (L.) Sw.
16. *Campanula americana* L.
17. *Carex albursina* Sheldon.
18. *Carex careyana* Torr.
19. *Carex hirtifolia* Mackenz.
20. *Carex hitchcockiana* Dew.
21. *Carex jamesii* Lam.
22. *Carex laxiflora* Lam.
23. *Carex plantaginea* Lam.
24. *Carex sparganoides* Muhl.
25. *Carpinus caroliniana* Willd.
26. *Carya cordiformis* (Wang.) K. Koch.
27. *Caulophyllum thalictroides* (L.) Michx.
28. *Celtis occidentalis* L.
29. *Circaea quadrisulcata* (Maxim.) French & Sav.
30. *Claytonia virginica* L.
31. *Cornus alternifolia* L.f.
32. *Crataegus* sp.
33. *Cryptotaenia canadensis* (L.) DC.
34. *Cystopteris fragilis* (L.) Bernh.
35. *Dentaria diphylla* Michx.
36. *Dentaria laciniata* Muhl.
37. *Desmodium glutinosum* (Muhl.) Wood
38. *Dicentra canadensis* (Goldie) Walp.
39. *Dicentra cucullaria* (L.) Bernh.
40. *Dryopteris goldiana* (Hook.) Gray
41. *Dryopteris spinulosa* (O.F.Muell) Watt.
42. *Epifagus virginiana* (L.) Bart.
43. *Erigenia bulbosa* (Michx.) Nutt.
44. *Erythronium americanum* Ker.
45. *Euonymus obovatus* Nutt.
46. *Fagus grandifolia* Ehrh.
47. *Festuca obtusa* Biehler
48. *Floerkea proserpinacoides* Willd.
49. *Fraxinus americana* L.
50. *Fraxinus pennsylvanica* Marsh
51. *Fraxinus quadrangulata* Michx.
52. *Galium aparine* L.
53. *Galium triflorum* Michx.
54. *Geranium maculatum* L.
55. *Geranium robertianum* L.
56. *Geum canadense* Jacq.
57. *Gymnocladus dioica* (L.) K. Koch
58. *Hepatica acutiloba* DC.
59. *Hydrophyllum appendiculatum* Michx.
60. *Hydrophyllum canadense* L.
61. *Hydrophyllum virginianum* L.
62. *Impatiens pallida* Nutt.
63. *Isopyrum biternatum* (Raf.) T&G.

TABLE 1.—Continued

64.	<i>Juglans cinerea</i> L.
65.	<i>Juglans nigra</i> L.
66.	<i>Lindera benzoin</i> (L.) Blume.
67.	<i>Liriodendron tulipifera</i> L.
68.	<i>Monotropa uniflora</i> L.
69.	<i>Morus rubra</i> L.
70.	<i>Orchis spectabilis</i> L.
71.	<i>Osmorhiza claytoni</i> (Michx.) C.B. Clarke
72.	<i>Osmorhiza longistylis</i> (Torr.) DC.
73.	<i>Ostrya virginiana</i> (Mill.) K. Koch
74.	<i>Oxalis stricta</i> L.
75.	<i>Panax quinquefolis</i> L.
76.	<i>Parthenocissus quinquefolia</i> (L.) Planch
77.	<i>Phlox divaricata</i> L.
78.	<i>Phryma leptostachya</i> L.
79.	<i>Phytolacca americana</i> L.
80.	<i>Pilea pumila</i> (L.) Gray
81.	<i>Platanus occidentalis</i> L.
82.	<i>Poa sylvestris</i> Gray
83.	<i>Podophyllum peltatum</i> L.
84.	<i>Polygonatum pubescens</i> (Willd.) Pursh.
85.	<i>Populus deltoides</i> Marsh.
86.	<i>Prunus serotina</i> Ehrh.
87.	<i>Prunus virginiana</i> L.
88.	<i>Pyrus malus</i> L.
89.	<i>Quercus rubra</i> L.
90.	<i>Ranunculus abortivus</i> L.
91.	<i>Ranunculus recurvatus</i> Poir.
92.	<i>Rhus radicans</i> L.
93.	<i>Ribes cynosbati</i> L.
94.	<i>Rosa multiflora</i> Thunb.
95.	<i>Rubus allegheniensis</i> Porter
96.	<i>Rubus occidentalis</i> L.
97.	<i>Sambucus canadensis</i> L.
98.	<i>Sambucus pubens</i> Michx.
99.	<i>Sanguinaria canadensis</i> L.
100.	<i>Sanicula trifoliata</i> Bickn.
101.	<i>Sassafras albidum</i> (Nutt.) Nees
102.	<i>Scrophularia marilandica</i> L.
103.	<i>Setaria viridis</i> (L.) Beauv.
104.	<i>Smilacina racemosa</i> (L.) Desf.
105.	<i>Smilax taminioides</i> var. <i>hispida</i> (Muhl.) Fern.
106.	<i>Solanum dulcamara</i> L.
107.	<i>Staphylea trifolia</i> L.
108.	<i>Stylophorum diphyllum</i> (Michx.) Nutt.
109.	<i>Tilia americana</i> L.
110.	<i>Tovaria virginiana</i> (L.) Raf.
111.	<i>Trillium flexipes</i> Raf.
112.	<i>Trillium grandiflorum</i> (Michx.) Salisb.
113.	<i>Trillium recurvatum</i> Beck
114.	<i>Ulmus americana</i> L.
115.	<i>Ulmus rubra</i> Muhl.
116.	<i>Urtica dioica</i> L.
117.	<i>Viola canadensis</i> L.
118.	<i>Viola pensylvanica</i> Michx. (f).
119.	<i>Viola sororia</i> Willd.
