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A FLORISTIC INVENTORY AND DESCRIPTION OF THE STRUCTURE AND COMPOSITION OF THE PLANT COMMUNITIES OF BOTANY GLEN, GRANT COUNTY, INDIANA

Amanda L. Stonehouse, **Kemuel S. Badger**, and **Donald G. Ruch**: Department of Biology, Ball State University, Muncie, Indiana 47306-0440 USA

Paul E. Rothrock: Randall Environmental Center, Taylor University, Upland, Indiana 46989-1001 USA

ABSTRACT. Botany Glen, the James S. Wilson Memorial Sanctuary, is an 18 ha (45 acre) forested tract located in Grant County, Indiana, adjacent to the Mississinewa River. Botany Glen is an important natural area in east-central Indiana due to its relatively small size and high diversity. A systematic floristic inventory and permanent monitoring plots were used to describe the structure and composition of the woody and herbaceous plant communities at the site. This study documents 370 species and varieties of vascular plants representing 244 genera and 90 families; 160 species are recorded for the first time in Grant County. Of the 370 species listed, 69 (or 19%) are exotic. Most of these exotics have failed to penetrate the interior of the forest. Local variations in site conditions are reflected by changes in woody plant dominance. The dominant woody overstory species vary from *Quercus* spp. and *Carya* spp. on drier topographic positions to *Platanus occidentalis* and *Acer saccharinum* on the floodplains. The associated herbaceous communities also vary considerably along this gradient, with some species confined to specialized habitats such as seeps, steep slopes and areas subject to the most intense flooding.

Keywords: Grant County, flora, plant community, successional forest, floodplain forest, upland forest

Botany Glen, also known as the James S. Wilson Memorial Sanctuary, is an 18 ha (45 acre) woodland tract owned and managed by Indiana Wesleyan University (formerly Marion College) with a reverter to the Nature Conservancy. Botany Glen has been included in the Indiana chapter of the Nature Conservancy's guide to dedicated nature preserves. Indiana Wesleyan University and Taylor University have made use of Botany Glen for biological study since IWU took ownership in 1962. Portions of this property have been used as an outdoor adventure center since a ropes course was built in 1996. The property is located in Grant County, Indiana (Fig. 1) in the township of Fairmount (SE 3 Sec. 11 and NE 3 Sec. 14, R8E, T23N, Gas City Quadrangle).

Botany Glen is located in the Central Till Plain Natural Region (Homoya et al. 1985). This region is the largest natural region in Indiana and also one of the best suited for farming. Of the 107,446 ha that comprise Grant County, only about 7% is classified as forest (Smith & Golitz 1988). The original beech-maple forests of north-central Indiana were cleared for crops by settlers (Den Uyl 1954). Today there are only fragments of woodland in a matrix of cropland (Brothers & Spingarn 1992). Although relatively small, Botany Glen is a significant natural area in this region.

The uplands and slopes of Botany Glen are dominated by oak-hickory (*Quercus* and *Carya*) forest with sugar maple (*Acer saccharum*) beginning to dominate the understory (Lindsey et al. 1969). The forest can be further subdivided into dry, upland woods on the eastern ridge top; Mississinewa River floodplain on the north portion of the property; and wet, lowland and seeps associated with the stream and woody old field areas adjacent to existing fields on the west side.

Floristic inventories are compilations of all species present in a particular area and are based on extensive surveys. Inventories are valuable because they can be used to document biodiversity of a particular area, to update regional floras, and to detect the presence of invasive species as well as rare or endan-

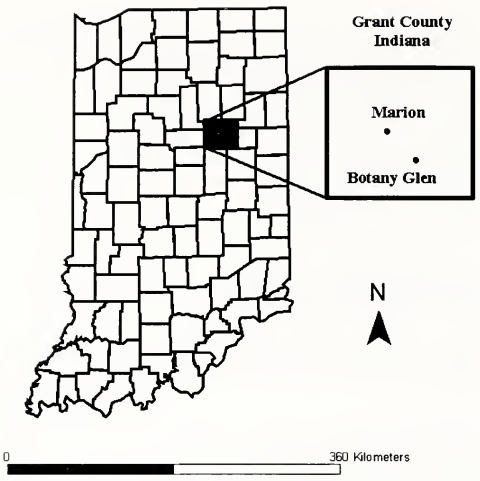


Figure 1.—Location of Botany Glen. Map of Indiana (left) showing the location of Grant County and the location of Botany Glen relative to Marion, Indiana (right).

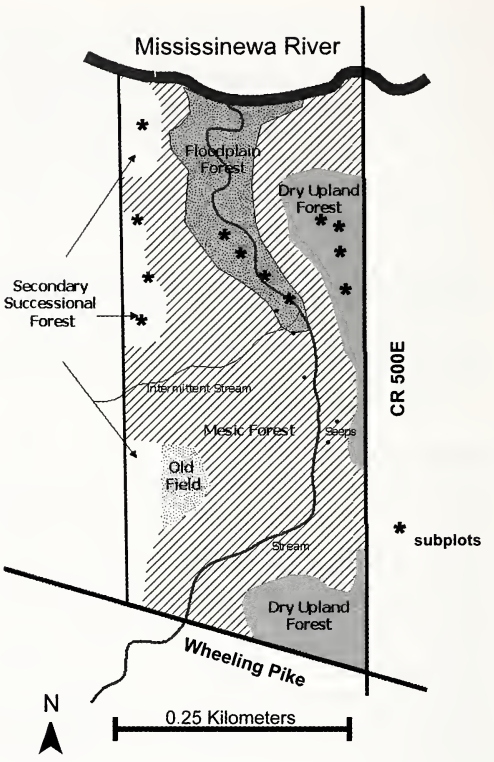


Figure 2.—Location of boundary, prominent physical features, general habitat types and permanent plots of Botany Glen. The five seeps are shown as black dots.

gered species. Floristic inventories help to determine critical species to focus conservation efforts on, based on local and regional significance. This study is part of a larger regional effort to document biodiversity in east-central Indiana (Rothrock et al. 1993; Rothrock 1997; Ruch et al. 1998; Ruch et al. 2002).

Although Botany Glen has been used as a field study area by at least two universities, a complete flora has never been published. The only noteworthy investigation was a brief description by Lindsey et al. (1969), who cited Botany Glen as an important area for preservation because of its proximity to the universities and for the potentially high quality of terrestrial biological study.

Monitoring is a valuable tool for ecological study and managers of natural areas. Once preliminary information about a community has been gathered, objectives for monitoring can be established. Some general purposes of monitoring include detection or prediction of change over time (due to human activities or natural occurrences), evaluation of community health, and ability to define normal variation in the community (U.S. Dept. of the Army 1999). Monitoring is a direct and accurate way to document successional changes (Barbour et al. 1999). Inventories provide additional information for consideration when establishing monitoring objectives and procedures. Combining data from inventories and monitoring allows inferences to be made about the successional status of a community.

The objectives of this study are to inventory the flora of Botany Glen, to describe the structure and composition of the prominent plant communities, and to establish permanent monitoring plots and monitoring procedures.

STUDY SITE DESCRIPTION

James S. Wilson purchased Botany Glen in the late 1830s as part of a 65 ha (160 acre) homestead. According to Whitson (1914), James's son, Frank, expanded the property and profitably cultivated 62 of 77 ha. In 1962, James's grandson, George Wilson, donated the 18 ha parcel designated as The James S. Wilson Memorial Sanctuary (now known as Botany Glen), to Marion College (now Indiana Wesleyan University) as a wildlife sanctuary and as a laboratory for ecological and biological study.

Botany Glen is located in south-central Grant County (Fig. 1). The property is bor-

dered by the Mississinewa River to the north, County Road 500 E to the east, US 35 (Wheeling Pike) to the south, and by farmland to the west (Fig. 2). There are entrance gates on the east and south sides. Botany Glen is bisected into east and west halves by an unnamed stream (a Mississinewa River tributary) that is joined by another intermittent stream from the west. Just north of the intermittent stream are the foundation and chimney of a building that burned to the ground in the 1940s. At one time, this building was part of a Boy Scout camp located at Botany Glen (Swyers 2001). Neighbors living across CR 500E from Botany Glen confirm the presence of a Boy Scout camp and also reported several small fires had swept through the east side of the property in the early 1960s. Indiana Wesleyan University built a high ropes course and gaming area in April of 1996 on the south-central portion of the property that was still in use at the time of this study. The secondary successional areas on the west side of Botany Glen were evidently farmed at one time. It is not clear whether they were cultivated or just grazed, but old fencing has been found in those areas.

Botany Glen lies within the Bluffton Till Plain Section of the Central Till Plain Region. The retreat of the Wisconsinan ice sheet left a level plain of till that formed the parent material of the soils that cover this section today. The bedrock that underlies the deep, clay-rich soil of this section is composed of limestone and siltstone that dates to the Silurian period (Homoya et al. 1985; Hedge 1997; Jensen 1988).

The topography of Botany Glen has been most affected by the river and the streams that flow into it. Most of the land surrounding Botany Glen shares the same elevation as that of the uplands. The north-flowing stream lies in a wide, relatively deep valley (> 15 m in places) whose sides are very steep and eroded in places. This central valley bisects a bluff adjacent to the Mississinewa River and the lower portion is often impacted by river flooding. Erosion by runoff has formed several smaller ravines on the east and west sides of the property. This variation in topography produces microhabitats that support a higher number of species than would be expected in a homogeneous site of similar size.

The predominant soil at Botany Glen is Glynwood silt loam, which covers the level hilltops and is only moderately well drained. Hennepin clay loam and Morley silt loam are common along the very steeply to strongly sloping hillsides and drainageways and along the intermittent stream. Sloan clay loam, which is very poorly drained, is found throughout the floodplain and along the length of the stream. A small swath of Morley clay loam covers the moderate slopes on the south and east sides of the upland north of the intermittent stream. The Mississinewa River banks and parts of the terrace are composed of well-drained Landes sandy loam. There is a small patch of Fox silt loam at the farthest southwest portion of the river terrace (Jensen 1988).

METHODS

The floristic inventory was conducted from September 2001 through October 2002 with weekly visits to the property for collection. Effort was made to systematically survey every plant community type at least every two weeks. More time was devoted to collection of plant specimens during periods of prolific growth and blooming. Collections in the Indiana Wesleyan University and Taylor University Herbaria were reviewed and compared to specimens collected during this study. The Grant County list of plants from the Indiana Natural Heritage Data Center was utilized to check for new county records. Voucher specimens have been deposited in the Ball State University Herbarium (BSUH). Nomenclature follows Gleason & Cronquist (1991) with the following exceptions. Swink & Wilhelm (1994) was used for species in the Cyperaceae and pteridophyte nomenclature follows the *Flora of North America*, Volume 2 (Flora of North America Editorial Committee 1993). The companion to Gleason & Cronquist (Holmgren 1998) was used for confirmation in some cases.

Permanent monitoring plots were established in the dry upland forest, the floodplain forest, and the secondary successional forest communities. Plots were placed in areas that were typical for a given community type. Each plot consists of four circular subplots arranged linearly with center points 40 m apart.

Overstory stems (with dbh ≥ 5.0 cm) within 15 m of the plot centers were sampled in a clockwise manner beginning at north. The species identity of each individual was deter-

mined, and the diameter at breast height (dbh) measured. The distance between each tree and the subplot center was measured in meters with a Hagloff Forester digital distance-measuring device. Stem density per hectare, basal area (dominance) per hectare, and frequency of each species were calculated for each community. Overstory species importance values (IV) were calculated for each species by dividing the sum of the values of the relative dominance, relative frequency, and the relative density by three (Barbour et. al. 1999).

The understory was sampled with circular 5 m radius plots that were nested within each circular subplot. All woody stems (of height = 1 m and with dbh < 5.0 cm) were identified and counted. Stem density per hectare and frequency of each species were calculated for each community. Understory species importance values (IV) were calculated for each species by dividing the sum of the values of relative frequency and the relative density by two.

Herbaceous species were sampled in the first weeks of May, June, and August. Herb species presence was recorded while systematically walking through each quarter of the circular subplots. Herbaceous cover was determined in three 2 × 2 m plots along a transect in each circular subplot. Transects were rotated 90° sequentially between subplots to cover topographic variation within the subplots. Visual estimates were used to determine cover for herbaceous and woody species (of height < 1 m) in these plots. The following modified Daubenmire cover scale was used to convert the estimated percent cover to a cover class (CC): CC1 = 1–7%, CC2 = 8–25%, CC3 = 26–50%, CC4 = 51–75%, CC5 = 76–93%, CC6 = 94–100%. Herbaceous importance values (IV) were calculated for each species by dividing the sum of the values of relative frequency and relative cover by two.

RESULTS

The floristic survey of Botany Glen yielded 370 species and varieties of vascular plants representing 244 genera in 90 families (Appendix A). Thirty-one families are represented by only one species. Of the 370 species reported, 160 are recorded for the first time in Grant County. *Veronica anagallis-aquatica* is listed as threatened by the Indiana Natural Heritage Program (1996). The six families having the highest number of species are the Asteraceae (42), Poaceae (28), Cyperaceae (20), Brassicaceae (16), Rosaceae (15), and Lamiaceae (14).

Species previously collected at Botany Glen but not found during this study were documented by Stonehouse (2003). Most species found previously but not in this study are typical of east-central Indiana forests. One species of particular interest, *Stenanthium gramineum*, was collected in 1936 by Potzger and Friesner. This species is listed as state endangered on the Indiana Natural Heritage Program's list of endangered, threatened, and rare vascular plant species.

Of the 370 plant species, 69, or 19% of the total, are exotic. All but nine of these (*Alliaria petiolata*, *Lonicera maackii*, *Lysimachia nummularia*, *Phalaris arundinacea*, *Poa pratensis*, *Rorippa nasturtium-aquaticum*, *Rosa multiflora*, *Rumex crispus*, and *Urtica dioica*) have failed to penetrate the interior of the forest.

A frequently encountered invasive is *Alliaria petiolata*, which is aggressively reproducing along all streams and edges, especially in the floodplain and the southeast corner of the property. *Rosa multiflora* is found in all three plots and is spreading along the west edge; there is also a large patch in the floodplain. Several introduced species (*Pinus strobus*, *Pyrus malus*, *Berberis thunbergii*, *Yucca filamentosa*, and *Zea mays*) do not exhibit effective reproduction.

COMMUNITY DESCRIPTIONS

Mesic forest.—This community type covers most of the uplands, slopes, and well-drained lowlands of Botany Glen (Fig. 2). Dominant tree species are *Acer saccharum*, *Carya* spp., *Fagus grandifolia*, *Fraxinus americana*, *Juglans nigra*, *Quercus* spp., and *Ulmus* spp. The stems are relatively large and form a closed canopy. The understory is composed primarily of *Acer saccharum*, *Asimina triloba*, *Fraxinus* spp., *Prunus serotina*, and *Viburnum* spp. Springtime ephemeral herbs are abundant throughout the mesic forest; the herb layer remains relatively dense throughout most of the growing season. Abundant herbaceous species are *Cystopteris protrusa*, *Cryptotaenia canadensis*, *Galium* spp., *Geranium maculatum*, *Polymnia canadensis*, *Sanicula gregaria*, and *Viola* spp.

A few smaller communities exist within the

larger mesic forest. There are several small seeps along the stream and in the middle of the east hillside (Fig. 2). They are characterized by very wet, dark soils with high organic matter. The soil was saturated in the spring and remained quite moist for the rest of the 2002 growing season. The seeps are dominated primarily by *Symplocarpus foetidus*. *Caltha palustris*, *Cardamine pensylvanica*, *Cardamine rhomboidea*, and *Saururus cernuus* are found almost exclusively in the seeps.

The steepest slopes create a suitable habitat for several species. *Adiantum pedatum*, *Athyrium thelypterioides*, *Athyrium pynocarpon*, *Hepatica acutiloba*, *Hydrangea americana*, *Polystichum acrostichoides*, *Stylophorum diphyllum*, *Tradescantia virginiana*, *Trillium grandiflorum*, and *Veratrum woodii* are all confined to the slope communities.

Dry upland forest covers the hilltops on the east and southeast portions of Botany Glen (Fig. 2). The overstory here has a very high proportion of *Quercus* and *Carya* species. Other prominent species include *Fraxinus americana*, *Ostrya virginiana*, *Acer saccharum*, and *Juglans nigra*. In the understory, *Acer saccharum*, *Fraxinus quadrangulata*, and *Viburnum* spp. are common. The herbaceous layer in this plot decreased significantly through the growing season as the canopy closed and as water became limited. Some herbaceous species typical of the dry upland forest include *Dodecatheon meadia*, *Actaea alba*, *Carex pensylvanica*, and *Prenanthes altissima*.

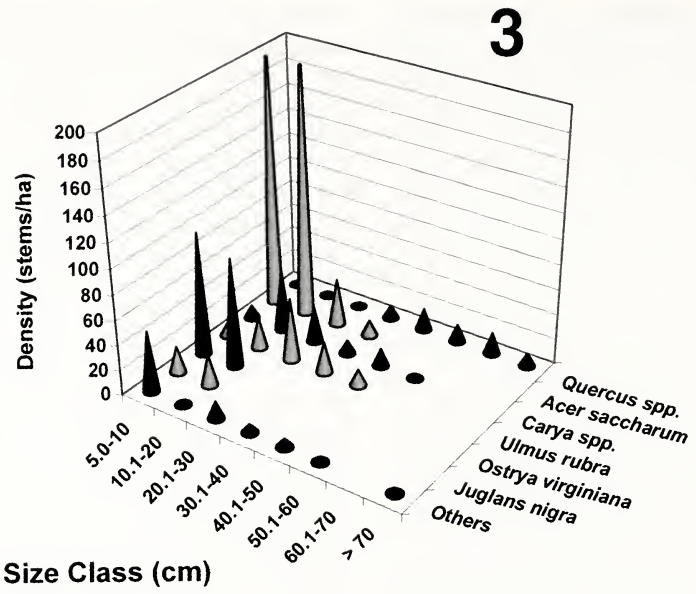
One of the permanent monitoring plots (Plot 3, Fig. 2) is situated in the dry upland forest described above. This monitoring plot is highest of the three in total basal area and second highest in density of stems. The species having the highest importance values in the overstory are *Acer saccharum* (16.5%) and *Quercus alba* (15.3%), followed by *Carya glabra* (9.3%) and *Ostrya virginiana* (8.1%) (Table 1). *Acer saccharum* dominates due to high density of small stems (all < 31 cm dbh) while *Quercus alba* is found in a wide range of larger stems (Fig. 3). There are several large stems of *Quercus velutina*, which gives the species moderately high importance (6.6%); however, it is completely lacking in the lower size-classes (Fig. 3). The understory in Plot 3 is also dominated by *Acer saccharum* followed by *Fraxinus quadrangulata* and *Prunus serotina* (Table 2).

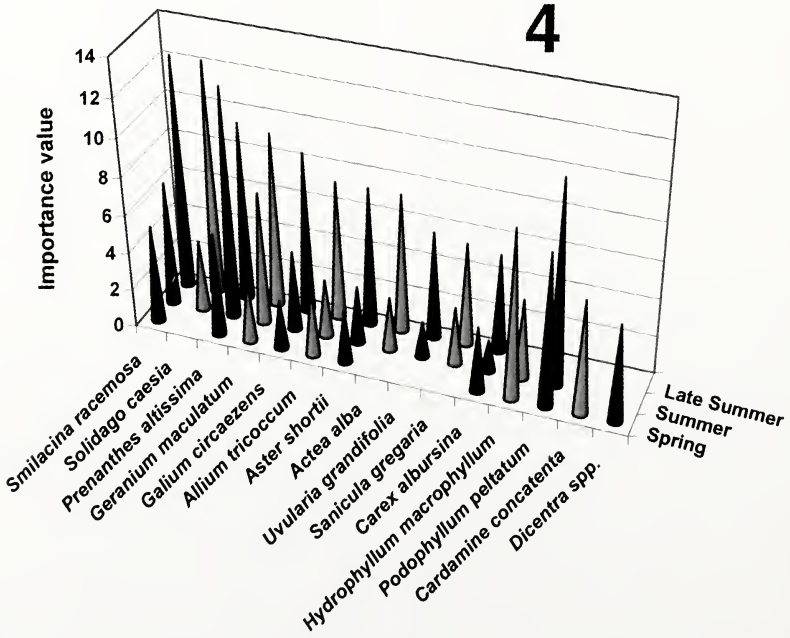
Spring dominants in the herbaceous layer were *Hydrophyllum macrophyllum*, *Podophyllum peltatum*, and *Cardamine concatenata* (Fig. 6). *Prenanthes altissima*, *Podophyllum peltatum*, and *Geranium maculatum* were dominant during the summer sampling. Late summer dominants included *Smilacina racemosa*, *Solidago caesia*, and *Prenanthes altissima*.

Floodplain forest.—The floodplain forest lies along the Mississinewa River and the northern extent of the stream (Fig. 2). The overstory in areas that receive the most flooding consists of a few very large, scattered stems of *Platanus occidentalis*. The southern portion of the floodplain is flooded less frequently. The overstory here is more diverse and other important species are *Aesculus glabra*, *Celtis occidentalis*, *Carya* spp., *Fraxinus* spp., *Juglans nigra*, and *Ulmus americana*. There are multiple large canopy gaps throughout the floodplain. Very few stems fit into the understory category. However, in this partially shaded, moist habitat the herbaceous layer grew very lush. Frequently encountered herbs in the floodplain include *Bidens frondosa*, *Carex* spp., *Erythronium albidum*, *Floerkia proserpinacoides*, *Impatiens* spp., *Laportea canadensis*, *Lysimachia* spp., *Polygonum* spp., *Urtica dioica*, and *Viola striata*. Other species of note include *Camassia scilloides*, *Chelone obliqua*, *Iris virginica*, and *Verbesina alternifolia*, which all grow in dense, isolated patches.

The Mississinewa riverbanks are dominated by *Acer saccharinum*, *Platanus occidentalis*, *Populus deltoides*, *Tilia Americana*, and *Ulmus* spp. The soil on the natural levee is higher than the surrounding floodplain and is therefore slightly better drained, allowing for a denser overstory and understory. The frequent flooding results in a herbaceous layer that is unique for Botany Glen. Some species confined to this habitat include *Justicia americana*, *Lindernia dubia*, *Mimulus alatus*, *Phlox paniculata*, *Polygonum cespitosum*, *Rorippa palustris*, *R. sylvestris*, *Sagittaria latifolia*, and *Veronica anagallis-aquatica*.

Permanent monitoring Plot 2 is located in the south portion of the floodplain forest (Fig. 2). The overstory in this plot ranks lowest of the three permanent plots in stem density but second highest in total basal area due to few very large stems. The dominant overstory species are *Platanus occidentalis*, *Ulmus americana* and *Aesculus glabra* (Table 3). *Platanus*





Figures 3, 4.—3. Dry upland forest. Overstory size-class stem distribution for the dry upland forest of Botany Glen (Plot 3) for the species with the highest Importance Value. Some species from the same genus with similar habitat requirements were combined. The remaining species are grouped with "Others." Other species are shown in Table 1; 4. Seasonal comparison of dominant herbaceous species in the dry upland forest of Botany Glen (Plot 3). The dominant species are those that have an Importance Value of 5 or higher.

Table 1.—Stand table for dry upland forest of Botany Glen (Plot 3). DEN (Density) is the number of stems per hectare. RD (Relative density) is expressed as percent. BA (Basal area) is in meters squared per hectare. RBA (Relative basal area) is expressed as a percent. FRE (Frequency) refers to the percentage of subplots in which each species occurs. RFRE (Relative frequency) is the frequency of occurrence of each species relative to all species. IV (Importance value) is the average of RD, RBA, and RFRE, expressed in percent.

Species	DEN	RD	BA	RBA	FRE	RFRE	IV
Acer saccharum	297.1	35.3	2.41	6.55	100	7.5	16.5
Quercus alba	63.7	7.6	12.00	32.64	75	5.7	15.3
Carya glabra	74.3	8.8	4.19	11.40	100	7.5	9.3
Ostrya virginiana	123.8	14.7	0.72	1.96	100	7.5	8.1
Quercus velutina	17.7	2.1	4.41	11.99	75	5.7	6.6
Ulmus rubra	60.1	7.1	1.15	3.13	100	7.5	5.9
Carya ovata	42.4	5.0	2.16	5.87	75	5.7	5.5
Juglans nigra	21.2	2.5	2.59	7.04	75	5.7	5.1
Prunus serotina							
Fraxinus americana	17.7	2.1	2.04	5.55	75	5.7	4.4
Quercus rubra	21.2	2.5	1.50	4.08	75	5.7	4.1
Aesculus glabra	10.6	1.3	0.92	2.50	75	5.7	3.1
Carya cordiformis	28.3	3.4	0.13	0.35	75	5.7	3.1
Liriodendron tulipifera	14.1	1.7	0.32	0.87	75	5.7	2.7
Fraxinus quadrangula-	3.5	0.4	1.61	4.38	25	1.9	2.2
ta	7.1	0.8	0.03	0.08	50	3.8	1.6
Crataegus mollis	10.6	1.3	0.03	0.08	25	1.9	1.1
Fagus grandifolia	3.5	0.4	0.34	0.92	25	1.9	1.1
Ulmus americana	7.1	0.8	0.16	0.44	25	1.9	1.1
Celtis occidentalis	7.1	0.8	0.02	0.05	25	1.9	0.9
Tilia americana	3.5	0.4	0.02	0.05	25	1.9	0.8
Vitis sp.	3.5	0.4	0.01	0.03	25	1.9	0.8
Carpinus caroliniana	3.5	0.4	0.01	0.03	25	1.9	0.8
Total	841.6	100.0	36.77	100.0	1325	100.0	100.0

occidentalis has the highest importance value (16.1%) due to its large basal area even with relatively low density. For *U. americana* (IV = 12.2%) and *A. glabra* (IV = 10.7%) the opposite is true as there are many small trees between 9–20 cm dbh. *Platanus occidentalis* and *Juglans nigra* have no stems in the lower size-classes (Fig. 7). Species with higher densities in the lower size-classes are *Aesculus glabra*, *Carya cordiformis*, *Celtis occidentalis*, and *Ulmus americana* (Fig. 5). The sapling density for the floodplain is the lowest of the three communities and is dominated by shrubs (*Asimina triloba*, *Lindera benzoin*, and *Sambucus canadensis*) that will not become components of the overstory (Table 2). *Laportea canadensis* and *Sanicula gregaria* were the two most dominant herbaceous species for all three sampling periods. *Osmorhiza longistylis* was a co-dominant in the spring and summer but was dormant by the late summer. The dense summer and late-summer herbaceous community included *Impatiens* spp., *Geum canadense*, *Cryptotaenia canadensis*, *Viola striata*, and *Asarum canadense* (Fig. 6).

Successional communities.—These areas, which cover only a small proportion of Botany Glen, were disturbed in the past or are regularly disturbed today. The overstory of the secondary successional forest along the west fence (Fig. 2) has relatively high density with many small stems and few large trees dispersed throughout. It is primarily dominated by *Acer saccharum*, *Aesculus glabra*, *Fraxinus americana*, *Juglans nigra*, *Prunus serotina*, and *Ulmus* spp. The understory is dense with saplings of overstory trees (mostly *Acer saccharum*) as well as *Asimina triloba*, *Cornus drummondii*, *Crataegus* spp., and *Sassafrass albidum*. The herbaceous layer closest to the fence is dense with semi-woody herbaceous species such as *Rosa multiflora*, *Rubus occidentalis*, *Toxicodendron radicans*, and vines of *Vitis* spp. These semi-woody herbaceous plants decrease in fre-

Table 2.—Comparison of understory species counts for each plot in Botany Glen.

Species	Number of stems			Total stems per species
	Dry Upland	Floodplain	Successional area	
Acer saccharum	85	1	222	222
Ulmus americana	1		23	23
Fraxinus quadrangulata	23			0
Aesculus glabra	3	2	11	11
Fraxinus americana	8		3	3
Prunus serotina	10			0
Lonicera mackii			10	10
Carya cordiformis	1		9	9
Ulmus rubra			8	8
Crataegus punctata		2	6	6
Cornus drummondii	2		5	5
Viburnum prunifolium	6		1	1
Celtis occidentalis	4	1	1	1
Ostrya virginiana	4		1	1
Fagus grandifolia	2	2		0
Asimina triloba		4		0
Lindera benzoin		4		0
Sambucus canadensis		4		0
Crataegus mollis			2	2
Acer negundo			1	1
Cercis canadensis			1	1
Eleagnus umbellata			1	1
Quercus muhlenbergii			1	1
Sassafras albidum			1	1
Vitis spp.	1			0
Total	150	20	307	307

quency toward the interior and the herbaceous layer becomes more typical of the rest of the mesic forest. Herbaceous species unique to this forest type are *Asplenium platyneuron*, *Agrimonia pubescens*, *Liparis liliifolia*, and *Ophioglossum vulgatum*.

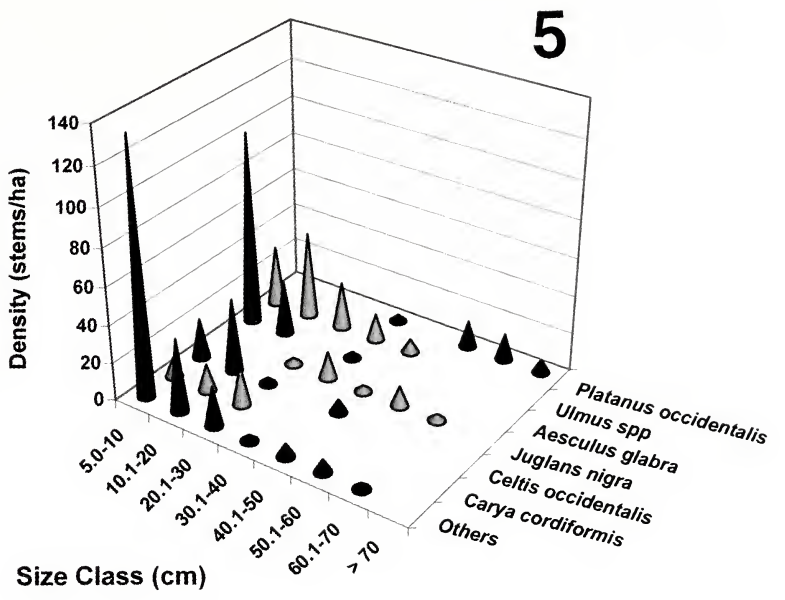
The old field on the west side of the property (Fig. 2) and east of the driveway and gaming area are dominated by herbaceous plants with some woody vegetation beginning to establish. Many exotic species, including *Achillea millefolium*, *Chrysanthemum leucanthemum*, and *Bromus commutatus*, can be found here. Dominant species found here include *Crataegus* spp., *Rubus* spp., *Sassafras albidum*, *Solidago canadensis*, and *Toxicodendron radicans*.

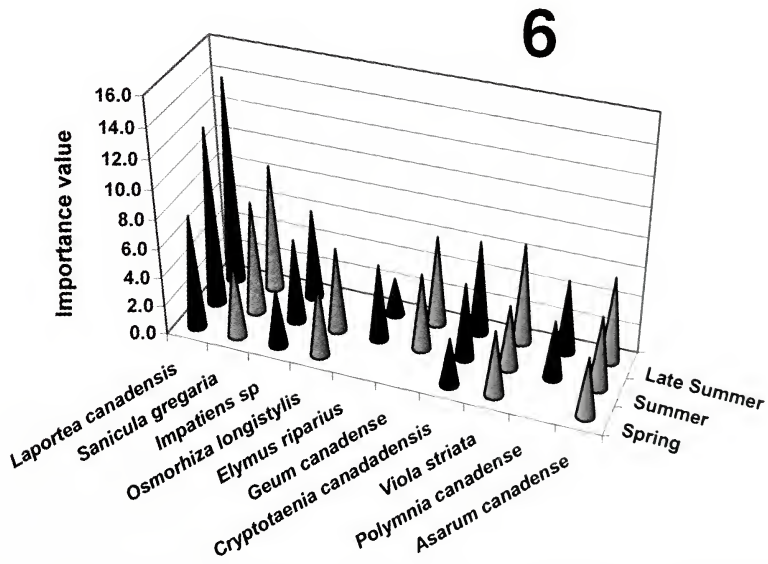
Plot 1 (secondary successional forest) is located in a woody old-field on the upland along the west fence of the property (Fig. 2). In the overstory, stems with dbh = 55 cm are infrequent, with the majority of stems between 5–20 cm dbh. The total density of stems in this plot is greater than either of the other two plots (Tables 1, 3, and 4). Species with the highest importance values are *Fraxinus americana* (17.8%), *Prunus serotina* (16.7%), and *Acer saccharum* (15.6%) (Fig. 7 and Table 5). *Fraxinus americana* and *Prunus serotina* rank highly due to large basal area, whereas *Acer saccharum* has a high density of small stems. The dense understory (dbh < 5 cm) is dominated by *Acer saccharum*, followed by *Ulmus americana* and *Aesculus glabra* (Table 2).

The herb layer was relatively dense throughout the growing season. *Sanicula gregaria*, *Asarum canadense*, and *Osmorhiza longistylis* dominated the herbaceous layer during spring and early summer (Fig. 8). The only change in late summer was a change in dominance from *Osmorhiza longistylis* to *Geum canadensis*, *Polymnia canadensis*, and *Elymus villosus* when *Osmorhiza longistylis* was senescing.

DISCUSSION

Botany Glen, although relatively small (18 ha), supports a diverse flora. This study has





Figures 5, 6.—5. Floodplain forest. Overstory size-class stem distribution for the floodplain forest of Botany Glen (Plot 2) for the species with the highest Importance Value. Some species from the same genus with similar habitat requirements were combined. The remaining species are grouped with "Others." Other species are shown in Table 3; 6. Seasonal comparison of dominant herbaceous species in the floodplain forest of Botany Glen (Plot 2). The dominant species are those that have an Importance Value of 5 or higher.

documented 370 species of vascular plants at Botany Glen, of which 301 are native. These figures compare similarly to other natural areas (Table 5) in east-central Indiana.

The species documented in Botany Glen are typical of the other inventories with only a few exceptions. Species found only at Botany Glen and not at other documented studies from the region include *Ophioglossum vulgatum*, *Heracleum lanatum*, *Triosteum perfoliatum*, *Trillium grandiflorum*, *Stylophorum diphyllum*, *Chelone oblique*, and *Viola palmata*

Table 3.—Stand table for the floodplain forest of Botany Glen (Plot 2). DEN (Density) is the number of stems per hectare. RD (Relative density) is expressed as percent. BA (Basal area) is in meters squared per hectare. RBA (Relative basal area) is expressed as a percent. FRE (Frequency) refers to the percentage of subplots in which each species occurs. RFRE (Relative frequency) is the frequency of occurrence of each species relative to all species. IV (Importance value) is the average of RD, RBA, and RFRE, expressed in percent.

Species	DEN	RD	BA	RBA	FRE	RFRE	IV
Plantanus occidentalis	38.9	5.9	12.08	36.32	75	6.1	16.1
Ulmus americana	106.1	16.0	4.15	12.48	100	8.2	12.2
Aesculus glabra	134.4	20.2	1.28	3.85	100	8.2	10.7
Juglans nigra	35.4	5.3	5.74	17.26	100	8.2	10.2
Celtis occidentalis	70.7	10.6	2.08	6.25	100	8.2	8.4
Carya cordiformis	46.0	6.9	1.51	4.54	75	6.1	5.9
Fraxinus americana	31.8	4.8	1.87	5.62	75	6.1	5.5
Crataegus punctata	38.9	5.9	0.23	0.69	75	6.1	4.2
Carya ovata	24.8	3.7	0.62	1.86	75	6.1	3.9
Vitis spp.	21.2	3.2	0.09	0.27	75	6.1	3.2
Acer saccharum	21.2	3.2	0.52	1.56	50	4.1	2.9
Carpinus caroliniana	28.3	4.3	0.15	0.45	50	4.1	2.9
Ulmus rubra	17.7	2.7	0.10	0.30	50	4.1	2.3
Acer negundo	14.1	2.1	0.13	0.39	50	4.1	2.2
Quercus alba	3.5	0.5	1.06	3.19	25	2.0	1.9
Liriodendron tulipifera	3.5	0.5	0.96	2.89	25	2.0	1.8
Asimina triloba	14.1	2.1	0.04	0.12	25	2.0	1.4
Fagus grandifolia	3.5	0.5	0.45	1.35	25	2.0	1.3
Morus rubra	3.5	0.5	0.18	0.54	25	2.0	1.0
Crataegus mollis	3.5	0.5	0.02	0.06	25	2.0	0.9
Parthenocissus sp.	3.5	0.5	0.01	0.03	25	2.0	0.9
Total	664.6	100.0	33.3	100.0	1225	100.0	100.0

(Rothrock et al. 1993; Rothrock 1997; Ruch et al. 1998; Ruch et al. 2002). *Hydrastis canadensis* and *Veratrum woodii* were documented at Ginn Woods and Wilbur Wright Fish and Wildlife Area, respectively, but were found in greater abundance at Botany Glen (Ruch et al. 2002). The number of pteridophytes at Botany Glen is comparable to the larger Ginn Woods and Wilbur Wright Fish and Wildlife Area.

Representatives of the Indiana Natural Heritage Program have attempted, unsuccessfully, to relocate *Stenanthium gramineum* at Botany Glen. Although *S. gramineum* has not been documented at Botany Glen since Potzger and Friesner collected it in 1936, it is possible that *S. gramineum* is still growing here. *Stenanthium gramineum* is typically found in mesic woods often near wet areas such as the river and stream floodplains of Botany Glen. In Indiana, individuals have been found not to flower in densely shaded areas (Alice Heikens pers. comm.). In this case it would be difficult to distinguish from other monocots, such as *Camassia scilloides*, growing in the floodplain forest. Future efforts to relocate this species are warranted.

Lindsey described the forest of Botany Glen in 1969 as "... young growth oak-hickory type ... with sugar maple entering so vigorously as to show higher density than any two species of oak, but the same absolute basal area as white oak alone." Data from the monitoring plot for the dry upland forest (Plot 3, Table 1) show that the density of *Acer saccharum* (297.1 stems/ha) still far surpasses that for all three *Quercus* species combined (92 stems/ha). However, basal area calculations for this plot reveal that the basal area of *Quercus alba* (12 m^2/ha) exceeds that for *Acer saccharum* (2.41 m^2/ha). This pattern holds true when densities are averaged for all three monitoring plots, although there is a smaller difference between average basal areas (2.81 m^2/ha for *Acer saccharum* and 4.36 m^2/ha for *Quercus alba*). This suggests that the density of small stems of *Acer saccharum* has increased since Lindsey's assessment of Botany Glen.

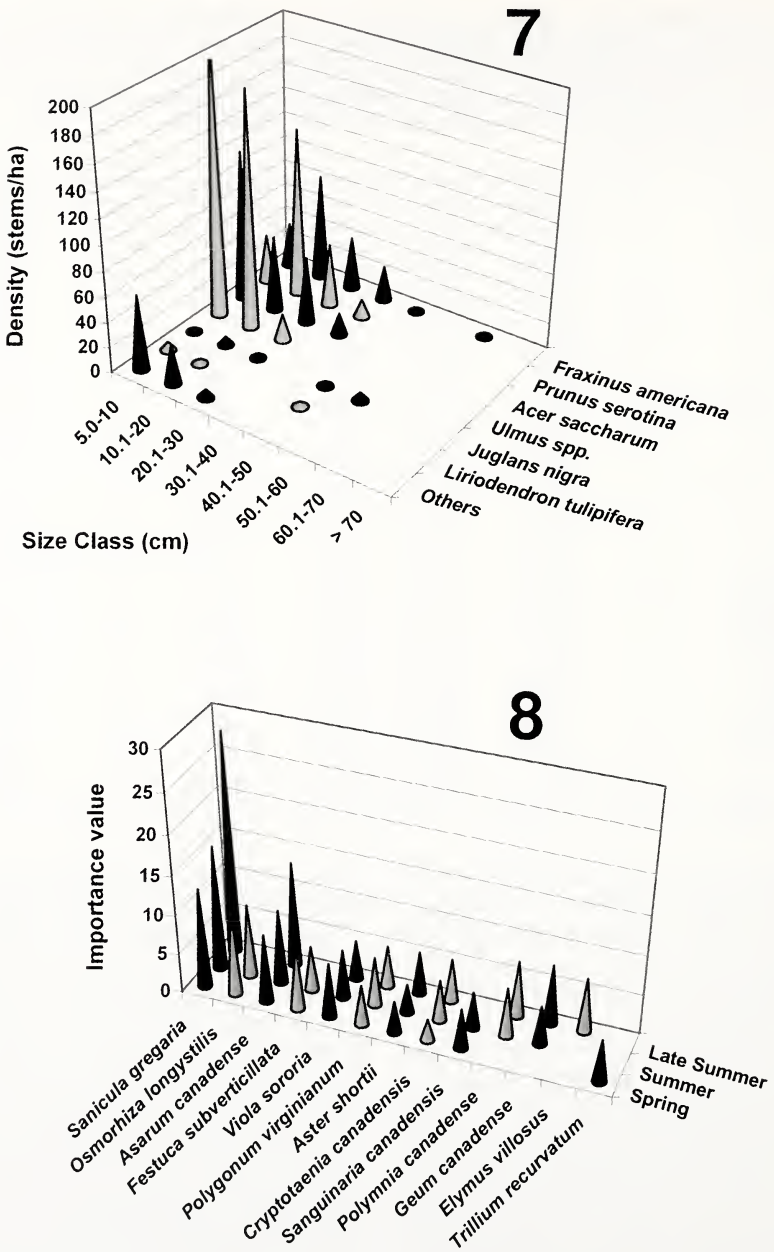
Table 4.—Stand table for the secondary successional forest of Botany Glen (Plot 1). DEN (Density) is the number of stems per hectare. RD (Relative density) is expressed as percent. BA (Basal area) is in meters squared per hectare. RBA (Relative basal area) is expressed as a percent. FRE (Frequency) refers to the percentage of subplots in which each species occurs. RFRE (Relative frequency) is the frequency of occurrence of each species relative to all species. IV (Important value) is the average of RD, RBA, and RFRE, expressed in percent.

Species	DEN	RD	BA	RBA	FRE	RFRE	IV
Fraxinus americana	198.1	14.0	8.57	29.21	100	10.3	17.8
Prunus serotina	237.0	16.8	6.74	22.97	100	10.3	16.7
Acer saccharum	251.1	17.8	5.50	18.74	100	10.3	15.6
Ulmus rubra	261.8	18.6	3.15	10.74	75	7.7	12.3
Juglans nigra	173.3	12.3	2.39	8.15	75	7.7	9.4
Ulmus americana	176.9	12.5	1.38	4.70	100	10.3	9.2
Liriodendron tulipifera	14.1	1.0	0.54	1.84	75	7.7	3.5
Aesculus glabra	42.4	3.0	0.31	1.06	25	2.6	2.2
Pyrus malus	14.1	1.0	0.09	0.27	50	5.1	2.1
Platanus occidentalis	3.5	0.2	0.22	0.75	25	2.6	1.2
Carya ovata	7.1	0.5	0.13	0.44	25	2.6	1.2
Acer negundo	3.5	0.2	0.14	0.46	25	2.6	1.1
Ostrya virginiana	3.5	0.2	0.06	0.20	25	2.6	1.0
Cercis canadensis	3.5	0.2	0.04	0.14	25	2.6	1.0
Celtis occidentalis	3.5	0.2	0.03	0.10	25	2.6	1.0
Crataegus mollis	3.5	0.2	0.02	0.07	25	2.6	1.0
Quercus rubra	3.5	0.2	0.01	0.03	25	2.6	0.9
Quercus alba	3.5	0.2	0.01	0.03	25	2.6	0.9
Sassafras albidum	3.5	0.2	0.01	0.03	25	2.6	0.9
Vitis spp.	3.5	0.2	0.01	0.03	25	2.6	0.9
Total	1410.9	100.0	29.3	100.0	975.0	100.0	100.0

The presettlement vegetation of the Central Till Plain has been broadly described as beech–maple (Hedge 1997). Lindsey (1969) states that oak–hickory forest is a "subfinal" successional type and that mature forests in this region of Indiana are beech–maple. The composition of the forest of Botany Glen is undergoing change with the increase of *Acer saccharum*. A visual survey of the overstory confirms the present dominance of *Quercus* and *Carya* species and the growing dominance of *Acer saccharum*. However, *Fagus grandifolia* does not show a co-dominance with *Acer saccharum*. The sum of its importance values for all three plots does not even approach 3%, and a visual survey reveals a relatively low density of stems in Botany Glen. For now, Botany Glen's forests may still be classified as oak–hickory.

The average density of all three permanent monitoring plots at Botany Glen is 972.4 stems/ha and the average basal area is 33.1 m^2/ha. The average density for the forest communities of Ginn Woods is 421 stems/ha and average basal area is 37 m^2/ha (Badger et al. 1998). The mean density and basal area for the communities at Wilbur Wright Fish and Wildlife Area is 1065.7 stems/ha and 26.2 m^2/ha (Reidy 2002). The lower density of the communities of Ginn Woods is suggestive of the more widespread stems of this old-growth forest. The higher densities and lower basal areas found overall at Botany Glen and Wilbur Wright Fish and Wildlife Area are indicative of a younger forest with many smaller stems. The total basal area for the upland forest (36 m^2/ha) and the floodplain forest (33 m^2/ha) are indicative of mature stands.

The secondary successional forest containing Plot 1 is the area most recently disturbed by human activity. The plant community here does not fit well into the National Vegetation Classification System's (NVCS) associations (Faber-Langendoen 2001). The very high number of stems of *Acer saccharum* in the understory suggests that it will become dominant. Continued closing of the canopy will select species that are more shade tolerant. The west edge will likely continue to harbor many exotic and pioneer species due to the



Figures 7, 8.—7. Secondary successional forest. Overstory size-class stem distribution for the secondary successional forest of Botany Glen (Plot 1) for the species with the highest Importance Value. Some species from the same genus with similar habitat requirements were combined. The remaining species are grouped with "Others." Other species are shown in Table 4; 8. Seasonal comparison of dominant herbaceous layer in secondary successional forest of Botany Glen (Plot 1). The dominant species are those that have Importance Value of 5 or greater.

presence of a cultivated field just beyond the fence.

Much of the west side of Botany Glen was most likely under cultivation for some time prior to 1962. Although most of this area has filled in with woody species, there is a small area of old field that remains predominantly herbaceous. Only a few areas of Botany Glen

Table 5.—A comparison of some east-central Indiana natural areas. Area is in hectares. Pteridophyte counts include ferns and fern allies. (Rothrock et al. 1993; Rothrock 1997; Ruch 1998; Ruch et al. 2002; Ruch pers. obser.)

	Area	Native species	Pteridophytes
Fogwell Forest	11	213	11
Botany Glen	18	301	13
Ginn Woods	61	385	16
Mounds State Park	105	388	7
Wilbur Wright FWA	416	472	15

are regularly disturbed, including the roadsides and the ropes course area, both of which are mowed in the summer. Some of the ropes course area has been covered in wood chips to discourage plant growth and to prevent erosion.

The vegetation of the floodplain forest (Plot 2) most closely resembles the *Platanus occidentalis–Acer saccharinum–Juglans nigra–Ulmus rubra* forest described in the NVCS (Faber-Langendoen 2001). However, the community immediately adjacent to the Mississinewa River fits better into the *Acer saccharinum–Ulmus americana–(Populus deltoides)* forest (Faber-Langendoen 2001). The very low count of saplings noted in Plot 2 may be attributable, in part, to the high seedling mortality (> 50%) associated with the poorly-drained Sloan clay loam soil (Jensen 1988) and annual flooding. Both *Platanus occidentalis* and *Juglans nigra* are dominants that show little replacement in the lower size-classes (Fig. 5). It would be expected that these two species would decline relative to those well represented in the lower size-classes, such as *Carya cordiformis*, *Celtis occidentalis*, and *Aesculus glabra*. However, periodic severe floods may provide disturbance that would allow for reproduction of more flood-tolerant species.

The community of plants in the dry upland forest (Plot 3) is best classified as *Quercus velutina–Quercus alba–Carya (glabra, ovata)* forest (Faber-Langendoen 2001). Fire suppression in this community explains the aggressive spread of *Acer saccharum* in the smaller size-classes. With continued fire suppression, *A. saccharum* will alter the *Quercus–Carya* association that relies on fire to control competing species. With time and mortality of maturing *Quercus* and *Carya* species, the *Quercus–Carya* association may be dominated by shade-tolerant species. The increasingly closed canopy associated with fire suppression will also affect the associated herbaceous community of the oak–hickory forest (Barbour 1999; Gurevitch 2002).

Attention should be given to several concerns for the future management of Botany Glen. There has been no known attempt to control exotic species. *Alliaria petiolata* has the potential to become a problem, especially on the southeast edge, as does *Rosa multiflora* on the west edge. Dumping of garbage from CR 500E has been significant; however, it is not as significant as the disposal of clippings, leaves, and other organic matter by neighbors living across the road to the east. Sections of the slopes adjacent to CR 500E are buried under 0.7 m of this material and herbaceous plants have ceased to grow in some of these areas. In addition, several cultivated species were collected from the east uplands that were presumably thrown into the woods or roadsides from gardens. Measures as simple as repairs to the east fence and posting of signs may prevent further dumping. Consideration should be given to prescribed fire management of the oak–hickory upland forest to reduce invasion of shade-tolerant species and to help maintain biodiversity.

ACKNOWLEDGMENTS

The Ball State University Department of Biology provided financial support and equipment for this study. The authors are grateful to Indiana Wesleyan University, especially to the Department of Biology and to Chaplain Gary Swyers, for their support. We would also like to thank Hank Huffman of the Indiana Division of Nature Preserves who provided useful information on Botany Glen. We also wish to extend our appreciation to Alice Heikens and Kay Yatskievych for their critical evaluation of the manuscript.

APPENDIX A

Catalog of Vascular Plants of Botany Glen

(arranged alphabetically by family)

Information following each species includes: ☆ = naturalized (exotic), non-native plants; + = county record according to a list

from the Indiana Natural Heritage Data Center.

Frequency of occurrence: rare = very few individuals or fewer than two colonies; infrequent = not widespread, may be in large numbers at one location; frequent = common throughout suitable habitat; abundant = in large numbers throughout the property.

The typical habitat and Ball State University Herbarium (BSUH) number are listed following estimate of frequency. Status of certain species in brackets is taken from a list compiled by the Indiana Division of Nature Preserves (10 April 1996).

PHYLUM EQUISETOPHYTA
(Scouring Rushes)

Equisetaceae (Horsetail Family)

Equisetum arvense L.: Common Horsetail; infrequent; eastside of floodplain in shade; BSUH 12100.

Equisetum hymale L.: Common Scouring Rush; frequent; along stream; BSUH 12101.

PHYLUM POLYPODIOPHYTA
(Ferns)

Pteridaceae (Maidenhair Fern Family)

Adiantum pedatum L.: Northern Maidenhair Fern; rare; on slope above intermittent stream; BSUH 12102.

Aspleniaceae (Spleenwort Family)

Asplenium platyneuron L. Oakes: (+); Ebony Spleenwort; frequent; secondary succesional woods, river floodplain; BSUH 12103.

Dryopteridaceae (Wood Fern Family)

Cystopteris protrusa (Weatherby) Blasdell: (+); Lowland Bladder-Fern; abundant; mesic woods; BSUH 12104.

Deparia acrostichoides (Swartz) M. Kato: (+); Silvery Glade Fern; rare; shallow ravine north of chimney; BSUH 12105.

Diplazium pycnocarpon (Sprengel) M. Broun: (+); Narrow Leaved Glade Fern or Glade Fern; rare; shallow ravine north of chimney; BSUH 12106.

Onoclea sensibilis L.: Sensitive Fern; rare; seep below high ropes; BSUH 12107.

Polystichum acrostichoides (Michx.) Schott: Christmas Fern; rare; eastern dry hillside by culvert; BSUH 12108

Ophioglossaceae
(Adder's Tongue Fern Family)

Botrychium dissectum var. *dissectum* Spreng.: (+); Lace-Frond Grape-Fern; rare; along west fence closer to river; BSUH 12109.

Botrychium dissectum var. *obliquum* (Muhl.) Clute: (+); Lace-Frond Grape-Fern; frequent; mesic woods; BSUH 12110.

Botrychium virginianum (L.) Swartz: Rattlesnake Fern; frequent; mesic woods; BSUH 12111.

Ophioglossum vulgatum L.: (+); Adder's Tongue Fern; rare; near west fence in secondary successional woods; BSUH 12112.

PHYLUM PINOPHYTA
(Gymnosperms)

Cupressaceae (Cypress Family)

Juniperus virginiana L.: Eastern Red Cedar; rare; edge of woods facing south along Wheeling Pike; BSUH 12113.

Pinaceae (Pine Family)

Pinus strobus L.: (☆, +); Northern White Pine; rare; planted through westside of property; BSUH 12114.

PHYLUM MAGNOLIOPHYTA
(Angiosperms)

Acanthaceae (Acanthus Family)

Justicia americana (L.) Vahl.: (+); American Waterwillow; frequent; along river; BSUH 12115.

Ruellia strepens L.: Smooth Ruellia; infrequent; along CR 500E; BSUH 12116.

Aceraceae (Maple Family)

Acer negundo L.: (+); Box Elder; frequent; in floodplain and along stream; BSUH 12117.

Acer nigrum Michx. f.: Black Maple; frequent; along stream and riverbanks; BSUH 12118.

Acer saccharinum L.: Silver Maple; infrequent; along river; BSUH 12119.

Acer saccharum Marshall: Sugar Maple; abundant; mesic woods; BSUH 12120.

Agavaceae (Agave Family)

Yucca filamentosa L.: (☆, +); Adam's Needle or Spanish Bayonet; rare; one plant on shoulder of east hillside very close to CR 500E, probably planted; BSUH 12121.

Alismataceae (Water Plantain Family)

Alisma subcordatum Raf.: (+); Southern Water Plantain; rare; along stream by river in sandy soil; BSUH 12122.

Sagittaria latifolia Willd.: (+); Common Arrow-Head; infrequent; along river east of stream mouth; BSUH 12123.

Amaranthaceae (Amaranth Family)

Amaranthus hybridus L.: (☆); Smooth Pigweed; infrequent; along river; BSUH 12124.

Anacardiaceae (Cashew Family)

Rhus glabra L.: Smooth Sumac; infrequent; along CR 500E; BSUH 12125.

Toxicodendron radicans (L.) Kuntz var. *negundo* (Greene) Reveal (+): Poison Ivy; frequent; in secondary successional areas; BSUH 12126.

Annonaceae (Custard Apple Family)

Asimina triloba (L.) Dunal: Pawpaw; frequent; in mesic woods; BSUH 12127.

Apiaceae (Carrot Family)

Angelica atropurpurea L.: Purplestem Angelica; infrequent; loodplain; BSUH 12128.

Chaerophyllum procumbens (L.) Crantz: Spreading Chervil; frequent; mesic woods; BSUH 12129.

Cicuta maculata L.: Common Water Hemlock; infrequent; floodplain; BSUH 12130.

Cryptotaenia canadensis (L.) DC.: Honewort; abundant; mesic woods; BSUH 12131.

Daucus carota L.: (☆); Wild Carrot; infrequent; along roads and in gaming area; BSUH 12132.

Erigenia bulbosa (Michx.) Nutt.: Harbinger of Spring; frequent; mesic woods and hillsides; BSUH 12133.

Heracleum lanatum Michx.: (+); Cow Parsnip; rare; on bank above river; BSUH 12134.

Osmorhiza longistylis (Torr.) DC.: Long Styled Sweet Cicely or Aniseroot; abundant; mesic woods; BSUH 12134.

Sanicula gregaria E. Bickn.: Cluster Sanicle; abundant; mesic woods; BSUH 12135.

Sanicula trifoliata E. Bickn.: (+); Beaked Sanicle; infrequent; mesic woods; BSUH 12136.

Taenidia integerrima (L.) Drude: Yellow Pimpernel; infrequent; dry hillsides; BSUH 12137.

Thaspium trifoliatum (L.) A. Gray: Smooth Meadow Parsnip; infrequent; along CR 500E and on dry hilltop; BSUH 12138.

Apocynaceae (Dogbane Family)

Apocynum cannabinum L.: Hemp Dogbane; infrequent; old-field and along CR 500E; BSUH 12139.

Vinca minor L.: (☆, +); Periwinkle; rare; along CR 500E; BSUH 12140.

Araceae (Arum Family)

Arisaema triphyllum var. *triphyllum* (L.) Schott: Jack-in-the-Pulpit; frequent; throughout mesic woods; BSUH 12141.

Symplocarpus foetidus (L.) Nutt.: (+); Skunk Cabbage; frequent; seeps and floodplain; BSUH 12142.

Aristolochiaceae (Birthwort Family)

Asarum canadense L.: Wild Ginger; abundant; mesic woods; BSUH 12143.

Asclepiadaceae (Milkweed Family)

Asclepias syriaca L.: Common Milkweed; rare; along CR 500E; BSUH 12144.

Asteraceae (Aster Family)

Achillea millefolium L.: (☆, +); Common Yarrow; infrequent; old-field; BSUH 12145.

Ambrosia artemisiifolia L. (+): Common Ragweed; frequent; along stream and roads; BSUH 12146.

Ambrosia trifida L.: Giant Ragweed; infrequent; along Wheeling Pike; BSUH 12147.

Aster cordifolius L. (+): Common Blue Heart-Leaved Aster; frequent; mesic woods; BSUH 12148.

Aster lanceolatus var. *simplex* (Willd.) A.G. Jones (+): Eastern Lined Aster; infrequent; along stream and river; BSUH 12149.

Aster lateriflorus (L.) Britton (+): Goblet Aster; frequent; mesic woods; BSUH 12150.

Aster novae-angliae L.: (+); New England Aster; rare; along Wheeling Pike; BSUH 12151.

Aster puniceus L.: Bristly Aster; infrequent; along stream and river; BSUH 12152.

Aster shortii Lindley: Midwestern Blue Heart-Leaved Aster; frequent; mesic woods; BSUH 12153.

Bidens cernua L.: Bur Marigold; infrequent; along stream and river; BSUH 12154.

Bidens frondosa L.: (+); Devil's Beggar Ticks; frequent; floodplain; BSUH 12155.

Bidens vulgata Greene: Tall Beggar Ticks; infrequent; floodplain; BSUH 12156.

Chrysanthemum leucanthemum L.: (☆); Ox-Eye Daisy; infrequent; old-field; BSUH 12157.

Cichorium intybus L.: (☆, +); Chicory; infrequent; along Wheeling Pike; BSUH 12158.

Cirsium arvense (L.) Scop. var. *arvense*: (☆); Canada Thistle; infrequent; along Wheeling Pike; BSUH 12159.

Cirsium discolor (Muhl.) Sprengel: (+); Field Thistle; rare; along Wheeling Pike; BSUH 12160.

Conyza canadensis (L.) Cronq.: (+); Horseweed; infrequent; along Wheeling Pike; BSUH 12161.

Eclipta prostrata (L) L.: (☆); Yerba-de-Tajo; rare; along river; BSUH 12162.

Erigeron annuus (L.) Pers.: Annual Fleabane; infrequent; open areas and edges of woods; BSUH 12163.

Erigeron philadelphicus L.: Philadelphia Daisy; infrequent; near seeps and stream; BSUH 12164.

Eupatorium purpureum L.: Purple-Node Joe Pye Weed; infrequent; hillsides; BSUH 12165.

Eupatorium rugosum Houttuyn: White Snakeroot; frequent; mesic woods; BSUH 12166.

Euthamia graminifolia (L.) Nutt.: (+); Common Flat-Topped Goldenrod; rare; old-field; BSUH 12462.

Galinsoga quadriradiata Ruiz & Pavon: (☆, +); Common Quickweed; infrequent; along CR 500E; BSUH 12167.

Helenium autumnale L.: Sneezeweed; rare; along stream near river; BSUH 12168.

Helianthus decapetalous L.: (+); Forest Sunflower; frequent; mesic woods; BSUH 12169.

Lactuca canadensis L.: Tall Lettuce; infrequent; edge of gaming area; BSUH 12170.

Lactuca floridana (L.) Gaertner: (+); Common Woodland Lettuce; infrequent; along Wheeling Pike; BSUH 12171.

Matricaria matricarioides (Less.) Porter: (☆); Pineapple Weed; rare; along Wheeling Pike and CR 500E; BSUH 12172.

Polymnia canadensis L.: Pale-Flowered Leaf Cup; abundant; mesic woods; BSUH 12173.

Prenanthes altissima L.: (+); Tall White Lettuce; frequent; mesic woods; BSUH 12174.

Rudbeckia laciniata L.: Cutleaf Coneflower; frequent; floodplain; BSUH 12175.

Senecio aureus L.: Heart-Leaved Groundsel; infrequent; dry hilltops; BSUH 12176.

Senecio glabellus Poir.: (+); Yellowtop; rare; 1 individual on floodplain west of stream; BSUH 12177.

Solidago caesia L.: (+); Blue-Stemmed Goldenrod; frequent; mesic woods; BSUH 12178.

Solidago canadensis (L.) var. *canadensis*: (+); Common Goldenrod; frequent; old-field; BSUH 12179.

Solidago flexicaulis L.: (+); Zigzag Goldenrod; frequent; mesic woods; BSUH 12180.

Sonchus asper (L.) Hill: (☆, +); Prickly Sow Thistle; rare; along Wheeling Pike; BSUH 12181.

Sonchus oleraceus L.: (☆, +); Common Sow Thistle; rare; along CR 500E; BSUH 12182.

Taraxacum officinale Weber: (☆, +); Common Dandelion; infrequent; along driveway and roads; BSUH 12183.

Verbesina alternifolia (L.) Britton: (+); Wingstem; frequent; along stream; BSUH 12184.

Vernonia gigantea (Walter) Trel.: Tall Ironweed; infrequent; along Wheeling Pike and stream; BSUH 12185.

Xanthium strumarium L.: (☆, +); Common Cocklebur; rare; along stream near river; BSUH 12186.

Balsaminaceae (Touch-Me-Not Family)

Impatiens capensis Meerb.: Orange Touch-Me-Not or Jewelweed; frequent; in floodplain and along streams; BSUH 12187.

Impatiens pallida Nutt.: (+); Yellow Touch-Me-Not or Jewelweed; frequent; in floodplain and along streams; BSUH 12188.

Berberidaceae (Barberry Family)

Berberis thunbergii DC.: (☆, +); Japanese Barberry; rare; dry hillside very close to east fence; BSUH 12189.

Caulophyllum thalictroides (L.) Michx.: Blue Cohosh; frequent; scattered through mesic woods; BSUH 12190.

Jeffersonia diphylla (L.) Pers.: (+); Twinleaf; frequent; mesic woods; BSUH 12191.

Podophyllum peltatum L.: May Apple; abundant; mesic woods; BSUH 12192.

Betulaceae (Birch Family)

Carpinus caroliniana Walter: Hornbeam, Blue Beech, or Ironwood; frequent; along streams; BSUH 12193.

Corylus americana Walter: American Hazelnut; rare; along CR 500E at SE corner of property; BSUH 12194.

Ostrya virginiana (Miller) K. Koch: Hop-Hornbeam or Ironwood; frequent; eastern dry hilltop; BSUH 12195.

Boraginaceae (Borage Family)

Hackelia virginiana (L.) M. Johnston: Stickseed; infrequent; along Wheeling Pike and on dry hilltops; BSUH 12196.

Mertensia virginica (L.) Pers.: (+); Eastern Blue Bells; frequent; mesic woods; BSUH 12197.

Brassicaceae (Mustard Family)

Alliaria petiolata (Bieb.) Cavara & Grande: (☆, +); Garlic Mustard; frequent; edges of woods and along streams; BSUH 12198.

Arabis laevigata (Muhl.) Poiret: Rock Cress; rare; steep slopes along stream; BSUH 12199.

Arabis shortii (Fern.) Gleason: (+); Short's Rock Cress; rare; along the intermittent stream in woods; BSUH 12470.

Barbarea vulgaris R. Brown: (☆, +); Yellow Rocket; infrequent; old-field; BSUH 12200.

Brassica nigra L.: (☆, +); Black Mustard; rare; along river; BSUH 12201.

Capsella bursa-pastoris (L.) Medikus: (☆); Shepherd's Purse; rare; along CR 500E and Wheeling Pike; BSUH 12202.

Cardamine concatenata (Michx.) O. Schwartz: Five-Parted Toothwort; frequent; mesic woods; BSUH 12203.

Cardamine douglassii Britton: (+); Pink Spring Cress; frequent; mesic woods; BSUH 12204.

Cardamine pensylvanica Muhl.: Pennsylvania Bittercress; rare; seep below chimney; BSUH 12205.

Cardamine rhomboidea (Pers.) DC.: Spring Cress; infrequent; in seeps and along streams; BSUH 12206.

Draba verna L.: (+); Whitlow Grass; infrequent; driveway along Wheeling Pike; BSUH 12207.

Iodanthus pinnatifidus (Michx.) Steudel: Purple Rocket; rare; floodplain; BSUH 12208.

Lepidium campestre (L.) R. Br.: (☆, +); Field Cress; rare; along roads; BSUH 12209.

Lepidium virginicum L.: Poor-Man's Pepper; infrequent; along Wheeling Pike; BSUH 12210.

Rorippa nasturtium-aquaticum (L.) Hayek.: (☆, +); Watercress; infrequent; along streams; BSUH 12211.

Rorippa palustris (L.) Besser var. *fernaldiana* (Butters & Abbe) Stuckey: Common Yellow Cress; infrequent; along river; BSUH 12212.

Rorippa sylvestris (L.) Besser: (☆, +); Creeping Yellow Cress; infrequent; along river; BSUH 12213.

Caesalpiniaceae (Caesalpinia Family)

Cercis canadensis L.: Red Bud; frequent; mesic woods; BSUH 12214.

Gleditsia triacanthos L.: (+); Honey Locust; infrequent; edges of woods and secondary successional areas; BSUH 12215.

Gymnocladus dioica (L.) K. Koch: (+); Kentucky Coffeetree; rare; north slope of east hillside; BSUH 12216.

Campanulaceae (Bellflower Family)

Campanula americana L.: Tall Bellflower; infrequent; along stream; BSUH 12217.

Lobelia inflata L.: (+); Indian Tobacco; rare; gaming area at woods' edge; BSUH 12218.

Lobelia siphilitica L.: Great Lobelia; infrequent; along stream; BSUH 12219.

Caprifoliaceae (Honeysuckle Family)

Lonicera maackii (Rupr.) Maxim: (☆, +); Amur Honeysuckle; frequent; woods' edges; BSUH 12220.

Sambucus canadensis L.: Common Elderberry; infrequent; floodplain; BSUH 12221.

Triosteum perfoliatum L.: Perfoliate Horse Gentian; infrequent; south of old-field; BSUH 12222.

Viburnum acerifolium L.: Dockmackie or Flowering Maple; infrequent; woods east of high ropes; BSUH 12223.

Viburnum opulus var. *opulus* L.: (☆, +); Guelder Rose; rare; along west fence near river; BSUH 12224.

Viburnum prunifolium L.: Black Haw; frequent; mesic woods; BSUH 12225.

Caryophyllaceae (Pink Family)

Arenaria serpyllifolia L.: (☆, +); Thyme-Leaved Sandwort; rare; along CR 500E; BSUH 12226.

Cerastium arvense L.: Field Chickweed; frequent; east hillside between path and CR 300E; BSUH 12471.

Cerastium brachypetalum Pers.: (+); Mouse-Ear Chickweed; infrequent; along driveway; BSUH 12227.

Silene stellata (L.) Aiton f.: (+); Starry Campion; infrequent; dry hilltops; BSUH 12228.

Silene virginica L.: Fire Pink; infrequent; woods just north of south gate; BSUH 12229.

Celastraceae (Staff-Tree Family)

Euonymus atropurpureus Jacq.: Wahoo; rare; E side of property by bridge over River; BSUH 12230.

Euonymus obovatus Nutt.: Running Strawberry Bush; frequent; mesic woods; BSUH 12231.

Clusiaceae (Mangosteen Family)

Hypericum punctatum Lam.: Spotted St. John's Wort; infrequent; old field; BSUH 12232.

Commelinaceae (Spiderwort Family)

Commelina communis L.: (☆, +); Common Dayflower; rare; along CR 500E above culvert; BSUH 12233.

Tradescantia subaspera Ker Gawler: Spiderwort; abundant; moist woods; BSUH 12234.

Tradescantia virginiana L.: Virginia Spiderwort or Widow's Tears; frequent; east hilltop; BSUH 12235.

Cornaceae (Dogwood Family)

Cornus alternifolia L. f.: Pagoda Dogwood; rare; south of intermittent stream by seep; BSUH 12236.

Cornus drummondii C.A. Meyer: (+); Rough-Leaved Dogwood; infrequent; along CR 500E and in the old field; BSUH 12237.

Cornus florida L.: (+); Flowering Dogwood; rare; east hilltop south near ravine that enters from east; BSUH 12238.

Crassulaceae (Stonecrop Family)

Sedum ternatum Michx.: Stonecrop; infrequent; on shoulder of east hillside; BSUH 12239.

Cucurbitaceae (Gourd Family)

Echinocystis lobata (Michx.) T. & G.: (+); Wild Cucumber; rare; along river and stream; BSUH 12240.

Cuscutaceae (Dodder Family)

Cuscuta gronovii Willd.: (+); Common Dodder; frequent; floodplain and along river; BSUH 12241.

Cyperaceae (Sedge Family)

Carex albursina Sheldon: Sedge; frequent; dry hillsides; BSUH 12242.

Carex blanda Dewey: Sedge; infrequent; along drainage near culvert east of stream; BSUH 12243.

Carex careyana Torr.: (+); Sedge; frequent; mesic woods; BSUH 12244.

Carex communis Bailey: Sedge; infrequent; north end of east hillside; BSUH 12245.

Carex davisii Schwein & Torr.: Sedge; infrequent; woods east of the south gate; BSUH 12246.

Carex frankii Kunth.: Sedge; infrequent; floodplain along trail east of stream; BSUH 12247.

Carex grayi Carey: Sedge; infrequent; floodplain and wet soil; BSUH 12248.

Carex grisea Wahlenb.: (+); (*C. amphibola* Steudel); Sedge; infrequent; along drainage near culvert east of stream; BSUH 12249.

Carex hirtifolia Mackenzie: Sedge; infrequent; east bank of stream near south portion of property; BSUH 12250.

Carex jamesii Schwein: Sedge; frequent; mesic woods; BSUH 12251.

Carex laevivaginata (Kuk.) Mackenzie: (+); Sedge; infrequent; floodplain west of stream, very wet; BSUH 12252.

Carex laxiculmis Schwein: Sedge; infrequent; top of north facing slope on SE side of property; BSUH 12253.

Carex laxiflora Lam.: Sedge; infrequent; shoulder of west hillside; BSUH 12254.

Carex oligocarpa Schk.: (+); Sedge; infrequent; east ridge along old trail; BSUH 12255.

Carex pensylvanica Lam.: (+); Sedge; infrequent; east hilltop, dry woods; BSUH 12256.

Carex shortiana Dewey: Sedge; rare; floodplain east of stream; BSUH 12257.

Carex sparganioides Muhl.: Sedge; rare; woods east of old field on slope shoulder; BSUH 12258.

Carex woodii Dewey: (+); Sedge; infrequent; top of north facing slope on SE side of property; BSUH 12259.

Cyperus strigosus L.: (+); False Nutsedge; rare; along river near bridge; BSUH 12260.

Eleocharis palustris L.: (+); Spike Rush; infrequent; springy area along river west of stream mouth; BSUH 12261.

Dipsacaceae (Teasel Family)

Dipsacus sylvestris Hudson: (☆); Common Teasel; rare; along Wheeling Pike; BSUH 12262.

Elaeagnaceae (Oleaster Family)

Elaeagnus umbellata Thunb.: (☆, +); Autumn Olive; infrequent; old field areas; BSUH 12263.

Euphorbiaceae (Spurge Family)

Acalypha rhomboidea Raf.: Rhombic Copperleaf; frequent; along Wheeling Pike and CR 500E; BSUH 12264.

Euphorbia maculata L.: (+); Milk Purslane; frequent; dry open disturbed areas; BSUH 12265.

Euphorbia nutans Lagasca: (☆, +); Eyebane; infrequent; near bridge along CR 500E; BSUH 12265.

Fabaceae (Pea Family)

Desmodium paniculatum (L.) DC.: (+); Panicled Tick-Trefoil; rare; along CR 500E by east gate; BSUH 12266.

Medicago lupulina L. :(☆); Black Medick; infrequent; along Wheeling Pike; BSUH 12267.

Melilotus officinalis (L.) Pallas: (☆); Yellow Sweet Clover; rare; along Wheeling Pike; BSUH 12268.

Robinia pseudoacacia L.; (☆, +); Black Locust; infrequent; SE corner along Wheeling Pike; BSUH 12269.

Trifolium hybridum L.: (☆, +); Alsike Clover; infrequent; driveway and gaming area; BSUH 12270.

Trifolium pratense L.: (☆, +); Red Clover; infrequent; along Wheeling Pike; BSUH 12271.

Trifolium repens L.: (☆, +); White Clover; infrequent; driveway; BSUH 12272.

Fagaceae (Beech Family)

Fagus grandifolia Ehrh.: American Beech; frequent; mesic woods; BSUH 12273.

Quercus alba L.: White Oak; abundant; mesic woods; BSUH 12274.

Quercus imbricaria Michx.: (+); Shingle Oak; rare; old field; BSUH 12275.

Quercus macrocarpa Michx.: Bur Oak; infrequent; along river; BSUH 12276.

Quercus muehlenbergii Engelm.: (+); Yellow Oak; infrequent; along stream; BSUH 12277.

Quercus rubra L.: Northern Red Oak; frequent; mesic woods; BSUH 12278.

Quercus velutina Lam.: (+); Black Oak; frequent; dry hilltops; BSUH 12279.

Fumariaceae (Fumitory Family)

Dicentra canadensis (Goldie) Walp.: (+); Squirrel Corn; frequent; mesic woods; BSUH 12280.

Dicentra cucullaria (L.) Bernh.: (+); Dutchman's Breeches; abundant; mesic woods; BSUH 12281.

Geraniaceae (Geranium Family)

Geranium maculatum L.: Wild Geranium; abundant; mesic woods; BSUH 12282.

Grossulariaceae (Gooseberry Family)

Ribes cynosbati L.: Dogberry; infrequent; hilltop south of intermittent stream; BSUH 12283.

Hippocastanaceae (Horse-Chestnut Family)

Aesculus glabra Willd.: Ohio Buckeye; abundant; mesic woods; BSUH 12284.

Hydrangeaceae (Hydrangea Family)

Hydrangea arborescens L.: (+); American Hydrangea; infrequent; steep slopes east of stream and along river: BSUH 12285.

Hydrophyllaceae (Waterleaf Family)

Hydrophyllum appendiculatum Michx.: Biennial Waterleaf; frequent; mesic woods; BSUH 12286.

Hydrophyllum canadense L.: (+); Maple-Leaved Waterleaf; infrequent; along intermittent stream; BSUH 12287.

Hydrophyllum macrophyllum Nutt.: Hairy Waterleaf; frequent; mesic woods; BSUH 12288.

Iridaceae (Iris Family)

Iris virginica var. *shrevei* (Small) E. Anderson: (+); Southern Blue Flag; infrequent; floodplain west of stream; BSUH 12289.

Sisyrinchium angustifolium Miller: Blue-Eyed Grass; rare; along stream south of floodplain; BSUH 12290.

Juglandaceae (Walnut Family)

Carya cordiformis (Wangenh.) K. Koch: Bitternut Hickory; frequent; mesic woods; BSUH 12291.

Carya glabra (Miller) Sweet: (+); Pignut Hickory; frequent; eastern dry hilltop; BSUH 12292.

Carya ovata (Miller) K. Koch: Shagbark Hickory; frequent; mesic woods; BSUH 12293.

Juglans nigra L.: Black Walnut; frequent; mesic woods; BSUH 12294.

Juncaceae (Rush Family)

Juncus tenuis var. *tenuis* Willd.: Path Rush; infrequent; driveway; BSUH 12295.

Luzula multiflora (Retz.) Lej.: (+); Wood Rush; frequent; mesic woods; BSUH 12296.

Lamiaceae (Mint Family)

Ajuga reptans L.: (☆, +); Carpet Bugle; rare; along CR 500E; BSUH 12297.

Blephilia hirsuta (Pursh.) Benth.: Hairy Wood Mint; frequent; mesic woods; BSUH 12298.

Collinsonia canadensis L.: Northern Horsebalm; frequent; mesic woods; BSUH 12299.

Glechoma hederacea L.: (☆); Gill-over-the-Ground; rare; along Wheeling Pike; BSUH 12300.

Lamium purpureum L.: (☆, +): Red Dead Nettle; infrequent; along driveway and roads; BSUH 12301.

Melissa officinalis L.: (☆, +); Lemon Balm; rare; along CR 500E by east gate; BSUH 12302.

Monarda fistulosa L.: Wild Bergamot; infrequent; just south of floodplain; BSUH 12303.

Prunella vulgaris L.: (☆); Selfheal; rare; driveway; BSUH 12304.

Scutellaria incana Biehler: Downy Skullcap; infrequent; woods along path north of the old field; BSUH 12305.

Scutellaria lateriflora L.: Mad-Dog Skullcap; infrequent; floodplain west of stream; BSUH 12306.

Scutellaria ovata Hill var. *versicolor* (Nutt.) Fern.: (+); Forest Skullcap; rare; woods east of old field on shoulder of slope; BSUH 12307.

Stachys hispida Pursh.: (+); Hispid Hedge Nettle; infrequent; west of stream near seeps; BSUH 12308.

Stachys tenuifolia Willd.: Smooth Hedge Nettle; infrequent; floodplain west of stream along trail; BSUH 12309.

Teucrium canadense L. var. *virginianum* (L.) Eaton: American Germander; infrequent; easternmost extent of the old field; BSUH 12310.

Lauraceae (Laurel Family)

Lindera benzoin (L.) Blume: Spicebush; frequent; along streams; BSUH 12311.

Sassafras albidum (Nutt.) Nees.: (+); Sassafras; frequent; along west fence and in old field; BSUH 12312, 12313.

Lemnaceae (Duckweed Family)

Lemna minor L.: (+); Lesser Duckweed; infrequent; standing water in floodplain and slow moving curves of stream; BSUH 12314.

Liliaceae (Lily Family)

Allium canadense L.: (+); Onion; frequent; lowlands; BSUH 12315.

Allium tricoccum Aiton var. *burdickii* (Aiton) Hanes: Ramp; abundant; mesic woods; BSUH 12316.

Camassia scilloides (Raf.) Cory: Wild Hyacinth; frequent; floodplain; BSUH 12317.

Erythronium albidum Nutt.: (+); White Trout Lily; frequent; lowlands; BSUH 12318.

Erythronium americanum Ker Gawler: Yellow Trout Lily; abundant; mesic woods; BSUH 12319.

Polygonatum biflorum (Walter) Elliott: Solomon's Seal; frequent; uplands and woods' edge along CR 500E; BSUH 12320.

Smilacina racemosa (L.) Desf.: False Solomon's Seal; frequent; mesic woods; BSUH 12321.

Trillium flexipes Raf.: (+); Bent Trillium; abundant; mesic woods; BSUH 12322.

Trillium grandiflorum (Michx.) Salisb.: (+); Big White Trillium; infrequent; steep slopes of ravines above streams; BSUH 12323.

Trillium recurvatum Beck.: Prairie Trillium; frequent; mesic woods; BSUH 12324.

Trillium sessile L.: Toadshade; frequent; mesic woods; BSUH 12325, 12326.

Uvularia grandiflora J.E. Smith: Bellwort; abundant; mesic woods; BSUH 12327.

Veratrum woodii Robbins: (+); False Hellebore; infrequent; woods south of high ropes and slope of east ridge; BSUH 12328.

Limnanthaceae (Meadow-Foam Family)

Floerkea proserpinacoides Willd.: False Mermaid; infrequent; floodplain; BSUH 12329.

Magnoliaceae (Magnolia Family)

Liriodendron tulipifera L.: Tulip Tree or Yellow Poplar; frequent; mesic woods; BSUH 12330.

Malvaceae (Mallow Family)

Abutilon theophrasti Medikus: (☆, +); Velvetleaf; infrequent; along river and stream; BSUH 12331.

Sida spinosa L.: (☆, +); Prickly Sida; rare; along Wheeling Pike; BSUH 12332.

Menispermaceae (Moonseed Family)

Menispermum canadense L.: Moonseed; rare; southeast corner of property at woods' edge; BSUH 12333.

Moraceae (Mulberry Family)

Morus alba L.: (☆, +); White Mulberry; rare; southeast corner, behind sign; BSUH 12334.

Morus rubra L.: (+); Red Mulberry; rare; along river and in floodplain; BSUH 12335.

Oleaceae (Olive Family)

Fraxinus americana L.: (+); White Ash; abundant; mesic woods; BSUH 12336.

Fraxinus pennsylvanica Marshall: (+); Green Ash; infrequent; floodplain and seeps; BSUH 12337.

Fraxinus quadrangulata Michx.: (+); Blue Ash; frequent; upland forests; BSUH 12338.

Onagraceae (Evening Primrose Family)

Circaea lutetiana L. var. *canadensis*: Common Enchanter's Nightshade; infrequent; shoulder of north end of east hilltop; BSUH 12339.

Oenothera biennis L.: Common Evening Primrose; rare; along Wheeling Pike; BSUH 12340.

Orchidaceae (Orchid Family)

Aplectrum hyemale (Muhl.) Torr.: (+); Puttyroot; rare; on east hillside along trail; BSUH 12341.

Liparis liliifolia (L.) Rich.: (+); Large Twayblade or Mauve Sleekwort; rare; woody old field along west fence; BSUH 12342.

Orobanchaceae (Broom-rape Family)

Epifagus virginiana (L.) Barton.: (+); Beech Drops; infrequent; with beech west of stream and seep; BSUH 12343, 12344.

Oxalidaceae (Wood Sorrel Family)

Oxalis stricta L.: Common Yellow Wood Sorrel; infrequent; woody old field along west fence and in gaming area; BSUH 12345.

Papaveraceae (Poppy Family)

Sanguinaria canadensis L.: (+); Bloodroot; frequent; mesic woods; BSUH 12346.

Stylophorum diphyllum (Michx.) Nutt.: (+); Celandine Poppy; infrequent; steep slope near trail, southeast corner; BSUH 12347.

Phytolaccaceae (Pokeweed Family)

Phytolacca americana L.: Pokeweed; infrequent; along Wheeling Pike; BSUH 12348.

Plantaginaceae (Plantain Family)

Plantago lanceolata L.: (☆, +); English Plantain; infrequent; along Wheeling Pike and CR 500E; BSUH 12349.

Plantago rugelii Decne.: American Plantain; infrequent; along Wheeling Pike and driveway; BSUH 12350.

Platanaceae (Plane-tree Family)

Platanus occidentalis L.: (+); Sycamore; frequent; floodplain, river and stream banks; BSUH 12351.

Poaceae (Grass Family)

Brachyelytrum erectum (Schreber) P. Beauv.: (+); Long-Awned Wood Grass; infrequent; east hillside; BSUH 12352.

Bromus commutatus Schrader: (☆); Hairy Chess; infrequent; old field; BSUH 12353.

Bromus inermis Leysser: (☆, +); Smooth Brome; rare; edge of gaming area; BSUH 12354.

Cinna arundinacea L.: Common Woodreed; frequent; mesic woods; BSUH 12355.

Diarrhena americana var. *americana* P. Beauv.: (+); Beak Grass; infrequent; mesic woods; BSUH 12356.

Digitaria ischaemum (Schreber) Muhl.: (☆, +); Smooth Crabgrass; infrequent; gaming area; BSUH 12357.

Echinochloa crusgalli (L.) P. Beauv.: Barnyard Grass; frequent; along the stream in the floodplain; BSUH 12472.

Eleusine indica (L.) Gaertner: (☆, +); Yardgrass; infrequent; along driveway; BSUH 12358.

Elymus hystrix L.: Bottlebrush Grass; frequent; mesic woods; BSUH 12359.

Elymus riparius Wieg.: Streambank Rye; frequent; mesic woods; BSUH 12360.

Elymus villosus Muhl.: Downy Wild Rye; frequent; mesic woods; BSUH 12361.

Elymus virginicus L.: Virginia Wild Rye; infrequent; along path through floodplain east of stream; BSUH 12362.

Eragrostis minor Host.: (☆, +); Lovegrass; infrequent; along CR 500E; BSUH 12363.

Festuca subverticillata (Pers.) E. Alexeev.: Nodding Fescue; frequent; mesic woods; BSUH 12364.

Glyceria striata (Lam.) A. Hitchc.: Fowl Mannagrass; infrequent; east bank of stream; BSUH 12365.

Leersia oryzoides (L.) Swartz: Rice Cut Grass; frequent; along stream and river; BSUH 12366.

Leersia virginica Willd.: White Grass; frequent; floodplain wood; BSUH 12473.

Muhlenbergia frondosa (Poiret) Fern.: Common Satin Grass; rare; steep bank along stream; BSUH 12367.

Muhlenbergia schreberi J.F. Gmel.: Nimblewill; rare; along CR 500E; BSUH 12368.

Panicum dichotomiflorum Michx.: (+); Panic Grass; infrequent; along stream; BSUH 12369.

Panicum lanuginosum Elliott var. *fasciculatum* (Torr.) Fern.: (+); Panic Grass; rare; north edge of gaming area; BSUH 12370.

Phalaris arundinacea L.: (☆, +); Reed Canary Grass; frequent; along river, streams and Wheeling Pike; BSUH 12371.

Phleum pratense L.: (☆); Timothy; infrequent; old field and gaming areas; BSUH 12372.

Poa pratensis L.: (☆); Kentucky Bluegrass; infrequent; woods east of driveway; BSUH 12373.

Setaria faberi R. Herrm.: (☆, +); Nodding Foxtail Grass; infrequent; along CR 500E; BSUH 12374.

Setaria glauca (L.) P. Beauv.: (☆): Yellow Foxtail Grass; infrequent; along CR 500E; BSUH 12375.

Sporobolus asper (Michx.) Kunth.: Tall Dropseed; infrequent; in dry or sandy soil along Wheeling Pike; BSUH 12474.

Tridens flavus (L.) A. Hitchc.: (☆, +); Purpletop; rare; along Wheeling Pike; BSUH 12376.

Zea mays L.: (☆, +); Volunteer Corn; rare; along Wheeling Pike; BSUH 12377.

Polemoniaceae (Phlox Family)

Phlox divaricata L.: Forest Phlox; abundant; mesic woods; BSUH 12378.

Phlox paniculata L.: (☆); Summer Phlox; infrequent; along river; BSUH 12379.

Polemonium reptans L.: Spreading Jacob's Ladder; frequent; mesic woods; BSUH 12380.

Polygonaceae (Smartweed Family)

Polygonum aviculare L.: (☆, +); Knotweed; frequent; gaming area and along roads; BSUH 12381.

Polygonum cespitosum Blume: (+); Smartweed; infrequent; along river; BSUH 12382.

Polygonum pensylvanicum L.: Pennsylvania Smartweed; infrequent; along streams and river; BSUH 12383.

Polygonum persicaria L.: (☆); Lady's Thumb; frequent; along streams and river; BSUH 12384.

Polygonum punctatum Elliott: Dotted Smartweed; frequent; floodplain; BSUH 12385.

Polygonum scandens L.: False Buckwheat; infrequent; along stream; BSUH 12386.

Polygonum virginianum L.: Jumpseed; abundant; floodplain; BSUH 12387.

Rumex altissumus A. Wood: (+); Pale Dock; rare; floodplain open area east of stream; BSUH 12388.

Rumex crispus L.: (☆, +); Curly Dock; rare; floodplain and along river; BSUH 12389.

Portulacaceae (Purselane Family)

Claytonia virginica L.: Spring Beauty; abundant; mesic woods; BSUH 12390.

Primulaceae (Primrose Family)

Dodecatheon meadia L.: Eastern Shooting Star; frequent; dry hilltops; BSUH 12391.

Lysimachia ciliata L.: Fringed Loosestrife; infrequent; floodplain, east of stream along trail; BSUH 12392.

Lysimachia nummularia L.: (☆, +); Moneywort; frequent; floodplain; BSUH 12393.

Samolus floribundus HBK.: Water Pimper-

nel; infrequent; along stream at river; BSUH 12394.

Ranunculaceae (Buttercup Family)

Actaea alba (L.) Miller: (+); Doll's Eyes; frequent; dry uplands; BSUH 12395.

Anemone virginiana L.: Tall Anemone; rare; woods' edge along CR 500E; BSUH 12396.

Anemonella thalictroides (L.) Spach.: Rue Anemone; abundant; mesic woods; BSUH 12397.

Caltha palustris L.: Marsh Marigold; frequent; seeps and very wet areas; BSUH 12398.

Hepatica acutiloba DC.: Sharp-Lobed Hepatica; frequent; on hillsides throughout; BSUH 12399.

Hydrastis canadensis L.: Golden Seal; frequent; woods north of gaming area and old field; BSUH 12400.

Isopyrum biternatum (Raf.) T. & G.: False Rue Anemone; abundant; mesic woods; BSUH 12401.

Ranunculus abortivus L.: (+); Small-Flowered Crowfoot; infrequent; along eastside of stream south of the floodplain; BSUH 12402.

Ranunculus hispidus Michx. *caricetorum* (Greene) T. Duncan: Hispid Buttercup; frequent; along stream in floodplain; BSUH 12403.

Thalictrum dasycarpum Fischer & Ave-Lall.: Purple-Stemmed Meadow Rue; infrequent; east hillside along trail; BSUH 12404.

Thalictrum dioicum L.: Early Meadow Rue; infrequent; along river and stream in floodplain; BSUH 12405.

Rosaceae (Rose Family)

Agrimonia pubescens Wallr.: Downy Agrimony; infrequent; old field area; BSUH 12406.

Crataegus mollis (T. & G.) Scheele: Downy Hawthorn; infrequent; woody old field; BSUH 12407.

Crataegus punctata Jacq.: (+); Dotted Hawthorn; infrequent; woody old field; BSUH 12408.

Fragaria virginiana Duchesne: Thick-Leaved Wild Strawberry; infrequent; along driveway; BSUH 12409.

Geum canadense Jacq.: White Avens; frequent; mesic woods; BSUH 12410.

Geum vernum (Raf.) T. & G.: Spring Avens; infrequent; woods; BSUH 12411.

Physocarpus opulifolius (L.) Maxim var. *intermedius* (Rydb.) B.L. Robinson: (+); Ninebark; rare; between driveway and west fence; BSUH 12412.

Potentilla simplex Michx.: Old-Field Five-Fingers; rare; east hilltop; BSUH 12413.

Prunus serotina Ehrh.: Wild Black Cherry; frequent; mesic woods; BSUH 12414.

Pyrus malus L.: (☆); Apple; infrequent; woody old field; BSUH 12415.

Rosa multiflora Thunb. (☆, +); Multiflora Rose; frequent; along west fence and in open areas of floodplain; BSUH 12416.

Rosa setigera Michx.: Climbing Prairie Rose; infrequent; old field; BSUH 12417.

Rubus allegheniensis T.C. Porter: Blackberry; infrequent; near west fence and river; BSUH 12418.

Rubus occidentalis L.: (+); Black Raspberry; frequent; along woods' edges and in old field; BSUH 12419.

Rubus pensilvanicus Poiret.: (+); Pennsylvania Blackberry; rare; along west fence in woody old field; BSUH 12420.

Rubiaceae (Madder Family)

Galium aparine L.: Cleavers; abundant; mesic woods; BSUH 12421.

Galium circaezaens Michx.: Forest Bedstraw or Wild Licorice; frequent; drier woods; BSUH 12422.

Galium concinnum T. & G.: Shining Bedstraw; abundant; mesic woods; BSUH 12423.

Galium triflorum Michx.: (+); Sweet Scented Bedstraw; frequent; mesic woods; BSUH 12424.

Salicaceae (Willow Family)

Populus deltoides Marshall: (+); Cottonwood; infrequent; along river; BSUH 12425.

Salix fragilis L.: (☆, +); Crack Willow; rare; along river; BSUH 12463.

Salix nigra Marshall: Black Willow; rare; along river below bridge; BSUH 12426.

Saururaceae (Lizard's Tail Family)

Saururus cernuus L.: Lizard's Tail; frequent; in seep north of intermittent stream; BSUH 12427.

Saxifragaceae (Saxifrage Family)

Heuchera americana L.: Common Alum-Root; infrequent; east hilltop; BSUH 12428.

Mitella diphylla L.: Two-Leaved Mitrewort; frequent; mostly in low areas along streams; BSUH 12429.

Scrophulariaceae (Figwort Family)

Aureolaria virginica (L.) Pennell: (+); Downy False Foxglove; infrequent; along CR 500E near the east gate; BSUH 12464.

Chelone obliqua L.: (+); Purple Turtlehead; infrequent; eastside of floodplain; BSUH 12430.

Lindernia dubia (L.) Pennell.: False Pimpernel; infrequent; along river; BSUH 12431.

Mimulus alatus Aiton: Sharpwing Monkey Flower; infrequent; along river; BSUH 12432.

Penstemon laevigatus Aiton: (+); Eastern Beard Tongue; rare; on riverbank west of stream mouth; BSUH 12475.

Scrophularia marilandica L.: Eastern Figwort; infrequent; along CR 500E and stream; BSUH 12433.

Verbascum thapsus L.: (☆); Common Mullein; rare; along Wheeling Pike; BSUH 12434.

Veronica anagallis-aquatica L.: (+); Water Speedwell; infrequent; along river; BSUH 12435 [Threatened].

Veronica serpyllifolia L.: (☆, +); Thyme-Leaved Speedwell; rare; along CR 500E; BSUH 12436.

Smilacaceae (Catbrier Family)

Smilax ecirrata (Englm.) S. Wats.: (+); Upright Smilax; infrequent; in floodplain; BSUH 12437.

Smilax herbacea L. var. *lasioneura* (Small) Rydb.: (+); Carrion Flower or Greenbrier; rare; southeast corner in fence along CR 500E 12438.

Smilax hispida Muhl.: Bristly Greenbrier; frequent; mesic woods; BSUH 12439.

Solanaceae (Nightshade Family)

Physalis longifolia Nutt. var. *subglabrata* (Mackenzie & Bush) Cronq.: Longleaf Ground Cherry; infrequent; along CR 500E; BSUH 12440.

Solanum nigrum L.: (Synonym: *Solanum ptychanthum* Dunal); Black Nightshade; infrequent; along stream near river; BSUH 12441.

Tiliaceae (Linden Family)

Tilia americana L.: Basswood or American Linden; infrequent; mesic woods; BSUH 12442.

Ulmaceae (Elm Family)

Celtis occidentalis L.: Northern Hackberry; frequent; mesic woods mostly in floodplain; BSUH 12443.

Ulmus americana L.: (+); White Elm or American Elm; abundant; mesic woods; BSUH 12444.

Ulmus rubra Muhl.: Slippery Elm or Red Elm; abundant; mesic woods; BSUH 12445.

Urticaceae (Nettle Family)

Boehmeria cylindrica (L.) Swartz.: False Nettle; rare; along trail through floodplain west of stream; BSUH 12446.

Laportea canadensis (L.) Wedd.: (+); Wood Nettle; abundant; mesic woods mostly in floodplain; BSUH 12447.

Pilea pumila (L.) A. Gray: Clearweed; infrequent; along river; BSUH 12448.

Urtica dioica L.: (☆); Nettle; infrequent; in floodplain; BSUH 12449.

Valerianaceae (Valerian Family)

Valeriana pauciflora Michx.: Long-Tube Valerian; infrequent; along streams and in wet areas; BSUH 12450.

Valerianella umbilicata (Sulliv.) A. Wood: Corn Salad; rare; in floodplain west of stream; BSUH 12451.

Verbenaceae (Vervain Family)

Phryma leptostachya L.: Lopseed; frequent; mesic woods; BSUH 12452.

Verbena hastata L.: Common Vervain; rare; along river; BSUH 12453.

Verbena urticifolia L.: White Vervain; rare; along river by stream mouth; BSUH 12454.

Violaceae (Violet Family)

Viola palmata L.: (+); Wood Violet; infrequent; on east hilltop; BSUH 12455.

Viola pubescens Aiton: Yellow Forest Violet; abundant; mesic woods; BSUH 12456.

Viola sororia Willd.: Dooryard Violet; abundant; mesic woods; BSUH 12457.

Viola striata Aiton: Creamy Violet; frequent; floodplain; BSUH 12458.

Vitaceae (Grape Family)

Parthenocissus quinquefolia (L.) Planchon: (+); Virginia Creeper; frequent; mesic woods; BSUH 12459.

Vitis riparia Michx.: River-bank or Frost Grape; frequent; mesic woods; BSUH 12460.

Vitis vulpina L.: Frost Grape; frequent; mesic woods; BSUH 12461.

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