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THE VASCULAR FLORA OF FOGWELL FOREST NATURE PRESERVE, ALLEN COUNTY, INDIANA

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ABSTRACT: This flora of Fogwell Forest Nature Preserve (Allen County, Indiana) documents 243 vascular plant species within the 28 acre site. Approximately 60 species, including *Stachys cordata*, are reported for the first time for Allen County. The physical and biotic history of the site are reviewed, and the major community types, especially the flat hardwood community, are described. Although few threatened or endangered species are included within the flatwoods, the virtual lack of exotic or weedy species indicates that Fogwell Forest has good preserve quality. This conclusion is further supported by an average coefficient of conservatism of at least 5.6 and a high floristic quality index (> 80).

KEYWORDS: Allen County — flora, county records — vascular plants, flatwoods, flora — Indiana, swamps — Indiana, *Stachys cordata*.

INTRODUCTION

The Central Till Plain Natural Region (Homoya, *et al.,* 1985) represents a major vegetation and physiographic zone within Indiana. This glacial till formation extends from south of Indianapolis to Fort Wayne in the northeast and from the Ohio State Line to the Wabash River Valley in the west. Historically, the gentle topographic relief and highly tillable soils have resulted in the clearing of most of the land for agricultural uses. In Wabash County, typical of the Till Plain Natural Region, less than 5% of the County currently is forested (Hicks and Keller, 1996). Furthermore, the remnant forest might now be visualized as a series of biological islands since the average woodlot seldom exceeds 5 acres in extent and is surrounded by cultivated fields, old fields, pasture, and human habitation. Given this high degree of disturbance and fragmentation, it is not surprising that the region possesses so few dedicated nature preserves. Of the approximately 120 Indiana Nature Preserves (Indiana Department of Natural Resources, 1991), only 14% are found in the Central Till Plain Natural Region, and the majority of these are clustered near the cities of Indianapolis and Fort Wayne.

Fogwell Forest Nature Preserve, a 28 acre site owned and managed by Acres Land Trust, Fort Wayne, Indiana, contains an excellent example of a mature Central Till Plain second-growth flatwood forest. Since becoming a preserve in 1976, only informal study of its flora has been undertaken. The following report seeks to provide a full, baseline inventory of the vascular flora of the area, with documented voucher specimens, and to describe recent physical and historic factors which have shaped its flora.

MATERIALS AND METHODS

In order to fully document the flora, the Preserve was visited intensively during the 1993 growing season — twice monthly in May and June, and monthly through the remainder of the season. Since the Preserve is fairly small and without a well-defined system of trails, sampling was done by wandering through the Preserve. The path varied with each visit. Occasional follow-up surveys were undertaken during 1994 and 1996 to insure that, to the extent possible, no species had been missed. Voucher specimens of each species observed were collected and deposited in the Friesner Herbarium at Butler University (BUT). Nomenclature follows Gleason and Cronquist (1991). Species were deemed unreported for Allen County if they did not appear in the computer database of Keller, *et al.* (1984).

The floristic quality of the wooded portion of the Preserve was assessed by two quantitative measures, namely the mean coefficient of conservatism (C) and the floristic quality index (I), both devised by Swink and Wilhelm (1994). Swink and Wilhelm assigned C values (ranging from 0-10) to native species based upon their fidelity to specific microhabitats. The mean of C ($\overline{C}$) is determined from the number of native species present at the site being analyzed. The floristic quality index (I) is equal to $\overline{C}\sqrt{N}$, where N equals the number of native species in the study area. In contrast to $\overline{C}$, the floristic quality index provides an assessment of native species diversity, which theoretically should be high in intact natural communities.

DESCRIPTION OF THE AREA

Fogwell Forest Nature Preserve, located in the northwest $^1/_4$ of Section 1 and an adjacent portion of Section 39 (Banstetters Reserve), T29N, R11E (41° 0′ N, 85° 14.5′ W), contains about 28 acres of old second-growth forest with woodland vernal pools. The Preserve is surrounded by agricultural land and a housing subdivision. Acreage northwest and southwest of the forest block is still used for growing row crops. Acreage to the south and east has been out of production since 1993 when an unsuccessful attempt was made to utilize this tract as a wetland mitigation site. In the mitigation effort, agricultural drainage tiling was disabled and a few species of woody and herbaceous plants were installed. Since 1993, natural ecological succession has been allowed to reclaim this tract. To some extent, agricultural tiling has modified the hydrology of Fogwell Forest. Glenn Fogwell recalls one length of tile extending about 150 feet into the eastern portion of the woods to drain a small pond. This tiling may still be functional since, during one high water period, water was observed to flow over ground and into a drain hole (Rich Dunbar, pers. comm.).

Fogwell Forest lies just within the Mississippi River (as opposed to the Lake Erie) watershed in southwestern Allen County. Specifically, the forest sits on glacial till of the Wabash Moraine (Kirschner and Zachary, 1969) or the adjacent ground-moraine (Bleuer and Moore, 1978). This geologically young deposit,

over 100 feet thick, was left by the retreat of the Erie Lobe of the Wisconsinan glacier approximately 12,000 years ago (Bleuer and Moore, 1978).

The resulting soils, belonging to the Blount-Pewamo Association, are Blount silt loams (Kirschner and Zachary, 1969). This soil type is deep but somewhat poorly drained. The 9-inch A horizon is friable, dark grayish-brown, and slightly acidic. Subsoils are friable to firm, mostly with distinct mottling (indicating a non-oxidizing environment), and strongly acidic. The underlying calcareous parent material ranges from 20 to 40 inches below the surface.

A second nature preserve, Fox Island (Lindsey, *et al.*, 1969), is located within 1.5 miles of Fogwell Forest Nature Preserve. With about 200 acres, Fox Island is much larger and more diverse in habitat and flora than Fogwell Forest (Oliphant, 1988); it includes a cattail marsh and some open water. Furthermore, being associated with a morainal dune, much of Fox Island has sandy substrate covered with young upland forest dominated by *Quercus velutina*. In contrast to Fox Island, Fogwell Forest offers an unusually fine example of flatwood vegetation. The site exhibits more or less flat topography and poorly drained depressions. Very slight elevational changes modify the forest vegetation from vernal pool with *Quercus bicolor* (and occasionally, *Q. macrocarpus*) to mesic woods with *Acer saccharum*, *Fagus grandifolia*, *Q. alba*, and *Q. rubra*.

THE PLANT COMMUNITIES

Historically, the combination of geology, soils, and climate that prevailed across Indiana's Central Till Plain Natural Region gave rise to a regional forest dominated by *Fagus grandifolia* and *Acer saccharum*. Homoya (1985) considers Fogwell Forest, in particular, to be at the northern edge of the Bluffton Till Plain Section, a transition zone between the forests of northern versus southern affinities. Before dissection of this forest for agriculture and settlements, the Bluffton Till Plain had, in addition to forests of *F. grandifolia* and *A. saccharum*, an abundance of flatwoods with hydrophytic woody species, such as *Acer rubrum*, *Quercus bicolor*, and *Fraxinus pennsylvanica*. The Fogwell Preserve exemplifies this combination of meso- and hydrophytic forest communities.

Before being donated to Acres Land Trust by Glenn Fogwell and his sisters Mabel Corville and Mildred Klopfenstein in 1976, the land had been part of the family farm for 3 generations. According to Glenn Fogwell, some trees were removed from the western part of the present-day preserve by his grandfather. During the 1930's, following several visits by State Forester Charles Deam, the tract was designated a classified forest. This status allowed the property owners to sell or remove old trees but required them to leave new growth and to never clear the ground. As a result, an unspecified number of trees down to one foot in diameter were sold from the eastern 13 acres of the forested area. Between the 1930's and 1976, no further live trees were felled, but dead wood was removed for firewood. During the known history of this tract, no selective disturbance of the herbaceous vegetation, such as collecting medicinals or the removal of plants for sale or use elsewhere, ever occurred. The logging of the 1930's undoubt-

edly had some effects on the herbaceous layer, but, at the time of this survey, no apparent differences in species richness were noticed between the western and eastern portions of the Preserve. Today, the vegetation of Fogwell Forest Nature Preserve may be visualized as having 3 distinct community types: flatwoods, ecotone, and adjacent old field.

Flatwoods. The core of the Preserve is the 28 acre flatwoods dominated by mixed hardwoods. Associated with vernal pools are mature individuals of *Quercus bicolor* and a sparse herbaceous flora that includes *Carex bromoides*, *C. grayi*, and *C. muskingumensis* and the ferns *Onoclea sensibilis, Athyrium* sp., *Dryopteris* sp., and *Thelypteris* sp.

In the more mesic areas, the canopy layer is dominated by *Acer saccharum*, *Fagus americana*, and *Quercus rubra*. Subdominants of the canopy include *Juglans nigra*, *Carya ovata*, *Quercus alba*, and *Tilia americana*. During the study, several mature individuals of *F. americana* succumbed. At the same time, no loss of other dominant canopy trees was observed. Given that the forest contains some younger and sapling stage *F. americana*, these losses may not have a long-term effect on canopy composition.

The mesic understory layer contains *Lindera benzoin*, *Viburnum prunifolium,* and *Aesculus glabra* as well as scattered areas with *Carpinus caroliniana* and *Ostrya virginiana*. *Ulmus rubra* grows in openings and near the edge of the woods. Although numerous, *A. glabra*, *C. caroliniana*, and *U. rubra* failed to produce seed crops during the observation period.

The herbaceous layer proved to be particularly rich in the spring and early summer. The earliest cohort to flower includes drifts of *Trillium grandiflorum* and abundant *Cardamine concatenata*, *Geranium maculatum*, *Osmorhiza longistylis*, *Asarum canadense*, *Arisaema triphyllum*, *Phlox divaricata*, and *Galium aparine*. Three species of *Hydrophyllum*, but especially *H. macrophyllum*, were also common. Although *Carex* species are diverse, none proved to be dominant within the herbaceous layer. *Carex woodii*, due to its rhizomatous habit, occupies some significant area in the western portion of the woods.

The early summer dominants of the herbaceous layer include *Laportea canadensis* as well as *Cryptotaenia canadensis*, *Sanicula gregaria*, and *Smilax ecirrhata*. *Parthenocissus quinquefolia* is the dominant vine species in the Preserve. Common grass species include *Elymus hystrix* and *Festuca subverticillata* as well as *Cinna arundinacea*.

In later summer, significant flowering populations of *Impatiens capensis*, *Collinsonia canadensis*, and *Polygonum virginianum* were observed. In contrast, populations of autumn-blooming species were small and only attained meaningful size near the margins of the forest. The most frequent autumn-blooming species include *Aster cordifolius*, *A. lateriflorus*, *Solidago caesia*, and *S. flexicaulis*.

Ecotone Between Woods and Fields. The edges of the woodland provide suitable but limited habitat for sun-loving woody and successional species. The tree species *Quercus muhlenbergii* and *Prunus serotina* occupy the ecotone

area but were not observed within the Forest Preserve itself. Likewise, the vine *Toxicodendron radicans* is virtually restricted to this ecotone. Common woody species at the woodland edges include *Rubus* spp., *Viburnum prunifolium*, *Rosa setigera*, and *Crataegus* spp. Among herbaceous species, the most abundant are *Achillea millefolium*, *Aster pilosus*, *Helianthus tuberosus*, *Solidago canadensis*, and *Trifolium* spp.

Old Field. During the observation period, the adjacent old fields were in a pre-*Solidago* stage. The grasses *Bromus inermis*, *Dactylis glomerata*, *Festuca elatior*, and *Poa pratensis* were common as were the dicot perennials *Plantago* spp., *Trifolium* spp., and *Fragaria virginiana*.

FLORISTIC NOTES

Within the Preserve, no members of the family Orchidaceae were noted. Their absence contrasts sharply with the four species found in the larger, more diverse Fox Island Nature Preserve (Oliphant, 1988). On the other hand, the quality and richness of the Fogwell site are supported by other observations. The Preserve as a whole supports 243 species, including 10 fern species and 1 fern ally. Species in the flatwoods, including its edge species, had a mean coefficient of conservatism ($\bar{C}$) of 5.6 (*i.e.*, an above average value). The mean coefficient increased to 6.3 when the edge species were deleted from the analysis. Most impressive, however, is the floristic quality index (I) of 81.4. According to Swink and Wilhelm (1994), a remnant community with an I value greater than 45 has natural area potential. In fact, in their study area of northwestern Indiana, northeastern Illinois, and adjacent Wisconsin, communities scoring 50 or higher were extremely rare.

Of further value in assessing the floristic quality of Fogwell Preserve, the core flatwoods is remarkably free of exotic and weedy species. *Rosa multiflora*, for example, does not extend beyond the forest margin. Most exotic species, such as *Setaria faberi*, are limited to well-lit sites, such as the old field. With the exception of *Lonicera morrowii*, currently growing in the ecotonal area, the exotic species observed are likely to quickly diminish with successional maturation of the old fields.

Among the species verified in this flora, 61 are new for Allen County (*cf.* Keller, *et al.*, 1984). Although about a third of these might be considered weedy or exotic species, the majority are woodland native species. This number is a surprisingly large for what may be thought of as a well-collected region. Two explanations might be offered. First, much of the "botanizing" of the region was informal *(i.e.*, visual reports were made, but no voucher specimens were collected). This is certainly true of the nearby Fox Island Nature Preserve (Ronald Zartman, Fox Island Naturalist, pers. comm.). Second, the area was undercollected by Charles Deam while he was preparing his *Flora of Indiana*. One might speculate that Deam tended to ignore Allen County in favor of his home area of Wells County as well as the botanically richer counties to the north.

Although Deam rarely collected in Allen County, his visits to the Fogwell property are easily documented. Some visits may have been solely in an official capacity leading to designating the area as classified forest. On the other hand, Deam did collect specimens from the site on 9 June 1933; his total for the day consisted of 30 specimens, half of them from the Fogwell farm (Lewis Johnson, pers. comm.). Deam's accession notes indicate that some were from "open space," while others came from a "low spot." At least 2 species collected by Deam are not found within the present-day Preserve—*Carex tenera* var. *echinodes* and *Ranunculus recurvatum*. The first taxon is of particular interest since it has a limited global distribution. Many areas of potentially suitable habitat for *Carex tenera* var. *echinodes* lie outside the Preserve in the extended backyards of nearby housing; the species should still be sought there.

Among the non-weedy species not previously documented for Allen County, *Stachys cordata* is of greatest interest. Homoya (pers. comm.) describes this taxon, characterized by long petioles and stipitate-glandular stems, as mostly from the southeastern and south-central portion of the State though the species is not as rare as indicated by Deam (1940). This species has not been reported for nearby Michigan (Voss, 1996) but does apparently occur in western Ohio in Auglaize and Shelby Counties (Cooperrider, 1995). Gleason and Cronquist (1991) characterize *S. cordata* as chiefly Appalachian in distribution. Thus, Allen County must be at or near the northern and western limit for this species. Oliphant (1988) lists (but does not document) a plant, tentatively identified as *Stachys nutallii*, for nearby Fox Island Nature Preserve. Given that this is a taxonomically and nomenclaturally confusing entity, Oliphant's specimen very likely represents another occurrence of *S. cordata* in Allen County.

Another species documented for Fogwell Forest, *Carex woodii*, was considered by Deam (1940) to be a rare plant of northern Indiana. Not surprisingly, Bacone and Hedge (1980) originally placed this species on their state endangered and threatened plant list. However, previous floristic studies often overlooked *C. woodii*, perhaps by confusing the species with clones of *C. pensylvanica* or because of sparse flowering and fruiting. *Carex woodii* has been seen widely in rich woods throughout northeastern Indiana.

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CATALOG OF VASCULAR PLANTS IN FOGWELL FOREST NATURE PRESERVE ARRANGED ALPHABETICALLY BY FAMILY WITHIN DIVISION[1]

DIVISION EQUISETOPHYTA — Scouring Rushes

Equisetaceae — Horsetail Family

Equisetum arvense L.
Field horsetail; rare in woods; collection number = 2796; coefficient of conservatism[2] = 0.

DIVISION POLYPODIOPHYTA — Ferns

Adiantaceae — Maidenhair Fern Family

Adiantum pedatum L.
Northern maidenhair fern; infrequent in mesic woods; 3025; 10.

Aspleniaceae — Spleenwort Family

Athyrium filix-femina (L.) Roth [*A. angustum*]
Lady fern; infrequent in damp woods; 3386; 8.

\+ *Athyrium thelypterioides* (Michx.) Desv.
Silvery glade-fern; frequent in damp woods; 3060B; 10.

\+ *Cystopteris protrusa* (Weatherby) Blasdell [*C. fragilis* var. *protrusa*]
Lowland bladder-fern; frequent in woods; 2966; 6.

Dryopteris carthusiana (Villars) Fuchs [*D. spinulosa*]
Toothed wood-fern; infrequent in damp woods; 3132; 6.

\+ *Dryopteris goldiana* (Hook.) Gray
Goldie's wood-fern; infrequent in damp woods; 3133; 10.

\+ *Thelypteris hexagonoptera* (Michx.) Weatherby [*Dryopteris hexagonoptera*]
Broad beech-fern; occasional in damp woods; 3384; 10.

Onocleaceae — Sensitive Fern Family

Onoclea sensibilis L.
Sensitive fern; infrequent in wet woods; 3064; 8.

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[1] + = Not previously reported for Allen County (based upon C. Keller, *et al.*, 1984). The scientific names in brackets are synonyms used in Deam (1940).

[2] Non-native species are not given a coefficient of conservatism (C) nor are they used to calculate the floristic quality index (I) (Swink and Wilhelm, 1994). The coefficient of conservatism is also not listed for native species collected from fallow or old fields; these species (marked na = not applicable) occur outside the core Preserve and were not included in the calculation of I.

Ophioglossaceae — Adder's Tongue Family

Botrychium dissectum Spreng. var. *obliquum* (Muhl.) Clute
Lace-frond grape-fern; rare in woods; 3134; 6.

Botrychium virginianum (L.) Swartz
Rattlesnake fern; frequent in mesic woods; 3027; 6.

DIVISION MAGNOLIOPHYTA — Flowering Plants

Aceraceae — Maple Family

Acer rubrum L.
Red maple; infrequent in moist, wooded openings; 3291; 7.

+ *Acer saccharum* Marsh
Sugar maple; abundant in mesic woods; 3189; 3.

Anacardiaceae — Cashew Family

+ *Toxicodendron radicans* (L.) Kuntze var. *negundo* (Gr.) Reveal [*Rhus radicans*]
Common poison-ivy; frequent at wood edges; 3083; 2.

Annonaceae — Custard-Apple Family

Asimina triloba (L.) Dunal
Papaw; occasional in woods; 3059; 9.

Apiaceae — Carrot Family

Cryptotaenia canadensis (L.) DC.
Honewort; common in mesic woods; 3055; 2.

+ *Daucus carota* L.
Wild carrot; edge of fields; 3145; non-native.

Erigenia bulbosa (Michx.) Nutt.
Harbinger of spring; frequent in mesic woods; 2785; 10.

Osmorhiza longistylis (Torrey) DC.
Long-styled sweet cicely; abundant in woods; 2843, 2967; 3.

+ *Sanicula gregaria* Bickn.
Cluster sanicle; common in woods; 3056; 2.

Sanicula trifoliata Bickn.
Beaked sanicle; infrequent in woods; 3072; 10.

Apocynaceae — Dogbane Family

Apocynum cannabinum L.
Hemp-dogbane; infrequent at edges of woods and fields; 3282; 4.

Araceae — Arum Family

Arisaema triphyllum (L.) Schott
Jack-in-the-pulpit; common in woods; 2770; 4.

Araliaceae — Ginseng Family

Panax quinquefolium L.
American ginseng; scarce in woods; 3221; 9.

Aristolochiaceae — Birthwort Family

Asarum canadense L.
Wild ginger; common in woods; 2772; 7.

Asteraceae — Aster Family

Achillea millefolium L.
Common yarrow; edges of woods and fields; 3089; non-native.

+ *Ambrosia artemisiifolia* L.
Common ragweed; edges of fields; 3198; na.

Aster cordifolius L.
Common blue heart-leaved aster; frequent, margin of woods; 3213; 7.

Aster lateriflorus (L.) Britton
Goblet-aster; frequent, especially near margin of woods; 3233B; 4.

Aster novae-angliae L.
New England aster; scarce in old field; 3609; na.

Aster pilosus Willd.
Awl-aster; frequent at edge of fields; 3215; na.

Aster shortii Lindley
Midwestern blue heart-leaved aster; infrequent in woods; 3230; 8.

+ *Chrysanthemum leucanthemum* L.
Ox-eye daisy; edges of woods and fields; 3092; non-native.

+ *Cirsium arvense* (L.) Scop.
Canada thistle; edges of fields; 3088; non-native.

+ *Erigeron annuus* (L.) Pers.
Annual fleabane; old field and edge of woods; 3018; na.

Erigeron strigosus Muhl.
Rough fleabane; edges of fields; 3125; na.

Eupatorium purpureum L.
Purple-node joe-pye weed; scarce in woods; 3112; 7.

Eupatorium rugosum Hout.
White snakeroot; occasional in woods; 3201; 4.

Euthamia graminifolia (L.) Nutt. [*Solidago graminifolia*]
Common flat-topped goldenrod; edge of field; 3214; na.

Helianthus tuberosus L.
Jerusalem artichoke; frequent at edge of woods; 3197; 3.

Lactuca biennis (Moench) Fernald
Tall blue lettuce; infrequent at edges of woods; 3199; 4.

Lactuca floridana (L.) Gaertn.
Woodland lettuce; scarce in woods; 3232; 5.

Polymnia canadensis L.
Pale-flowered leaf-cup; infrequent in mesic woods; 3388; 10.

Prenanthes altissima L.
Tall white lettuce; scarce in woods; 3223; 8.

Rudbeckia hirta L.
Black-eyed Susan; local in old field; 3611; na.

Solidago caesia L.
Axillary goldenrod; frequent in mesic woods; 3212; 7.

Solidago canadensis L.
Common goldenrod; frequent at edge of field; 3187; na.

Solidago flexicaulis L.
Zigzag goldenrod; frequent in mesic woods; 3226; 7.

\+ *Taraxacum officinale* Weber
Common dandelion; fallow field; 2803; non-native.

Balsaminaceae — Touch-Me-Not Family

Impatiens capensis Meerb.
Orange touch-me-not; frequent near wooded depressions; 3130; 3.

Berberidaceae — Barberry Family

Caulophyllum thalictroides (L.) Michx.
Blue cohosh; infrequent in mesic woods; 3069; 8.

\+ *Podophyllum peltatum* L.
May-apple; infrequent in mesic woods; 2842; 4.

Betulaceae — Birch Family

Carpinus caroliniana Walter
Hornbeam; frequent in woods; 3302; 8.

Ostrya virginiana Walt.
Hop-hornbeam; frequent in woods; 3275; 4.

Bignoniaceae — Trumpet-Creeper Family

Campsis radicans (L.) Seemann
Trumpet creeper; scarce near wooded depressions; 3128; non-native.

Brassicaceae — Mustard Family

Barbarea vulgaris Br.
Yellow rocket; edge of cultivated field; 3147; non-native.

+ *Capsella bursa-pastoris* (L.) Medic.
Shepherd's purse; old field; 3259; non-native.

Cardamine concatenata (Michx.) Schwarz [*Dentaria laciniata*]
Five-parted toothwort; abundant in mesic woods; 2795; 5.

Cardamine douglasii Britton
Pink spring-cress; frequent in woods; 2775; 7.

+ *Cardamine rhomboidea* (Pers.) DC. [*C. bulbosa*]
Spring-cress; scarce in wet woods; 2850; 6.

Caesalpiniaceae — Caesalpinia Family

+ *Gymnocladus dioica* (L.) Koch
Kentucky coffee-tree; single individual sighted but also reported on Fox Island (Oliphant, 1988); 3136; 8.

Campanulaceae — Bellflower Family

Campanula americana L.
Tall bellflower; occasional in woods; 3123; 3.

Lobelia inflata L.
Indian tobacco; scarce in old field; 3610; na.

Lobelia siphilitica L.
Great lobelia; occasional, low edges of woods; 3200; 6.

Caprifoliaceae — Honeysuckle Family

+ *Lonicera morrowii* Gray
Honeysuckle; frequent, wood edges; 3139, 3239B; non-native.

Sambucus canadensis L.
Common elderberry; infrequent in wet woods; 3065; 1.

Viburnum acerifolium L.
Dockmackie; infrequent in woods; 3067; 9.

Viburnum prunifolium L.
Black haw; frequent, especially along edge of woods; 3218; 5.

Caryophyllaceae — Pink Family

+ *Cerastium nutans* Raf.
Mouse-ear chickweed; fallow field; 2800; na.

Cerastium vulgatum L. [*C. fontanum*]
Mouse-ear chickweed; fallow field; 2802; non-native.

Silene virginica L.
Fire-pink; infrequent, wood edge; 3033; 10.

+ *Stellaria media* (L.) Villars
Chickweed; fallow field; 2801; non-native.

Celastraceae — Staff-Tree Family

Euonymous obovatus Nutt.
Running strawberry-bush; scarce in damp woods; 3225; 7.

Chenopodiaceae — Goosefoot Family

Atriplex patula L.
Spearscale; infrequent at edge of cultivated field and woods; 3612; non-native.

Clusiaceae — Mangosteen Family

Hypericum majus (Gray) Britton
St. John's-wort; old field; 3099; na.

+ *Hypericum mutilum* L.
St. John's-wort; low edge of cultivated field; 3146; na.

Hypericum punctatum Lam.
Spotted St. John's-wort; old field; 3100; na.

Convolvulaceae — Morning-Glory Family

+ *Ipomoea purpurea* (L.) Roth
Common morning-glory; edge of cultivated field; 3190; non-native.

Cornaceae — Dogwood Family

+ *Cornus drummondii* Meyer
Rough-leaved dogwood; infrequent at wood edges; 3097; 2.

+ *Cornus florida* L.
Flowering dogwood; occasional in woods; 3211; 8.

Cuscutaceae — Dodder Family

Cuscuta gronovii Willd.
Common dodder; infrequent on *Laportea canadensis*; 3224; 4.

Cyperaceae — Sedge Family

+ *Carex albursina* Sheldon
Sedge; frequent, mesic woods; 2837; 7.

Carex blanda Dewey
Sedge; occasional, mesic woods and edges; 2977; 1.

+ *Carex bromoides* Willd.
Sedge; infrequent at edges of wooded depressions; 2972; 10.

Carex cephalophora Muhl.
Sedge; infrequent in margins of woods and old fields; 3263; 3.

+ *Carex conjuncta* Boott
Sedge; edge of woods and near the northern edge of its range; 2988; 10.

Carex davisii Schw. & Torr.
Sedge; woods, especially near margins; 3261; 7.

+ *Carex gracilescens* Steudel
Sedge; scarce, mesic woods; 3260; 10.

Carex gracillima Schw.
Sedge; infrequent near wooded depressions; 2976; 10.

Carex granularis Willd.
Sedge; infrequent at wood edges; 3284; 4.

Carex grayi Carey
Sedge; infrequent in wet woods; 3129; 7.

Carex grisea Wahl.
Sedge; occasional in woods; 2964; 2.

Carex hirtifolia Mack.
Sedge; frequent in mesic woods; 2832; 5.

Carex jamesii Schw.
Sedge; infrequent in mesic woods; 2827; 5.

Carex laxiculmis Schw.
Sedge; occasional in mesic woods; 2974; 10.

+ *Carex laxiflora* Lam.
Sedge; occasional in mesic woods; 2851; 10.

Carex lupulina Willd.
Sedge; infrequent near wooded depressions; 3080; 7.

+ *Carex molesta* Mack. *ex* Bright
Sedge; scarce at wood edge; 3285; 2.

Carex muskingumensis Schw.
Sedge; infrequent at edges of wooded depressions; 3062; 8.

Carex normalis Mack.
Sedge; infrequent at edges of woods; 3278; 5.

Carex pensylvanica Lam.
Sedge; infrequent in drier woods; 2844; 5.

Carex radiata (Wahl.) Small [*C. rosea*]
Sedge; infrequent near wooded depressions; 2971; 6.

+ *Carex rosea* Willd. [*C. convoluta*]
Sedge; occasional in woods; 2970; 4.

Carex shortiana Dewey
Sedge; edge of woods; 2987; 10.

Carex sparganioides Willd.
Sedge; frequent in mesic woods; 2965; 3.

Carex squarrosa L.
Sedge; infrequent near wood edges; 3277; 10.

Carex stipata Muhl.
Sedge; infrequent at wet wood edges; 3280; 3.

Carex vulpinoides Michx.
Sedge; infrequent at wood edges; 3084; 2.

+ *Carex woodii* Dewey
Sedge; locally frequent in woods; 2786; 10.

+ *Cyperus strigosus* L.
False nutsedge; edge of field; 3188; na.

Eleocharis ovata (Roth.) Roem & Schul.
Blunt spike-rush; low edge of cultivated field; 3148; na.

Dioscoreaceae — Yam Family

Dioscorea villosa L.
Colic-root; infrequent in mesic woods; 3228; 7.

Euphorbiaceae — Spurge Family

Acalypha rhomboidea Raf.
Rhombic copperleaf; occasional near margins of woods; 3203; 0.

Fabaceae — Pea Family

+ *Desmodium glutinosum* (Muhl. *ex* Willd.) Wood
Cluster-leaf tick-trefoil; occasional in woods; 3076; 5.

+ *Trifolium hybridum* L.
Alsike clover; edge of woods and fallow field; 3013; non-native.

+ *Trifolium pratense* L.
Red clover; edge of woods and fallow field; 3014; non-native.

+ *Trifolium repens* L.
White clover; edge of woods and fallow field; 3012; non-native.

Fagaceae — Beech Family

Fagus grandifolia Ehrh.
American beech; common in woods; 3231; 5.

Quercus alba L.
White oak; frequent in woods; 3020; 5.

Quercus bicolor Willd.
Swamp white oak; frequent in wet woods; 3296; 6.

+ *Quercus macrocarpus* Michx.
Bur-oak; occasional in woods; 3230B; 5.

Quercus muhlenbergii Engelm.
Yellow oak; infrequent near edges of woods; 3614; 8.

Quercus rubra L.
Northern red oak; common in mesic woods; 3137; 7.

Quercus velutina Lam.
Black oak; infrequent in western part of woods; 3288; 6.

Fumariaceae — Fumitory Family

Dicentra canadensis (Goldie) Walp.
Squirrel-corn; occasional in woods; 2797; 8.

Dicentra cucullaria (L.) Bernh.
Dutchman's breeches; occasional in woods; 2784; 6.

Geraniaceae — Geranium Family

Geranium maculatum L.
Wild geranium; abundant in woods; 2777; 4.

Grossulariaceae — Gooseberry Family

Ribes cynosbati L.
Dogberry; common in woods; 2788; 5.

Hippocastanaceae — Horse-Chestnut Family

Aesculus glabra L.
Ohio buckeye; frequent in woods; 2789; 3.

Hydrophyllaceae — Waterleaf Family

Hydrophyllum appendiculatum Michx.
Biennial waterleaf; frequent in woods; 2848; 8.

Hydrophyllum canadense L.
Maple-leaved waterleaf; occasional in woods; 3023; 10.

Hydrophyllum macrophyllum Nutt.
Hairy waterleaf; abundant in woods; 3022; 6.

Hydrophyllum virginianum L.
Eastern waterleaf; common in woods; 2979; 5.

Juglandaceae — Walnut Family

Carya cordiformis (Wang.) Koch.
Bitternut-hickory; infrequent in woods; 3208; 7.

Carya ovata (Miller) Koch.
Shagbark-hickory; frequent at edges of woods; 3217; 5.

Juglans nigra L.
Black walnut; frequent in woods; 3138; 5.

Juncaceae — Rush Family

Juncus tenuis Willd. var. *tenuis*
Path-rush; edges of woods and old field; 3086; 0.

Lamiaceae — Mint Family

Agastache neptoides (L.) Kuntze.
Catnip giant-hyssop; local in woods; 3111; 5.

Collinsonia canadensis L.
Northern horse-balm; frequent in mesic woods; 3116; 10.

Lycopus americanus Muhl.
American water-horehound; rare at moist field-edge; 3149; na.

Prunella vulgaris L.
Self-heal; edges of woods and fields; 3096; non-native.

Scutellaria lateriflora L.
Skullcap; scarce, damp wooded opening; 3617; 5.

+ *Stachys cordata* Riddell [*S. riddellii*, *S. nutallii*]
Hedge-nettle; infrequent in mesic woods; 3074; 10.

Teucrium canadense L. var. *virginicum* (L.) Eaton
American germander; occasional, wood edges; 3140; 3.

Lauraceae — Laurel Family

Lindera benzoin (L.) Blume
Spice-bush; abundant in moist woods; 2790, 3110; 7.

Liliaceae — Lily Family

Allium tricoccum Aiton var. *burdickii* Hanes
Ramps; rare in mesic woods; 2780, 3238B; 7.

Erythronium albidum Nutt.
White trout-lily; scarce in woods; 2794; 5.

Polygonatum pubescens (Willd.) Pursh
Solomon's seal; infrequent in woods; 2838; 7.

Smilacina racemosa (L.) Desf.
False Solomon's seal; abundant in woods; 2831; 3.

+ *Trillium flexipes* Raf. [*T. gleasoni*]
Bent trillium; infrequent in mesic woods; 2782; 6.

Trillium grandiflorum (Michx.) Salisb.
Big white trillium; abundant in mesic woods; 2776; 8.

Trillium sessile L.
Toadshade; infrequent in woods; 2773; 10.

Uvularia grandiflora Smith
Bellwort; frequent in mesic woods; 2771, 3024; 7.

Limnanthaceae — Meadow-Foam Family

+ *Floerka proserpinacoides* Willd.
False mermaid; infrequent in woods; 2774; 8.

Menispermaceae — Moonseed Family

Menispermum canadense L.
Moonseed; infrequent in moist, wooded openings; 3142; 6.

Moraceae — Mulberry Family

+ *Morus rubra* L.
Red mulberry; infrequent near wooded depressions; 3106; 10.

Oleaceae — Olive Family

Fraxinus americana L.
White ash; frequent in woods and edges; 3210; 5.

+ *Fraxinus nigra* Marsh
Black ash; infrequent in wet woods; 3135; 10.

Fraxinus pennsylvanica Marsh.
Green ash; scarce in wet woods; 3295; 5.

Onagraceae — Evening Primrose Family

Circaea lutetiana L. [*C. quadrisulcata*]
Common enchanter's nightshade; frequent in woods; 3082; 1.

Orobanchaceae — Broom-Rape Family

Epifagus virginiana (L.) Barton
Beech-drops; occasional in woods; 3613; 10.

Oxalidaceae — Wood-Sorrel Family

Oxalis dillenii Jacq.
Southern yellow wood-sorrel; fallow field and edge of woods; 3019; na.

Oxalis stricta L.
Common yellow wood-sorrel; edge of woods; 3081; 0.

Papaveraceae — Poppy Family

Sanguinaria canadensis L.
Bloodroot; occasional in woods; 2779; 6.

Phytolaccaceae — Pokeweed Family

Phytolacca americana L.
Pokeweed; scarce near wood edge; 3141; 1.

Plantaginaceae — Plantain Family

+ *Plantago lanceolata* L.
English plantain; edges of woods and fields; 3090; non-native.

Plantago rugelii Desne.
American plantain; edges of woods and fields; 3091; 0.

Poaceae — Grass Family

+ *Brachyelytrum erectum* (Schreber) Beauv.
Long-awned wood grass; occasional, moist, humus-rich soil in woods; 3375; 10.

+ *Bromus inermis* Leysser
Smooth brome; locally frequent at edges of woods and fields; 3286; non-native.

+ *Bromus pubescens* Muhl. [*B. purgans*]
Brome grass; infrequent in damp woods; 3387; 5.

+ *Bromus tectorum* L.
June grass; old field; 3257; non-native.

Cinna arundinacea L.
Common woodreed; frequent in woods; 3235; 5.

Dactylis glomerata L.
Orchard-grass; edge of woods and old fields; 2989; non-native.

+ *Digitaria ischaemum* (Schweig.) Muhl.
Smooth crab-grass; edge of woods and fields; 3196; non-native.

Echinochloa crusgalli (L.) Beauv.
Barnyard-grass; scarce in moist, wooded pathway; 3371; 0.

Elymus hystrix L. [*Hystrix patula*]
Bottlebrush-grass; common in mesic woods; 3057; 5.

Elymus villosus Willd.
Downy wild rye; scarce in damp woods; 3389; 5.

Festuca elatior L.
Tall fescue; edge of woods and old fields; 2990; non-native.

Festuca subverticillata (Pers.) Alexeev. [*F. obtusa*]
Nodding fescue; frequent in mesic woods; 3032; 5.

Glyceria striata (Lam.) Hitchc.
Fowl-mannagrass; scarce in damp woods; 3390; 4.

+ *Lolium perenne* L.
Ryegrass; old field; 3256; non-native.

Muhlenbergia schreberi Gmelin
Nimblewill; infrequent in damp woods; 3202; 0.

Poa pratensis L.
Kentucky bluegrass; edge of woods and old fields; 2986; non-native.

Poa sylvestris Gray
Forest bluegrass; occasional in damp woods; 2973; 10.

+ *Setaria faberi* Hermm.
Nodding foxtail; edge of cultivated field; 3195; non-native.

Polemoniaceae — Phlox Family

Phlox divaricata L.
Forest-phlox; abundant in woods; 2768; 5.

Polemonium reptans L.
Spreading Jacob's ladder; frequent in woods; 2778; 5.

Polygonaceae — Smartweed Family

+ *Polygonum persicaria* L.
Lady's thumb; edge of cultivated field; 3191; non-native.

Polygonum virginianum L.
Jumpseed; abundant in woods; 3115; 2.

Rumex crispus L.
Curly dock; fallow field; 3015; non-native.

Portulacaceae — Purslane Family

Claytonia virginica L.
Spring-beauty; occasional in woods; 2767; 2.

Primulaceae — Primrose Family

Lysimachia ciliata L.
Fringed loosestrife; infrequent in moist woods; 3063; 4.

Ranunculaceae — Buttercup Family

+ *Actaea alba* (L.) Miller [*A. pachypoda*]
Doll's eyes; infrequent in woods; 2830, 3071; 7.

Anemone quinquefolia L.
Wood-anemone; scarce in woods; 2833; 7.

+ *Anemonella thalictroides* (L.) Spach [*Thalictrum thalictroides*]
Rue-anemone; infrequent, mesic woods; 2839; 7.

Hepatica americana (DC) KerGawler
Round-lobed hepatica; infrequent, mesic woods; 2787; 9.

Hydrastis canadensis L.
Golden seal; scarce in mesic woods; 2791; 8.

Ranunculus abortivus L.
Small-flowered crowfoot; fallow field; 2799; na.

Ranunculus hispidus Michx. var. *caricetorum* (Greene) Duncan [*R. septentrionalis*]
Hispid buttercup; frequent near wooded depressions; 2783; 5.

Rosaceae — Rose Family

Agrimonia pubescens Wallr.
Downy agrimony; occasional, mesic woods; 3143; 5.

Crataegus mollis (T. & G.) Scheele
Downy hawthorn; wood edges; 3093; 2.

Crataegus punctata Jacq.
Dotted hawthorn; wood edges; 3276; 2.

Fragaria virginiana Duchesne
Thick-leaved wild strawberry; edge of woods and old field; 3017; 1.

Geum canadense Jacq.
White avens; frequent in mesic woods; 3120; 1.

Geum vernum (Raf.) T. & G.
Spring avens; occasional in woods; 2855; 5.

Potentilla norvegica L.
Strawberry-weed; old field; 3098; na.

Potentilla simplex Michx.
Old field five-fingers; infrequent, edge of woods and old fields; 3266; 4.

Prunus serotina Ehrh.
Wild black cherry; frequent at edge of woods; 2985, 3085; 1.

+ *Rosa multiflora* Thunb. *ex* Murr.
Multiflora-rose; infrequent, edge of woods; 3016; non-native.

Rosa setigera Michx.
Climbing prairie-rose; edge of woods; 3103; 7.

Rubus allegheniensis Porter
Common blackberry; edge of woods; 3031; 3.

+ *Rubus occidentalis* L.
Black raspberry; edge of woods; 2984; 2.

Rubiaceae — Madder Family

Galium aparine L.
Cleavers; abundant in woods; 2968; 1.

Galium circaezans Michx.
Forest bedstraw; infrequent in woods; 3227; 10.

Galium concinnum T. & G.
Shining bedstraw; occasional in woods; 3235B; 5.

Galium obtusum Bigelow
Bluntleaf-bedstraw; occasional in woods; 3234B; 5.

Rutaceae — Rue Family

Zanthoxylum americanum Miller
Common prickly-ash; edge of woods; 2829; 3.

Salicaceae — Willow Family

Populus deltoides Marsh
Cottonwood; infrequent at wet wood edge; 3294; 2.

Saxifragaceae — Saxifrage Family

Mitella diphylla L.
Two-leaved mitrewort; frequent, mesic woods; 2781; 10.

Penthorum sedoides L.
Ditch-stonecrop; scarce on a moist, wooded pathway; 3373; 5.

Scrophulariaceae — Figwort Family

Chelone glabra L.
White turtlehead; scarce in moist woods; 3222; 8.

+ *Collinsia verna* Nutt.
Blue-eyed Mary; local in flatwoods; 2793; 10.

Gratiola neglecta Torr.
Hedge-hyssop; local in moist, wooded pathway; 3290; 7.

Mimulus alatus Aiton
Sharpwing monkey-flower; damp, wooded opening; 3616; 7.

Penstemon digitalis Nutt.
Tall white beard-tongue; infrequent at edges of woods; 3281; 4.

Scrophularia marilandica L.
Eastern figwort; infrequent, damp woods; 3382; 4.

Veronica serpyllifolia L.
Thyme-leaved speedwell; fallow field; 2858; non-native.

Smilacaceae — Catbrier Family

Smilax ecirrhata (Engelm.) Wats.
Catbrier; frequent in mesic woods; 3268, 3301; 5.

Smilax herbacea L. var. *lasioneura* (Sm.) Rydb.
Catbrier; infrequent in mesic woods; 2852; 5.

Smilax hispida Muhl.
Bristly catbrier; infrequent in mesic woods; 3273; 5.

Solanaceae — Nightshade Family

Solanum nigrum L.
Black nightshade; infrequent in damp woods; 3380; 0.

Tiliaceae — Linden Family

Tilia americana L.
Basswood; common in woods; 3300; 5.

Ulmaceae — Elm Family

Celtis occidentalis L.
Northern hackberry; infrequent in moist, wooded openings; 3205; 3.

Ulmus americana L.
American elm; infrequent at wood edges; 3299; 3.

Ulmus rubra Muhl.
Slippery elm; common in moist, wooded openings; 3204; 4.

Urticaceae — Nettle Family

Boehmeria cylindrica (L.) Swartz
False nettle; infrequent in damp woods; 3234; 2.

Laportea canadensis (L.) Wedd.
Wood nettle; abundant in woods; 3121; 3.

Verbenaceae — Vervain Family

Phryma leptostachya L.
Lopseed; frequent in mesic woods; 3107; 4.

Violaceae — Violet Family

+ *Viola pubescens* Aiton
Yellow forest-violet; common in woods; 2769, 2975; 5.

Viola sororia Willd.
Dooryard-violet; infrequent in woods; 2798; 3.

Viola striata Aiton
Creamy violet; occasional in woods; 2962; 6.

Vitaceae — Grape Family

+ *Parthenocissus quinquefolia* (L.) Planchon
Virginia-creeper; common in woods; 3030; 2.

+ *Vitis vulpina* L.
Frost-grape; infrequent at edges of woods; 3194; 9.