

THE VASCULAR FLORA AND PLANT COMMUNITIES OF HOLHOUSE WOODS NATURE PRESERVE IN WAYNE COUNTY, INDIANA

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ABSTRACT. Holthouse Woods Nature Preserve (HWNP), owned by the Whitewater Valley Land Trust, Inc., is located along the east fork of the Whitewater River in south-central Wayne County, Indiana, in Abington Township. An inventory of the vascular flora indicates that the 8.9 ha site contains significant regional plant diversity with 331 taxa representing 227 genera and 73 families. Of the 331 taxa, 227 taxa (~69%) are native and 104 taxa (~31%) are non-native, and five represented first records for Wayne County. Although none of the plants documented at the site have state or federal status, one species is on the Indiana Watch List, i.e., *Prenanthes crepidinea*. A detailed physiognomic analysis revealed that the native species consisted of 38 woody species, 155 herbaceous vines or forbs, 33 graminoids, and one fern ally. Of the 104 non-native species, nine were woody, 74 were herbaceous vines or forbs, and 21 were grasses. The major habitats at HWNP are mesic slope woodland, floodplain woodland, a seasonal creek bed, roadside, old-field, drier woodland along River Road, and the Whitewater River corridor which includes the riverbank and sandy/gravel shoreline and two sandy/gravel islands. Floristic Quality Index (FQI) for native species was 43.3, and a mean Coefficient of Conservatism (mean C) was 2.9. For all species FQI = 35.8 and the mean C = 2.0. Given that most of the area is floodplain forest, these numbers indicate that HWNP is a nature preserve quality site but is being compromised by non-natives. The four most invasive non-natives were *Lonicera maaackii* in the sloping woodland, *Ranunculus ficaria* var. *bulbifera* in the floodplain woods, and *Artemisia vulgaris* and *Humulus japonicus* along the river corridor. A census of all trees with a dbh \geq 20 cm revealed that the floodplain woodland is dominated by woody species commonly characteristic of this habitat, e.g., *Acer negundo*, *Populus deltoides*, *Acer saccharinum*, *Platanus occidentalis*, *Juglans nigra*, *Aesculus glabra*, *Celtis occidentalis*, and *Ulmus americana*. A sample of trees with a dbh \geq 5 cm but $<$ 20 cm suggest that *A. negundo*, *J. nigra*, and *A. glabra* will continue to dominate the site, but that *A. saccharinum*, *P. deltoides*, and *P. occidentalis* will decrease in importance.

Keywords: Floristic quality index (FQI), county records, vascular plants, flora-Indiana, floodplain woods, Wayne County, IN

INTRODUCTION

Using funds received from a Rocky Express Gas Pipeline (REX) Migratory Bird Mitigation grant, the Whitewater Valley Land Trust, Inc. (WVLT) purchased nine properties in the Whitewater River Watershed in 2009. These lands are being conserved, in part, by funding and technical assistance made available as mitigation for impacts caused by the construction and maintenance of Rockies Express Pipeline, LLC in partnership with the U.S. Fish and Wildlife Service. Holthouse Woods Nature Preserve (HWNP), which lies on the east side of the

east fork of the Whitewater River just east of Abington, Indiana in southern Wayne County, was one of the properties purchased. Because the property contained a quality floodplain forest along the Whitewater River corridor, and at the request of Mike Hoff, President of WVLT, this study was undertaken.

There have been no formal published studies regarding the flora of HWNP. However, one of the requirements of the REX grant was to create a list of the vascular plants at each site. In 2011, in consultation with WVLT, Don Ruch compiled this list for Holthouse Woods. The list was based on three forays into the site, i.e., late spring, mid-summer, and late summer/early fall. Ruch reported 243 taxa of plants,

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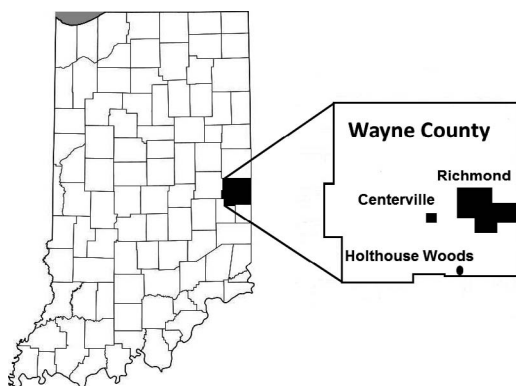


Figure 1.—Map indicating the location of Holt House Woods Nature Preserve in south-central Wayne County (right), and the location of Wayne County within the state of Indiana (left). (Indiana map modified from https://commons.wikimedia.org/wiki/File:Map_of_Indiana_highlighting_Wayne_County.svg.)

including 182 natives and 61 non-natives (exotics). The only detailed floristic study along the Whitewater River of which we are aware, was of the Wapi-nipi State Nature Preserve, formally known as the Coffman Woods Nature Preserve, adjacent to and just north of HWNP (Ruch et al. 2014a).

An inventory is the necessary first step in developing a long-term resource management plan, is the simplest means to document species diversity, and is a fundamental step in monitoring changes that may occur in species composition. Measures of diversity, such as species richness, are frequently seen as indicators of the well-being of ecological systems (Magurran 1988; García & Martínez 2012). (Species richness is a count of species and does not take into account the abundances of the species or their relative abundance distributions.)

The objectives of this study were (1) to inventory the vascular flora; (2) to determine the floristic quality of the site; (3) to describe the various habitats and summarize species dominance for each; (4) to identify areas of special concern (e.g., areas with rare or threatened plants, if any, and communities sensitive to disturbance); and (5) to analyze the structure and composition of the floodplain forest.

SITE DESCRIPTION

Located in south-central Wayne County, Indiana (Fig. 1), Holthouse Woods Nature

Preserve (HWNP) is an 8.9 ha (~ 22 acres) property located directly east and across the Whitewater River from Abington, Indiana (~ 12 km SSE of Richmond, IN). It is located in the NW $\frac{1}{4}$ Section 2, Twp. 12 N, Rng. 2W, Abington Twp., Wayne Co., or at ~ 39°43'37N and 84°57'40"W [NAD 83] at the southeast corner on River Road at the Union County line. The property is part of the riparian corridor along the Whitewater River. The preserve is bordered on the north by Pottershop Road, the Whitewater River along the west border, the Union County line on the south border, and River Road along the east border. The northern border is adjacent to and directly south of Wapi-nipi Nature Preserve, i.e., formerly Coffman Woods Nature Preserve. It should be noted that within the boundary of this study is a small mesic hillside forest, dropping 21.5 m (~ 70 ft.) over a distance of about 92 m (~ 302 ft.). This one hectare mesic sloping woodland along Pottershop Road is owned by the state and was included in the study.

Although HWNP contains a number of small habitat types, the majority of the site is quality floodplain woodland. Approximately 330 m south of Pottershop Road on River Road is a seasonal creek that flows across HWNP from east to west or from River Road to the Whitewater River. Although this creek holds water that flows in from the elevated river in the spring and drains the elevated land east of River Road after periods of rain, it is dry most of the growing season. Other habitat types present include the small mesic sloping woodland mentioned earlier, the roadside habitat, including a long, very narrow, upland roadside woodland adjacent to River Road, a small, less than 0.1 ha, old field in which WVLT has planted tree seedlings; this field was manicured (mowed periodically) prior to the purchase of the site by WVLT. The final major habitat is the Whitewater River and river corridor, which is quite diverse from both the floristic and topo-edaphographic perspective. Several sections of the shoreline are sandy or sand and gravel and are underwater seasonally or periodically due to rainfall. These shorelines rise slowly upward through sandy and silty soil into the floodplain woods. Most of the shoreline is steep riverbank of gravel, silt and clay that elevates quickly from 1–2.5 m above the river. At the southern end of the property, the riverbank rises over 3 m above the river. Within the river there are three sandy-gravel islands.

Although two are relatively small, the island located at the southern end of the property is ~ 0.5 ha. This “island” is only surrounded by water in the spring and early summer when the river is elevated. As the river recedes, the river channel on the west and south side of the island dries. This large island is the most floristically diverse site on the property.

HWNP lies in the transition zone between the Tipton Till Plain (Central Till Plain) and the Switzerland Hills region (Homoya et al. 1985; Wiseman & Berta 2013). The preserve is within the Whitewater Watershed (USGS Cataloging Unit 05080003, EPA 2015).

The soil of HWNP ranges from loam to silty clay loam (Blank 1987; WSS 2015). The soil along the river corridor and the floodplain woodland is Stonelick loam, which is occasionally flooded, but well drained, with a 0 to 2% slope. The soil of the fairly steep-sloping woodland and the long narrow drier roadside woodlands adjacent to River Road, including the small field, is Eden flaggy silty clay loam having a 25-40% slope and is an eroded, well-drained soil with very high runoff. Lastly, the soil of a small woodland in the southwest corner west of the Whitewater River is Genesee silt loam, which is characterized as having 0 to 2% slope with negligible runoff and being occasionally flooded but is well drained.

METHODS

Inventory and floristic quality index.—During the 2013 and 2014 growing seasons, 27 forays were conducted; forays were made into every major habitat type, and an effort was made to cover all areas within these habitats. Voucher specimens for each species were collected and deposited in the Ball State Herbarium (BSUH). Notes on vegetation consisted of a species list with visual estimates of distribution patterns and relative abundance (see catalog of vascular plants, Appendix 1). Additionally, seasonal changes in the dominant vegetation (based on time of flowering) were noted for the various habitats.

Nomenclature follows the Angiosperm Phylogeny Group (Angiosperm Phylogeny Group 2009; Stevens 2015). List preparation and sources used to identify plant taxa included Deam 1940; Jackson 2004; FNA 2008; Weeks, et al. 2010; Voss & Reznicek 2012; Weakley et al. 2012; USDA 2015; and Kay Yatskievych pers. comm.

A Floristic Quality Index (FQI) for HWNP was determined using the program developed by the Conservation Design Forum in conjunction with Rothrock (2004). This program also calculates the mean Coefficient of Conservatism (mean C), and the mean Wetland Indicator Status (mean W). Additionally, it presents a detailed physiognomic analysis of the flora, both native and non-native species. For a detailed description of how the FQI is determined and an explanation of C-values, see Swink & Wilhelm (1994), Rothrock (2004), and Rothrock & Homoya (2005). Briefly, C-values, which range from zero to ten, are an index of the fidelity of an individual species to undisturbed plant communities characteristic of the region prior to European settlement. The higher the C-value the more conserved the species is to an undisturbed habitat. All exotics are given a C value of 0. The FQI is determined by multiplying the mean C for all species present by the square root of the total number of species. (For native FQI and mean C, only the native species are used.) A FQI greater than 35 suggests that a site has remnant natural quality and contains some noteworthy remnants of natural heritage of the region (Rothrock & Homoya 2005, Swink & Wilhelm 1994). Areas registering in the 50s and higher are considered of paramount importance and should be conserved (Swink & Wilhelm 1994).

Floodplain woody plant analysis.—The boundary of the floodplain woodland was delineated based on topographic position. The total area of the floodplain (4.45 ha) was determined using ArcGIS software and aerial photography to create a polygon corresponding to the floodplain boundary. The protocol of Jackson & Allen (1966) was used to conduct a complete inventory of all overstory woody stems within the floodplain forest community. A full census of all trees in the study area with a dbh \geq 20 cm was conducted. For each stem, the species was determined and dbh (diameter at breast height) to the nearest 0.1 cm was measured with Haglof Aluminum Tree Calipers and standard dbh tapes. For each species, total basal area (BA), BA per ha, relative BA (RBA; = [BA per species / total BA for all species] \times 100), density (DEN; number of stems per ha), and relative DEN (RDEN; = [DEN of one species / total DEN for all species] \times 100) were computed. Relative importance value (RIV) for each species was

determined by dividing the sum of the RDEN and RBA by two.

Stems with a dbh < 20 cm were sampled with a plot technique. Three transects were run parallel to the Whitewater River (roughly north to southwest). Transects were 50 m apart. At 50 m intervals along each transect, a flag was placed in the ground to mark the center point of a 5 m radial plot. Thirty-eight plots were established. For each plot the 5 m radius was determined using a BOSCH laser distance measurer model G1580887. Trees between 5 cm to 19.9 cm dbh were identified and placed into one of two categories, i.e., 5–9.9 cm or 10–19.9 cm, using two precut wooden molds. (Since actual dbh was not measured, the midpoint of each category, i.e., 7.5 cm and 15.0 cm, was used for BA calculations.) For each species, BA per ha and RBA, DEN and RDEN, and frequency (FRE; the number of plots in which the species occurred out of the total number of plots) and relative frequency (RFRE; = [FRE of one species / total FRE for all species] × 100). Relative importance value (RIV) for each species was determined by dividing the sum of the RDEN plus RBA plus RFREQ by three.

RESULTS

Inventory and floristic quality index.—The vascular flora documented at HWNP is listed in Appendix 1. The flora consists of 331 taxa representing 227 genera and 73 families. The twelve families (based upon the APG-III classification) having the highest number of species are Asteraceae (50 species), Poaceae (41), Brassicaceae (16), Cyperaceae (13), Fabaceae (13), Lamiaceae (13), Polygonaceae (12), Apiaceae (10), Caryophyllaceae (8), Plantaginaceae (8), Ranunculaceae (8), and Rosaceae (7). These twelve families account for 199 of the 331 species or ~ 60% of the species documented. Of interest, the families Polypodiaceae and Orchidaceae, with their richness of sensitive species, were lacking in the HWNP flora.

A physiognomic summary of the flora in HWNP is presented in Table 1. Of the 331 documented taxa, 227 taxa (~69%) are native and 104 taxa (~31%) are non-native. Of the 227 native species, 38 (~ 16.7%) are woody, 155 (68.4%) are herbaceous vines or forbs, 33 (~ 14.5%) are graminoids, and only one (~ 0.4%) is a vascular cryptogam. Of the 104 non-native species, 9 (~ 8.7%) are woody, 74 (~ 70.9%) are

Table 1.—Physiognomic analysis of the vascular flora documented at Holthouse Woods Nature Preserve, Wayne County, Indiana. A = annual, B = biennial, H = herbaceous, P = perennial, W = woody.

	Native species summary		Non-native species summary	
	Number	% of Total	Number	% of Total
# of species	227	68.9%	104	31.1%
Tree	26	7.9%	4	1.2%
Shrub	6	1.8%	4	1.2%
W-Vine	6	1.8%	1	0.3%
H-Vine	4	1.2%	1	0.3%
P-Forbs	104	31.8%	27	7.9%
B-Forbs	6	1.8%	15	4.5%
A-Forbs	41	12.4%	31	9.4%
P-Grass	14	4.2%	8	2.4%
A-Grass	6	1.8%	13	3.9%
P-Sedge	11	3.3%	0	0.0%
A-Sedge	2	0.6%	0	0.0%
Fern	1	0.3%	0	0.0%

herbaceous vines or forbs, and 21 (~ 20.4%) are grasses. Native and non-native annuals and biennials, species mostly of ruderal habit, make up 34.4% of the total flora.

The Floristic Quality Index and mean Coefficients of Conservatism (mean C) for the native species is 43.8 and 2.9, respectively, and for all species, including the non-natives, is 36.4 and 2.0, respectively. No species were observed with a Coefficient of Conservatism (C) ≥ 9. Two species have a C = 8, i.e., *Carex amphibola* and *Symphytotrichum prenanthoides*. Nine species have a C = 7, i.e., *Hydrophyllum macrophyllum*, *Packeria obovata*, *Prenanthes crepidinea*, *Ranunculus hispidus* var. *hispidus*, *Silene nivea*, *Stellaria pubera*, *Symphytotrichum puniceum*, *Thalictrum thalictroides*, and *Valeriana pauciflora*. In comparison, 75 species (~ 22.7%) have C-values of 4-6 (i.e., 11 with C = 6, 28 with C = 5, and 36 with C = 4), and 244 species (~ 73.7%) have C-values ≤ 3 (i.e., 141 species with C = 0 (including 38 native and 104 non-native species), 29 species with C = 1, 27 species with C = 2, and 47 species with C = 3).

Although the non-native species account for ~ 31% of the taxa, they have little visual display or dominance at the site. The majority of the non-natives are confined to the roadside and old-field habitat or to the river corridor,

Table 2.—Stand table for the floodplain forest at Hothouse Woods Nature Preserve, Abington, Indiana; all trees with a dbh \geq 20 cm; total area = 4.45 ha. Species are listed in descending order based on relative importance values (RIV). Stems equal the total number of stems for a species. DEN (density) is the number of stems per hectare. RDEN (relative density) is the percent density of one species compared to all other species. BA (basal area) is in meters squared per hectare for each species. RBA (relative basal area) is the percent basal area for one species compared to the total basal area for all species. RIV is the average of RDEN and RBA expressed in percent. Others include *Acer nigrum*, *Carya cordiformis*, *Gleditsia triacanthos*, *Gymnocladus dioicus*, *Maclura pomifera*, *Malus pumila*, *Morus alba*, *Morus rubra*, *Prunus serotina*, *Robinia pseudoacacia*, and *Tilia americana*.

Species	Stems	DEN	RDEN	BA	RBA	RIV
<i>Acer negundo</i>	360	80.9	41.9	8.7	38.0	40.0
<i>Populus deltoides</i>	97	21.8	11.3	4.2	18.3	14.8
<i>Acer saccharinum</i>	103	23.1	12.0	2.7	11.8	11.9
<i>Platanus occidentalis</i>	69	15.5	8.0	2.8	12.1	10.1
<i>Juglans nigra</i>	85	19.1	9.9	1.7	7.3	8.6
<i>Aesculus glabra</i>	36	8.1	4.2	0.6	2.5	3.4
<i>Celtis occidentalis</i>	26	5.8	3.0	0.8	3.5	3.2
<i>Ulmus americana</i>	20	4.5	2.3	0.3	1.1	1.7
<i>Fraxinus</i> spp.	12	2.7	1.4	0.3	1.4	1.4
<i>Salix nigra</i>	16	3.6	1.9	0.2	0.7	1.3
Others	35	7.9	4.1	0.8	3.3	3.6
Total	859	193.0	100.0	23.1	100.0	100.0

and their occurrence is rare to infrequent with four noteworthy exceptions (Appendix 1). The mesic slope woodland at the northern end of the study area is heavily invaded with *Lonicera maackii*. The floodplain woodland, especially just south of the seasonal creek, is permeated with *Ranunculus ficaria* var. *bulbifera*. Lastly the river corridor, especially at the southern end of the property, is infested with large colonies of *Artemisia vulgaris* and *Humulus japonicus*.

Five species documented at HWNP are reported for the first time and represent Wayne County records. County records were determined using the Indiana Natural Heritage Data Center's records for Wayne County (this is the same plant list in the computer database of Keller et al. (1984)), the USDA Plant Database (2015), The Biota of North America Program (BONAP): Maps by States and Provinces (2014), Overlease & Overlease (2007), Deam (1940), the species listed at Hayes Arboretum (Ruch et al. 2007), Lick Creek Summit Nature Preserve (Ruch et al. 2008a), and Coffman Woods Nature Preserve (now Wapi-nipi State Nature Preserve; Ruch et al. 2014a). The records include the native species *Gratiola neglecta* and *Verbena bracteata*, and the non-native species *Artemisia vulgaris*, *Hordeum vulgare*, and *Sisymbrium officinale*. Additionally, there are two other species at HWNP that have not been previously reported from Wayne

County. These are not being reported as county records because we are unsure of their origin although they appear to have occurred naturally. They are *Echinacea purpurea*, woodland edge along River Road, and *Solanum lycopersicum*, several plants on the large sand/gravel island both years of this study. None of the species documented at the site have state rare, threatened, or endangered status (IDNR Nature Preserves 2013), but one species is on the state watch list, i.e., *Prenanthes crepidinea*.

Floodplain woody plant analysis.—Results of the full census of all trees with a dbh \geq 20 cm in the floodplain woodland are presented in Table 2. Eight hundred and fifty-nine stems were measured from 21 species. The floodplain was dominated by *Acer negundo*, *Populus deltoides*, *Acer saccharinum*, and *Platanus occidentalis*. Collectively these species comprise over 70% of the total stems and over 80% of the total basal area of the floodplain woodland. *Acer negundo* has by far the highest RIV (40.0) with 41.9% of the total stems and 38% of the total basal area within the floodplain. *Populus deltoides* and *Platanus occidentalis* had the highest average dbh (> 40 cm) and were the only species with multiple stems with dbh > 80 cm. The survey of trees with a dbh \geq 5 cm but < 20 cm is presented in Table 3. Eighty-six stems from 12 species were measured. The three most important species in the understory with respect to RIV are

Table 3.—Stand table for the floodplain forest at Holthouse Woods Nature Preserve, Abington, Indiana; all trees with a dbh \geq 5 cm and $<$ 20 cm; thirty-eight 5 m plots, total area = 2.2985 ha. Species are listed in descending order based on relative importance values (RIV). Stems equal the total number of stems for a species. DEN (density) is the number of stems per hectare. RDEN (relative density) is the percent density of one species compared to all other species. FRE (frequency) refers to the number of plots out of 38 in which each species occurs. RFRE (relative frequency) is the frequency of occurrence of each species relative to all species. BA (basal area) is in meters squared per hectare for each species. RBA (relative basal area) is the percent basal area for one species compared to the total basal area for all species. RIV is the average of RDEN, RFRE, and RBA expressed in percent. Others include *Carya cordiformis*, *Fraxinus* spp., *Platanus occidentalis*, *Robinia pseudoacacia*, *Salix nigra*, and *Vitis* spp.

Species	Stems	DEN	RDEN	FRE	RFRE	BA	RBA	RIV
<i>Acer negundo</i>	48	160.8	55.8	14	33.3	1.7	53.0	54.4
<i>Juglans nigra</i>	11	36.9	12.8	7	16.7	0.4	13.5	13.1
<i>Aesculus glabra</i>	8	26.8	9.3	6	14.3	0.3	10.7	10.0
<i>Maclura pomifera</i>	5	16.8	5.8	3	7.2	0.3	7.9	6.9
<i>Celtis occidentalis</i>	4	13.4	4.7	1	2.4	0.1	4.7	4.7
<i>Ulmus americana</i>	4	13.4	4.7	3	7.1	0.1	3.3	4.0
Others	6	20.1	6.9	8	19.0	0.3	5.7	6.9
Total	86	288.2	100.0	42	100.0	3.2	100.0	100.0

A. negundo, *Juglans nigra*, and *Aesculus glabra*. These species combine for 77.9% of all stems sampled and 77.2% of the total basal area in the understory. The fourth most important species is *Maclura pomifera*. This size class includes no stems of *A. saccharinum* or *P. deltoides* and only one of *P. occidentalis*, indicating that these were all sapling or pole size individuals.

DESCRIPTION OF THE MAJOR HABITATS

Holthouse Woods Nature Preserve contains several habitats, each with rather distinctive plant communities (Fig. 2). The communities are separated by topographic features, water regime, and soil types. The major habitats at HWNP are listed earlier in the Site Description section. Below is a more detailed description of the plants in each.

Sloping mesic woodland.—Common to abundant trees included *Acer nigrum*, *Celtis occidentalis*, *Juglans nigra*, and *Ulmus americana*. At the base of the slope there were a few *Quercus macrocarpa* and *Q. muehlenbergii*. The slope was heavily infested with *Lonicera maackii*. Other common woody shrubs and vines included *L. japonica*, *Menispermum canadense*, and *Parthenocissus quinquefolia*. Few grasses and sedges occurred here, the most common were *Carex amphibola*, *C. blanda*, *Festuca subverticillata*, and *Poa trivialis* near the base of the slope. This woodland had an excellent display of spring ephemerals, but an absence of summer

and fall herbaceous plants. The common spring ephemerals included *Cardamine concatenata*, *Delphinium tricorne*, *Galium aparine*, *Osmorhiza longistylis*, *Packera obovata*, *Polygonatum biflorum* var. *biflorum*, *Trillium sessile*, *Valeriana pauciflora* (lower slope), and *Viola striata*. The most common summer flowering herb was *Circaea lutetiana* ssp. *canadensis*.

Floodplain woodland.—The most abundant tree species throughout this woodland was *Acer negundo*. Other common species included *Acer saccharinum*, *Aesculus glabra*, *Juglans nigra*, *Platanus occidentalis*, and *Populus deltoides*. Woody vines included *Toxicodendron radicans* ssp. *negundo*, which was common and widespread, and *Humulus japonicus*, which was abundant at the southern end of the woodland in open areas. The two most common grasses were *Elymus macgregorii* and *Poa trivialis*. No sedges were common, and very few individual plants were observed. The herbaceous flora was impressive. Flowering herbs common to abundant in the spring and early summer included *Allium vineale*, *Cryptotaenia canadensis*, *Dicentra cucullaria*, *Enemion biternatum*, *Galium aparine*, *Geum vernum*, *Glechoma hederacea*, *Heracleum maximum*, *Hesperis matronalis*, *Hydrophyllum appendiculatum*, *Monarda fistulosa*, *Osmorhiza longistylis*, *Phacelia purshii*, *Ranunculus abortivus*, *R. ficaria* var. *bulbifera*, and *Stellaria media*. Flowering herbs common to abundant in summer through fall included *Fallopia scandens*, *Galium triflorum*, *Impatiens*

Holthouse Woods

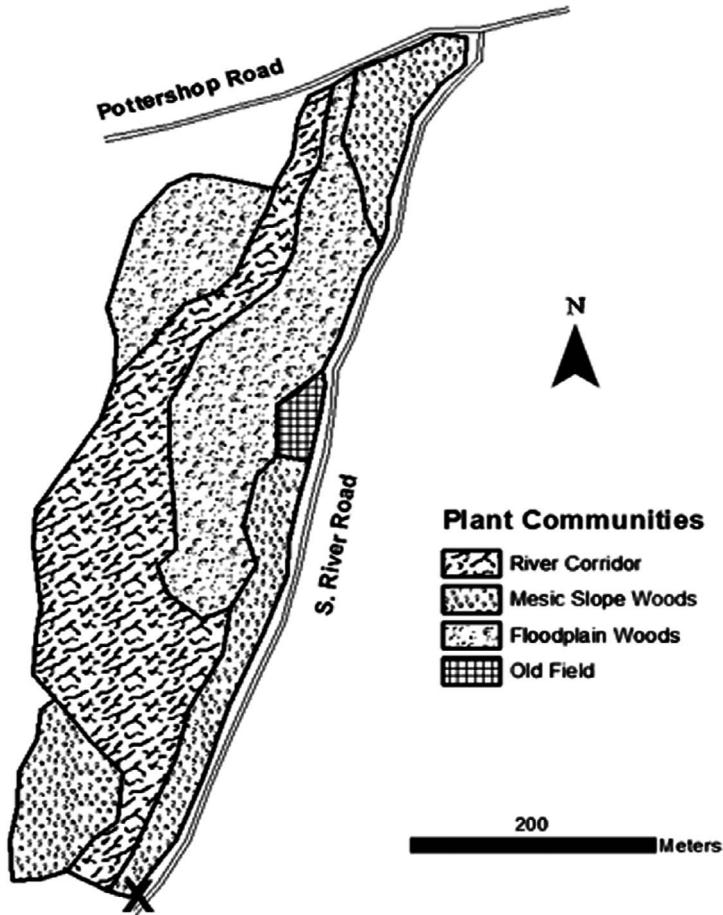


Figure 2.—Diagram illustrating the distribution of the major habitat types in Holthouse Woods Nature Preserve, Wayne County, Indiana. The X marks the latitude and longitude coordinates given in the Site Description section.

capensis, *Laportea canadensis*, *Lycopus americanus*, *Pilea pumila*, *Sanicula odorata*, *Solidago altissima*, *S. gigantea*, *Symphyotrichum lateriflorum*, *Tradescantia subaspera*, *Rudbeckia laciniata*, and *Verbesina alternifolia*. The floodplain woodland was severely infested with the exotic *R. ficaria* var. *bulbifera*. On the riverbank between the two bends of the river at the southern end, *Fallopia japonica* occurred, the only site on the property where it is found.

Seasonal creek.—Herbaceous species growing on the creek bank or creek bed included *Ageratina altissima*, *Ambrosia trifida*, *Campanulastrum americanum*, *Glyceria striata*, *Hackelia virginiana*, *Laportea canadensis*, *Leersia*

virginica, *Lobelia siphilitica*, *Lysimachia nummularia*, *Mentha spicata*, *Persicaria longiseta*, *Persicaria maculosa*, *Persicaria punctata* var. *leptostachya*, *Physalis longifolia* var. *subglabrata*, *Pilea pumila*, *Rumex obtusifolius*, *Samolus parviflorus*, *Scrophularia marilandica*, *Verbena urticifolia*, and *Xanthium strumarium*. Additionally, the only stem of *Gymnocladus dioicus* occurred at the top of the bank along this creek, as did the only colony of *Poa sylvestris*.

Roadside, old-field, and drier woodland along River Road.—Tree species along the roadside were characteristic of HWNP, as described above, with three notable observations. Several stems of *Juniperus virginiana* occurred along

the northern third of the property. *Morus alba* occurred frequently along the woodland edge on the northern half of the property. Lastly, several large *Quercus macrocarpa* stems occurred along the roadside on the southern third of the property. *Parthenocissus quinquefolia* and *Toxicodendron radicans* ssp. *negundo* were common. The roadside and woodland edge herbaceous flora was diverse and included a number of non-native species. The most common herbs were *Arenaria serpyllifolia*, *Capsella bursa-pastoris*, *Cardamine hirsuta*, *Cichorium intybus*, *Claytonia virginica*, *Conium maculatum*, *Conyza canadensis*, *Draba verna*, *Erigeron annuus*, *Galinsoga quadriradiata*, *Geum canadense*, *Impatiens pallida*, *Lepidium virginicum*, *Medicago lupulina*, *Oxalis stricta*, *Plantago lanceolata*, *P. rugelii*, *Polygonatum biflorum* var. *commutatum*, *Polygonum aviculare*, *Polymnia canadensis* (southern third), *Stellaria media*, *Symphyotrichum pilosum*, *Veronica arvensis*, *V. peregrina*, and *Viola sororia*. The most common and widespread grasses in this habitat were *Dactylis glomerata*, *Digitaria ciliaris*, *Eleusine indica*, *Eragrostis pectinacea*, *Festuca subverticillata*, *Poa annua*, *P. pratensis*, and *Schedonorus arundinaceus*. Lastly, along the extreme southern portion of River Road, where the edge slopes down toward the river, *Carex aggregata*, *C. blanda*, and *C. conjuncta* were common.

Whitewater River corridor.—The habitats within the river corridor contained the greatest diversity of plant species.

Riverbank and sandy/gravel shoreline: The four most common trees along river corridor were *Acer saccharinum*, *Morus alba*, *Platanus occidentalis*, and *Populus deltoides*. The most common or notable herbaceous species were *Acalypha rhomboidea*, *Agrostis stolonifera*, *Alliaria petiolata*, *Allium canadense*, *Amaranthus tuberculatus*, *Amphicarpa bracteata*, *Angelica atropurpurea*, *Arenaria serpyllifolia*, *Artemisia annua*, *A. vulgaris*, *Cirsium arvense*, *Echinochloa crus-galli*, *E. muricata*, *Elymus riparius*, *E. virginicus*, *Eragrostis hypnoides*, *Erigeron annuus*, *Helenium autumnale*, *Humulus japonicus* (abundant), *Ludwigia palustris*, *Lycopus americanus*, *Lysimachia nummularia*, *Mimulus alatus*, *Myosotis scopioides*, *Oenothera biennis*, *Persicaria maculosa*, *Phalaris arundinacea* (especially along the shoreline at the northern fifth of the property), *Pilea pumila*, *Plantago rugelii*, *Polanisia dodecandra*,

Rorippa sylvestris, *Scutellaria lateriflora*, *Solidago gigantea*, *Symphyotrichum prenanthoides*, *Verbena hastata*, *V. urticifolia*, and *Veronica anagallis-aquatica*.

Sandy/gravel islands: Many of the same species occurring along the river corridor were also found on the islands. However, because of its size, the species occurring on the large island at the southern end of the property will be described here. There were several large colonies of *Salix interior* and one large stand of *Acer saccharinum*. The most common grasses were *Echinochloa crus-galli*, *Eleusine indica*, and *Setaria pumila*. The two most common sedges were *Cyperus odoratus* and *C. strigosus*. However, *Cyperus erythrorhizos*, *Eleocharis erythropoda*, and *Schoenoplectus tabernaemontani* were infrequent to rare. The most common herbaceous plants included *Acalypha rhomboidea*, *Amaranthus albus*, *A. tuberculatus*, *Artemisia annua*, *A. vulgaris*, *Bidens cernua*, *Bidens frondosa*, *Eupatorium serotinum*, *Euphorbia maculata*, *E. nutans*, *Euthamia graminifolia*, *Ludwigia palustris*, *Persicaria maculosa*, *Polanisia dodecandra*, *Rorippa sylvestris*, and *Symphyotrichum pilosum*. Herbaceous plants which only occurred on the islands include *Abutilon theophrasti*, *Amaranthus hybridus*, *Asclepias incarnata*, *Chaenorrhinum minus*, *Croton monanthogynus*, *Eclipta prostrata*, *Epilobium coloratum*, *Eutrochium maculatum*, *Lycopus uniflorus*, *Persicaria lapathifolia*, *P. pensylvanica*, *Ranunculus sceleratus*, *Rudbeckia hirta* var. *pulcherrima*, and *Symphyotrichum novae-angliae*.

DISCUSSION

Inventory and floristic quality index.—The vascular flora at HWNP included the same core of plants, and subsequently plant families, reported for other sites in east central Indiana (Rothrock et al. 1993; Rothrock 1997; Ruch et al. 1998, 2002, 2004, 2007, 2008a, 2008b, 2009, 2012, 2014a, 2014b; Stonehouse et al. 2003, Tungesvick 2011; Prast et al. 2014). Twelve plant families, accounting for 60% of the plants reported at HWNP (e.g., 199 of 331 documented species) and the sites referred to above, are the Apiaceae, Asteraceae, Brassicaceae, Caryophyllaceae, Cyperaceae, Fabaceae, Lamiaceae, Plantaginaceae, Poaceae, Polygonaceae, Ranunculaceae, and Rosaceae (see Appendix 1). Based on variations between the Cronquist system (USDA 2015) and the

Angiosperm Phylogeny Group (Stevens 2015), the noted variation between earlier studies and the current one is the absence of the Liliaceae and Scrophulariaceae and the addition of the Plantaginaceae.

The FQI for the native vascular flora at HWNP was 43.3 and the mean C was 2.9. Swink & Wilhelm (1994) suggested that areas with FQI higher than 35 possess sufficient conservatism and richness to be of profound importance from a regional perspective. We have been using FQI = 45 for designating a site as nature preserve quality. Rothrock & Homoya (2005) reported that the average C-values for Indiana are 1.2 units lower than those of the Chicago region. Based on this information, HWNP is a site of profound importance from a regional perspective, and based on the lower C-values for Indiana, it should be considered a nature preserve quality site. In further support of this statement, floodplain forests are areas of high biodiversity and biomass (Mitsch & Gosselink, 2000; Naiman & Decamps, 1997) but typically do not contain many plant species with high C-values. At HWNP only 11 species (3.3%) had a $C \geq 7$, while 244 species (73.7%) have $C \leq 3$. Because FQI is determined by multiplying the square root of the number of species by the mean C, it would be harder for a site with a low mean C, such as floodplain woods, to obtain a FQI of nature preserve quality. A similar situation was seen at Mississinewa Woods in Randolph County (Ruch et al. 2012).

Floodplain woody plant analysis.—The top eight overstory species based on RIV, in order, are *A. negundo*, *P. deltoides*, *A. saccharinum*, *P. occidentalis*, *J. nigra*, *A. glabra*, *C. occidentalis*, and *U. americana* (Table 2). These are the typical species found in floodplain woodlands of east-central Indiana, e.g., Wilbur Wright Fish and Wildlife Area in Henry County (Ruch et al. 2002), Botany Glen in Grant County (Stonehouse et al. 2003), Lick Creek Summit Nature Preserve in Wayne County (Ruch et al. 2008a), Mississinewa Woods in Randolph County (Ruch et al. 2013), and Coffman Woods Nature Preserve in Wayne County (Ruch et al. 2014a). These woody species are common components of floodplain woods throughout Indiana (Lee 1945; Lindsey & Schmelz 1970; Schmelz & Lindsey 1970). Although a typical floodplain species, the absolute dominance of *A. negundo* was

unexpected, i.e., having the highest RDEN and RBA, and a RIV over two and one-half times that of *P. deltoides*, the second most important species.

The understory (Table 3) can be used to predict the future composition of the woods. *Acer negundo* was also the most prominent species in the understory with the highest RDEN and RBA, as well as the highest RFRE, and a RIV over four times that of *J. nigra*, the second most important species in this group. Based on the information in Table 3, it would appear the *A. negundo* will continue to dominate the site, and longer-lived *J. nigra* as well as *A. glabra* will increase in importance. *Populus deltoides*, *A. saccharinum*, and *P. occidentalis* having the second to fourth RIV at the site, respectively (Table 2), will decrease in importance since each species recorded only one or no stems in the smaller category. However predictions based on a single sampling event have limited certainty. Floodplain forest woody regeneration is impacted by periodic flooding and severe competition from a dense herbaceous community. Extremely high mortality rates for understory species may occur during severe flooding events. Some species, such as *P. deltoides* and *Salix* spp., may benefit by colonizing open areas created by flooding (Yin 1999).

Summary.—Following the completion of the study, we recommended that WVLT develop a management plan to remove and monitor future growth of *Lonicera maackii* growing in the slope woodland at the northern end of the property. Several years ago, we made a similar recommendation for the Wapi-nipi State Nature Preserve and much of the honeysuckle on the southern end of the property had been removed. Similarly, we recommended that they implement some program to monitor and attempt to reduce or eliminate the large colonies of *Artemisia vulgaris* and *Humulus japonicus* along the river corridor at the southern end of the property. Since there was only one clump of *Fallopia japonica*, Japanese knotweed, we removed it at the completion of the study. However, WVLT will need to continually monitor for any new growth in the area. Lastly, because HWNP is of nature preserve quality, we recommended it be added as additional acreage to the Wapi-nipi State Nature Preserve along its northern border.

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APPENDIX 1

CATALOG OF VASCULAR FLORA AT HOLTHOUSE WOODS NATURE PRESERVE, WAYNE COUNTY, INDIANA

Species are listed alphabetically by family, then genera, under major plant groups. Non-native (exotic) species are capitalized. Nomenclature follows the Angiosperm Phylogeny Group (Stevens 2015). Each species report contains the following information: (1) current scientific name; (2) vegetation association (FPW = floodplain woods; MSW = sloping mesic woodland; SC = seasonal creek; RC = river corridor (i.e., riverbank, shoreline, sand/gravel islands); RS = roadside, field & woodland edge along River Road); (3) a visual estimate of its relative abundance (see below); (4) the Indiana Coefficient of Conservation, C = # (Rothrock 2004); and (5) the Ball State University Herbarium (BSUH) number(s). The relative abundance for species is defined as follows; rare = ≤ 5 sites although a species may be abundant at one site; infrequent = occasional, not widespread throughout its potential habitats, but may be locally abundant at a site; common = frequent throughout its potential habitats and may be locally abundant at one or more sites; and abundant = common and numerous throughout its potential habitats. Potential Wayne County records are indicated by a pound-symbol (#) in parentheses immediately preceding a species. (See results section for determination of Wayne County records and comments concerning endangered, threatened or rare plants of Indiana.

MONILOPHYTA

EQUISETACEAE (Horsetail Family)

Equisetum arvense L. – RC; Rare; C = 1; BSUH 19288, 19328.

CONIFEROPHYTA

CUPRESSACEAE (Redwood or Cypress Family)

Juniperus virginiana L. – RS; Rare; C = 2; BSUH 19391, 19441

MAGNOLIOPHYTA

MAGNOLIOPSIDA (Dicotyledons)

ACANTHACEAE (Acanthus Family)

Justicia americana (L.) Vahl – RC; Rare; C = 6; BSUH 19551.

Ruellia strepens L. – RS; Rare; C = 4; BSUH 19641.

ADOXACEAE (Moschatel Family)

Sambucus canadensis L. (= *S. nigra* L. var. *canadensis* (L.) R. Bolli) – RC; Rare; C = 2; BSUH 19273.

AMARANTHACEAE

(Goosefoot or Pigweed Family)

Amaranthus albus L. (= *Amaranthus graecizans* L. in Deam 1940) – RC; Common; C = 0; BSUH 19611.

AMARANTHUS HYBRIDUS L. – RC; Infrequent; C = 0; BSUH 19607.

Amaranthus tuberculatus (Moq.) J.D. Sauer –RC; Abundant; C = 1; BSUH 19477, 19567, 19572.

CHENOPODIUM ALBUM L. – RS; Infrequent; C = 0; BSUH 19540.

ANACARDIACEAE (Cashew Family)

Toxicodendron radicans (L.) Kuntze ssp. *negundo* (Greene) Reveal – FPW, MSW; Abundant; C = 1; BSUH 19556.

APIACEAE (Carrot Family)

Angelica atropurpurea L. – FPW, RC; Infrequent; C = 6; BSUH 19343.

Cicuta maculata L. var. *maculata* – FPW; Infrequent; C = 6; BSUH 19276.

CONIUM MACULATUM L. – RS; Rare but locally abundant; C = 0; BSUH 19378.

Cryptotaenia canadensis (L.) DC. – FPW; Abundant; C = 3; BSUH 19346.

DAUCUS CAROTA L. – RC, RS; Infrequent; C = 0; BSUH 19371.

Heraclium maximum W. Bartram – FPW; Rare but locally abundant; C = 6; BSUH 19397.

Osmorhiza longistylis (Torr.) DC. – FPW, MSW; Abundant; C = 3; BSUH 19429.

PASTINACA SATIVA L. – RC, RS; Rare; C = 0; BSUH 19363.

Sanicula odorata (Raf.) Pryer & Philippe – FPW; Abundant; C = 2; BSUH 19398.

Thaspium trifoliatum (L.) A. Gray var. *aureum* (L.) Britt. – FPW, MSW; Infrequent; C = 5; BSUH 19384, 19399, 19518.

APOCYNACEAE (Dogbane or Milkweed Family)

Apocynum cannabinum L. – RS; Infrequent; C = 2; BSUH 19296.

Asclepias incarnata L. ssp. *incarnata* – RC; Rare; C = 4; BSUH 19500.

Asclepias syriaca L. – RS; Infrequent; C = 1; BSUH 19297.

ARISTOLOCHACEAE (Birthwort Family)

Asarum canadense L. – MSW; Infrequent; C = 5; BSUH 19404.

ASTERACEAE (Aster or Daisy Family)

Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* – FPW, MSW, RC; Abundant; C = 2; BSUH 19638.

Ambrosia artemisiifolia L. var. *elatiior* Descourt. – RC, RS; Abundant; C = 0; BSUH 19511.

Ambrosia trifida L. var. *trifida* – FPW especially along SC; Infrequent but locally abundant; C = 0; BSUH 19537.

ARCTIUM MINUS (Hill) Bernh. – RC; Rare; C = 0; BSUH 19508.

ARTEMISIA ANNUA L. – RC; Common; C = 0; BSUH 19609.

(#) *ARTEMISIA VULGARIS* L. – RC; Common; C = 0; BSUH 19608.

Bidens cernua L. – RC; Abundant; C = 2; BSUH 19624, 19626.

Bidens frondosa L. – RC; Common; C = 1; BSUH 19625.

Bidens vulgata Greene – RC; Infrequent; C = 0; BSUH 19635.

CICHORIUM INTYBUS L. – RS; Common; C = 0; BSUH 19370.

CIRSIUM ARVENSE (L.) Scop. – RC; Infrequent; C = 0; BSUH 19272, 19313.

CIRSIUM VULGARE (Savi) Ten. – RS; Rare; C = 0; BSUH 19539.

Conyza canadensis (L.) Cronquist var. *canadensis* – RS; Abundant; C = 0; BSUH 19558.

Echinacea purpurea (L.) Moench – RS; Rare; C = 6; BSUH 19299.

Eclipta prostrata (L.) L. – RC; Infrequent; C = 3; BSUH 19527, 19545.

Erigeron annuus (L.) Pers. – RS; Common; C = 0; BSUH 19368.

Erigeron philadelphicus L. var. *philadelphicus* – RS; Infrequent; C = 3; BSUH 19415.

Eupatorium perfoliatum L. var. *perfoliatum* – FPW; RC; Common; C = 4; BSUH 19507.

Eupatorium serotinum Michx. – RC (big island); Common; C = 0; BSUH 19531, 19634.

Euthamia graminifolia (L.) Nutt. – RC; Rare; C = 3; BSUH 19532.

Eutrochium maculatum (L.) E.E. Lamont var. *maculatum* – RC; Rare; C = 5; BSUH 19566.

GALINSOGA QUADRIRADIATA Ruiz & Pavón – RS; Infrequent; C = 0; BSUH 19315.

Helenium autumnale L. var. *autumnale* – RC; Rare; C = 3; BSUH 19550.

HELIANTHUS ANNUUS L. – RC (big island); Rare; C = 0; BSUH 19462.

Helianthus tuberosus L. – RS; Rare; C = 2; BSUH 19576.

Heliopsis helianthoides (L.) Sweet var. *helianthoides* – FPW; Rare; C = 4; BSUH 19327, 19534.

Lactuca floridana (L.) Gaertn. var. *floridana* – RS; Rare; C = 5; BSUH 19563.

LACTUCA SERRIOLA L. – RC; Infrequent; C = 0; BSUH 19503.

MATRICARIA DISCOIDEA DC. – RS; Infrequent; C = 0; BSUH 19438.

Nabalus crepidineus (Michx.) DC. (= *Prenanthes crepidinea* Michx.) – FPW; Rare; C = 7; BSUH 19263.

Packera glabella (Poir.) C. Jeffrey – FPW, RC; Infrequent; C = 0; BSUH 19417.

Packera obovata (Muhl. ex Willd.) W.A. Weber & Á. Löve – MSW; Common; C = 7; BSUH 19430.

Polymnia canadensis L. – MSC; Rare but locally abundant; C = 3; BSUH 19304.

Rudbeckia hirta L. var. *pulcherrima* Farw. – RC; Rare; C = 2; BSUH 19265.

Rudbeckia laciniata L. var. *laciniata* – RS; Common; C = 3; BSUH 19522.

Silphium perfoliatum L. var. *perfoliatum* – RC; Infrequent; C = 4; BSUH 19400, 19498.

Solidago altissima L. – RC, RS; Abundant; C = 0; BSUH 19628.

Solidago gigantea Aiton – FPW, RC; Abundant; C = 4; BSUH 19535, 19577.

SONCHUS OLERACEUS L. – RC; Rare; C = 0; BSUH 19485.

Symphytotrichum cordifolium (L.) Nesom – MSW; Infrequent; C = 5; BSUH 19654.

Symphytotrichum lanceolatum (Willd.) Nesom var. *lanceolatum* – MSW, RC; Infrequent; C = 3; BSUH 19601, 19617.

Symphytotrichum lateriflorum (L.) Á. Löve & D. Löve var. *lateriflorum* – FPW; Abundant; C = 3; BSUH 19616.

Symphytotrichum novae-angliae (L.) Nesom – RC; Rare; C = 3; BSUH 19600.

Symphytotrichum pilosum (Willd.) Nesom var. *pilosum* – RC, RS; Common; C = 0; BSUH 19618.

Symphytotrichum prenanthoides (Muhl. ex Willd.) Nesom – RC; Infrequent; C = 8; BSUH 19643.

Symphytotrichum puniceum (L.) Á. Löve & D. Löve var. *puniceum* – RC; Rare; C = 7; BSUH 19653.

TARAXACUM OFFICINALE F.H. Wigg. – RC, RS; Infrequent; C = 0; BSUH 19403.

Verbesina alternifolia (L.) Britton ex Kearney – FPW; Abundant; C = 3; BSUH 19555.

Vernonia gigantea (Walter) Trel. ssp. *gigantea* – RS; Infrequent; C = 2; BSUH 19523.

Xanthium strumarium L. var. *canadense* (Mill.) Torr. & A. Gray – RC, SC; Rare but locally abundant; C = 0; BSUH 19639.

BALSAMINACEAE (Touch-Me-Not Family)

Impatiens capensis Meerb. – RC; Common; C = 2; BSUH 19461.

Impatiens pallida Nutt. – RS; Rare but locally common; C = 4; BSUH 19459.

BERBERIDACEAE (Barberry Family)

Podophyllum peltatum L. – FPW, MSW; Common; C = 3; BSUH 19418.

BIGNONIACEAE (Trumpet-Creeper Family)

Catalpa speciosa (Warder) Warder ex Engelm. – RC; Rare; C = 0; BSUH 19325.

BORAGINACEAE (Borage Family)

Hackelia virginiana (L.) I.M. Johnst. – FPW, SC; Infrequent; C = 0; BSUH 19553.

Hydrophyllum appendiculatum Michx. – FPW; Abundant; C = 6; BSUH 19419.

Hydrophyllum macrophyllum Nutt. – MSW; Infrequent; C = 7; BSUH 19410.

MYOSOTIS SCOPIOIDES L. – RC; Rare; C = 0; BSUH 19481.

Phacelia purshii Buckley – FPW; Abundant; C = 3; BSUH 19421.

BRASSICACEAE (Mustard Family)

ALLIARIA PETIOLATA (M. Bieb.) Cavara & Grande – FPW, RC; Infrequent; C = 0; BSUH 19423.

Arabis laevigata (Muhl. ex Willd.) Poir. var. *laevigata* – MSW; Infrequent; C = 5; BSUH 19603.

BARBAREA VULGARIS R. Br. – RS; Infrequent; C = 0; BSUH 19446.

BRASSICA NIGRA (L.) W.D.J. Koch – RC; Rare but locally abundant; C = 0; BSUH 19282, 19283.

CAPSELLA BURSA-PASTORIS (L.) Medik. – RS; Infrequent; C = 0; BSUH 19414.

Cardamine concatenata (Michx.) O. Schwarz – MSW; Abundant; C = 4; BSUH 19597.

CARDAMINE HIRSUTA L. – RS; Abundant; C = 0; BSUH 19586.

DRABA VERNA L. – RS; Abundant; C = 0; BSUH 19587.

HESPERIS MATRONALIS L. – FPW, RC; Common; C = 0; BSUH 19422.

Iodanthus pinnatifidus (Michx.) Steud. – FPW; Rare; C = 6; BSUH 19348.

LEPIDIUM CAMPESTRE (L.) R. Br. – RS; Infrequent; C = 0; BSUH 19443.

Lepidium virginicum L. var. *virginicum* – RS; Common; C = 0; BSUH 19360.

Rorippa palustris (L.) Besser ssp. *fernaldiana* (Butters & Abbe) Jonsell – RC; Rare; C = 2; BSUH 19284.

RORIPPA SYLVESTRIS (L.) Besser – RC; Common; C = 0; BSUH 19536.

(#) *SISYMBRIUM OFFICINALE* (L.) Scop. – RS; Rare; C = 0; BSUH 19393.

THLASPI ARVENSE L. – RS; Rare; C = 0; BSUH 19437.

CAMPANULACEAE (Bellflower Family)

Campanula americana L. (= *Campanulastrum americanum* (L.) Sm.) – SC; Rare; C = 4; BSUH 19471.

Lobelia siphilitica L. var. *siphilitica* – FPW, SC; Common; C = 3; BSUH 19579.

CANNABACEAE (Indian Hemp Family)

Celtis occidentalis L. – MSW; Common; C = 3; BSUH 19435.

HUMULUS JAPONICUS Siebold & Zucc. – RC; Abundant; C = 0; BSUH 19278, 19476, 19629.

CAPRIFOLIACEAE (Honeysuckle Family)

DIPSACUS FULLONUM L. – RS; Rare but locally abundant; C = 0; BSUH 19295.

LONICERA JAPONICA Thunb. – MSW; Rare but locally common; C = 0; BSUH 19433.

LONICERA MAACKII (Rupr.) Maxim. – MSW; Abundant; C = 0; BSUH 19444.

Symphoricarpos orbiculatus Moench – FPW; Infrequent along riverbank; C = 1; BSUH 19515.

Valeriana pauciflora Michx. – FPW, MSW; Infrequent; C = 7; BSUH 19406.

Valerianella umbilicata (Sull.) Wood – FPW, RC; Infrequent; C = 5; BSUH 19420.

CARYOPHYLLACEAE (Pink Family)

ARENARIA SERPYLLIFOLIA L. – RC, RS; Common; C = 0; BSUH 19387.

CERASTIUM FONTANUM Baumg. ssp. *VULGARE* (Hartm.) Greuter & Burdet – RS; Infrequent; C = 0; BSUH 19262, 19595.

SAPONARIA OFFICINALIS L. – RC; Rare but locally abundant; C = 0; BSUH 19322.

Silene antirrhina L. – RC; Infrequent but locally abundant; C = 0; BSUH 19279.

SILENE LATIFOLIA Poir. ssp. *ALBA* (Mill.) Greuter & Burdet – RC; Infrequent; C = 0; BSUH 19319.

Silene nivea (Nutt.) Muhl. ex Otth – RS; Rare; C = 7; BSUH 19316.

STELLARIA MEDIA (L.) Vill. ssp. *MEDIA* – FPW, RC; Abundant; C = 0; BSUH 19293, 19453.

Stellaria pubera Michx. – FPW; Infrequent; C = 7; BSUH 19396.

CLEOMACEAE (Cleome Family)

Polanisia dodecandra (L.) DC. var. *dodecandra* – RC; Abundant; C = 1; BSUH 19321, 19585.

CONVOLVULACEAE (Morning-Glory Family)

Calystegia sepium (L.) R. Br. – RC; Infrequent; C = 1; BSUH 19463.

Cuscuta gronovii Willd. ex Schult. – RC; Rare; C = 2; BSUH 19630.

IPOMOEA HEDERACEA Jacq. – RC; Rare; C = 0; BSUH 19497.

IPOMOEA PURPUREA (L.) Roth – RC; Rare; C = 0; BSUH 19570.

CUCURBITACEAE (Gourd Family)

Echinocystis lobata (Michx.) Torr. & A. Gray – RS; Infrequent; C = 3; BSUH 19578.

Sicyos angulatus L. – RS; Infrequent; C = 3; BSUH 19524, 19631.

EUPHORBIACEAE (Spurge Family)

- Acalypha rhomboidea* Raf. – RC; Abundant; C = 0; BSUH 19478, 19512, 19615.
CROTON MONANTHOGYNUS Michx. – RC (big island); Infrequent; C = 0; BSUH 19584, 19660.
Euphorbia dentata Michx. var. *dentata* – RS; Infrequent; C = 0; BSUH 19521, 19613.
Euphorbia maculata L. – RC (big island); Common; C = 0; BSUH 19479.
Euphorbia nutans Lag. – RC (big island); Common; C = 0; BSUH 19506.

FABACEAE (Pea or Bean Family)

- Amphicarpaea bracteata* (L.) Fernald var. *comosa* (L.) Fernald – RC; Rare; C = 5; BSUH 19574.
Cercis canadensis L. var. *canadensis* – RS; Rare; C = 3; BSUH 19347.
Gleditsia triacanthos L. – FPW; Rare; C = 1; BSUH 19280.
Gymnocladus dioica (L.) K. Koch – SC; Rare; C = 4; BSUH 19364.
MEDICAGO LUPULINA L. – RS; Common; C = 0; BSUH 19361.
MELILOTUS ALBUS Medik. – RC; Rare; C = 0; BSUH 19324.
MELILOTUS OFFICINALIS (L.) Pall. – RC; Rare; C = 0; BSUH 19344.
Robinia pseudoacacia L. – FPW; Rare but locally common; C = 1; BSUH 19379, 19542.
SECURIGERA VARIA (L.) Lassen – RS; Infrequent; C = 0; BSUH 19332.
TRIFOLIUM HYBRIDUM L. – RC; Rare; C = 0; BSUH 19302.
TRIFOLIUM PRATENSE L. – RS; Infrequent; C = 0; BSUH 19373.
TRIFOLIUM REPENS L. – RS; Infrequent; C = 0; BSUH 19390.
VICIA CRACCA L. – RS; Rare but locally common; C = 0; BSUH 19375.

FAGACEAE (Beech Family)

- Quercus macrocarpa* Michx. var. *macrocarpa* – MSW, RS; Rare; C = 5; BSUH 19271, 19388.
Quercus muehlenbergii Engelm. – MSW; Rare; C = 4; BSUH 19405.

FUMARIACEAE (Fumitory Family)

- Corydalis flavula* (Raf.) DC. – FPW; Rare; C = 3; BSUH 19599.
Dicentra cucullaria (L.) Bernh. – FPW; Abundant; C = 6; BSUH 19592.

GROSSULARIACEAE (Gooseberry Family)

- Ribes cynosbati* L. – FPW; Rare; C = 4; BSUH 19267.

HYPERICACEAE (St. John's-Wort Family)

- HYPERICUM PERFORATUM* L. – RC; Rare; C = 0; BSUH 19475.

JUGLANDACEAE (Walnut Family)

- Carya cordiformis* (Wang.) K. Koch – RS; Rare; C = 5; BSUH 19274.
Juglans nigra L. – FPW; Common; C = 2; BSUH 19412.

LAMIACEAE (Mint Family)

- GLECHOMA HEDERACEA* L. – FPW, MSW; Infrequent; C = 0; BSUH 19424.
LAMIUM AMPLEXICAULE L. – RS; Rare; C = 0; BSUH 19594.
LAMIUM PURPUREUM L. var. *PURPUREUM* – RS; Infrequent; C = 0; BSUH 19440.
Lycopus americanus Muhl. ex W. Barton – FPW, RC; Abundant; C = 3; BSUH 19486, 19632.
Lycopus uniflorus Michx. var. *uniflorus* – RC; Rare but locally common; C = 5; BSUH 19645.
Mentha arvensis L. – RC; Infrequent; C = 4; BSUH 19482.
MENTHA SPICATA L. – SC; Rare but locally common; C = 0; BSUH 19519, 19538.
Monarda fistulosa L. ssp. *fistulosa* – FPW; Common; C = 3; BSUH 19468.
NEPETA CATARIA L. – RC; Rare; C = 0; BSUH 19460.
PRUNELLA VULGARIS L. ssp. *VULGARIS* – FPW; Infrequent; C = 0; BSUH 19552.
Scutellaria lateriflora L. var. *lateriflora* – RC; Rare; C = 4; BSUH 19573.
Stachys hispida Pursh – FPW; Infrequent; C = 4; BSUH 19292.
Teucrium canadense L. var. *canadense* – RC; Rare but locally abundant; C = 3; BSUH 19281.

LIMNANTHACEAE (False Mermaid Family)

- Floerkea proserpinacoides* Willd. – FPW; Rare; C = 5; BSUH 19605.

MALVACEAE (Mallow Family)

- ABUTILON THEOPHRASTI* Medik. – RC; Infrequent; C = 0; BSUH 19637.
MALVA NEGLECTA Wallr. – RS; Rare; C = 0; BSUH 19334.
Tilia americana L. var. *americana* – FPW; Rare; C = 5; BSUH 19266.

MENISPERMACEAE (Moonseed Family)

- Menispermum canadense* L. – MSW; Abundant; C = 3; BSUH 19409.

MONTIACEAE (Blinks Family)

- Claytonia virginica* L. var. *virginica* – RS; Abundant; C = 2; BSUH 19589.

MORACEAE (Mulberry Family)

- MACLURA POMIFERA* (Raf.) C.K. Schneid. – FPW; Infrequent; C = 0; BSUH 19395, 19517.
MORUS ALBA L. – FPW; Abundant; C = 0; BSUH 19392, 19402.
Morus rubra L. var. *rubra* – FPW; Rare; C = 4; BSUH 19268.

OLEACEAE (Olive Family)

- Fraxinus americana* L. – MSW; Infrequent; C = 4; BSUH 19289, 19561, 19580.

Fraxinus pennsylvanica Marshall – FPW; Infrequent; C = 1; BSUH 19289, 19350.

LIGUSTRUM OBTUSIFOLIUM Siebold & Zucc. – RS; Rare; C = 0; BSUH 19349.

ONAGRACEAE (Evening Primrose Family)

Circaea lutetiana L. ssp. *canadensis* (L.) Asch. & Magnus – MSW; Common; C = 2; BSUH 19294.

Epilobium coloratum Biehl. – RC; Rare; C = 3; BSUH 19571.

Ludwigia palustris (L.) Ell. – RC; Infrequent but locally abundant; C = 3; BSUH 19487, 19525, 19623.

Oenothera biennis L. – RC; Infrequent; C = 0; BSUH 19483.

OXALIDACEAE (Wood Sorrel Family)

Oxalis dillenii Jacq. – RS; Common; C = 0; BSUH 19339.

Oxalis stricta L. – RS; Common; C = 0; BSUH 19309.

PAPAVERACEAE (Poppy Family)

Sanguinaria canadensis L. – MSW; Infrequent; C = 5; BSUH 19432.

PENTHORACEAE (Ditch Stonecrop Family)

Penthorum sedoides L. – RC; Infrequent; C = 2; BSUH 19513.

PHRYMACEAE (Lopseed Family)

Mimulus alatus Aiton – RC; Common; C = 4; BSUH 19488.

Mimulus ringens L. var. *ringens* – RC; Rare but locally common; C = 4; BSUH 19465

Phryma leptostachya L. – RS; Infrequent; C = 4; BSUH 19458.

PHYTOLACCACEAE (Pokeweed Family)

Phytolacca americana L. var. *americana* – RS; Rare; C = 0; BSUH 19333.

PLANTAGINACEAE (Plantain Family)

CHAENORHINUM MINUS (L.) Lange – RC; Rare; C = 0; BSUH 19501, 19528.

(#) *Gratiola neglecta* Torr. – RC; Rare but locally common; C = 4; BSUH 19464.

Leucospora multifida (Michx.) Nutt. – Rare but locally abundant; C = 3; BSUH 19640.

PLANTAGO LANCEOLATA L. – RS; Common; C = 0; BSUH 19338.

Plantago rugelii Decne. var. *rugelii* – RC, RS; Common; C = 0; BSUH 19369, 19533.

Veronica anagallis-aquatica L. – RC, RS; Common; C = 5; BSUH 19298, 19376.

VERONICA ARVENSIS L. – RS; Abundant; C = 0; BSUH 19372, 19394.

VERONICA PEREGRINA L. – RS; Abundant; C = 0; BSUH 19454.

PLATANACEAE (Plane-Tree Family)

Platanus occidentalis L. – FPW; Common; C = 3; BSUH 19442.

POLEMONIACEAE (Phlox Family)

Phlox divaricata L. ssp. *divaricata* – MSW; Infrequent; C = 5; BSUH 19425.

Phlox paniculata L. – FPW; Rare; C = 3; BSUH 19275.

Polemonium reptans L. var. *reptans* – MSW; Infrequent; C = 5; BSUH 19428.

POLYGONACEAE (Smartweed Family)

FALLOPIA JAPONICA (Houtt.) Ronse Decr. – RC; Rare; C = 0; BSUH 19474, 19541.

Fallopia scandens (L.) Holub – FPW, RC; Infrequent; C = 0; BSUH 19627.

Persicaria lapathifolia (L.) Delarbre – RC; Infrequent; C = 0; BSUH 19529, 19530.

PERSICARIA LONGISETA (Bruijn) Kitag. – SC; Abundant here; C = 0; BSUH 19492, 19614.

PERSICARIA MACULOSA Gray – RC; Common; C = 0; BSUH 19509, 19612.

Persicaria pennsylvanica (L.) M. Gómez – RC; Rare; C = 0; BSUH 19636.

Persicaria punctata (Ell.) Sm. – RC, SC; Common; C = 3; BSUH 19560, 19621.

Persicaria virginiana (L.) Gaertn. (= *Tovara virginiana* (L.) Raf.) – SC; Common; C = 3; BSUH 19520.

POLYGONUM AVICULARE L. – RS; Abundant; C = 0; BSUH 19336.

Rumex altissimus A. Wood – RC; Infrequent; C = 2; BSUH 19314, 129401.

RUMEX CRISPUS L. var. *CRISPUS* – RS; Common; C = 0; BSUH 19374.

RUMEX OBTUSIFOLIUS L. – SC; Common; C = 0; BSUH 19331.

PRIMULACEAE (Primrose Family)

Lysimachia ciliata L. – RS; Rare; C = 4; BSUH 19301.

LYSIMACHIA NUMMULARIA L. – RC, SC; Common and locally abundant; C = 0; BSUH 19330, 19345.

Samolus parviflorus Raf. – SC; Infrequent; C = 5; BSUH 19514.

RANUNCULACEAE (Buttercup Family)

Delphinium tricorne Michx. – MSW; Common; C = 5; BSUH 19427, 19451.

Enemion biternatum Raf. – FPW; Common; C = 5; BSUH 19593.

Ranunculus abortivus L. – FPW; Common; C = 0; BSUH 19604.

RANUNCULUS FICARIA L. var. *BULBIFERA* Marsden-Jones – FPW; Common and locally abundant; C = 0; BSUH 19591.

Ranunculus hispidus Michx. var. *hispidus* – FPW; Infrequent; C = 7; BSUH 19606.

Ranunculus sceleratus L. var. *sceleratus* – RC; Rare; C = 3; BSUH 19569.

Thalictrum dasycarpum Fisch. & Avé-Lall. – FPW; Rare; C = 4; BSUH 19286, 19329.

Thalictrum thalictroides (L.) Eames & B. Boivin – FPW; Infrequent; C = 7; BSUH 19416.

ROSACEAE (Rose Family)

Geum canadense Jacq. var. *canadense* – FPW, RS; Common; C = 1; BSUH 19367.

Geum vernum (Raf.) Torr. & A. Gray – FPW; Abundant; C = 1; BSUH 19259.

MALUS PUMILA Mill. – MSW; Rare; C = 0; BSUH 19269.

Potentilla norvegica L. ssp. *monspeliensis* (L.) Asch. & Graebn. – RC; Rare; C = 0; BSUH 19499.

Prunus serotina Ehrh. var. *serotina* – FPW; Rare; C = 1; BSUH 19270.

ROSA MULTIFLORA Thunb. ex Mur. – RS; Rare; C = 0; BSUH 19377.

Rubus occidentalis L. – RS; Rare; C = 1; BSUH 19340.

RUBIACEAE (Madder Family)

Galium aparine L. – MSW; Abundant; C = 1; BSUH 19436.

Galium triflorum Michx. – FPW; Common; C = 5; BSUH 19469.

SALICACEAE (Willow Family)

Populus deltoides Bartr. ex Marshall var. *deltoides* – FPW; Common; C = 1; BSUH 19445.

Salix exigua Nutt. var. *interior* (Rowlee) Cronq. (= *Salix interior* Rowlee) – FPW; Rare but locally common; C = 1; BSUH 19494.

Salix nigra Marshall – RC (big island); Abundant; C = 3; BSUH 19351.

SAPINDACEAE (Soapberry Family)

Acer negundo L. – FPW; Abundant; C = 1; BSUH 19449.

Acer nigrum Michx. f. – FPW, MSW; Infrequent; C = 6; BSUH 19434.

Acer saccharinum L. – FPW, RC; Abundant; C = 1; BSUH 19450.

Acer saccharum Marshall var. *saccharum* – MSW; Infrequent; C = 4; BSUH 19307.

Aesculus glabra Willd. var. *glabra* – FPW; Common; C = 5; BSUH 19389.

SCROPHULARIACEAE (Figwort Family)

Scrophularia marilandica L. – SC; Common; C = 5; BSUH 19490.

VERBASCUM BLATTARIA L. – RC, RS; Infrequent; C = 0; BSUH 19323, 19337.

VERBASCUM THAPSUS L. – RC; Rare; C = 0; BSUH 19320.

SIMAROUBACEAE (Quassia Family)

AILANTHUS ALTISSIMA (Mill.) Swingle – FPW; Rare; C = 0; BSUH 19277.

SOLANACEAE (Nightshade Family)

Physalis longifolia Nutt. var. *subglabrata* (Mack. & Bush) Cronq. – RC, SC; Infrequent; C = 0; BSUH 19285, 19622.

SOLANUM LYCOPERSICUM L. – RC; Rare; C = 0; BSUH 19505.

Solanum ptycanthum Dunal – RC, RS; Infrequent but locally abundant; C = 0; BSUH 19480, 19642.

STAPHYLEACEAE (Bladdernut Family)

Staphylea trifolia L. – FPW; Rare; C = 5; BSUH 19413.

ULMACEAE (Elm Family)

Ulmus americana L. – FPW; Infrequent; C = 3; BSUH 19407, 19448.

URTICACEAE (Nettle Family)

Boehmeria cylindrica (L.) Sw. – RC; Infrequent; C = 3; BSUH 19516.

Laportea canadensis (L.) Wedd. – FPW, SC; Abundant; C = 2; BSUH 19489, 19575.

Parietaria pensylvanica Muhl. ex Willd. – RS; Rare; C = 1; BSUH 19655.

Pilea pumila (L.) A. Gray var. *pumila* – FPW, RC; Abundant; C = 2; BSUH 19557.

Urtica gracilis Aiton (= *Urtica dioica* L. ssp. *gracilis* (Aiton) Seland.) – FPW, RC; Infrequent; C = 1; BSUH 19287, 19467.

VERBENACEAE (Vervain Family)

(#) *Verbena bracteata* Lag. & Rodr. – RC; Rare; C = 0; BSUH 19318.

Verbena hastata L. var. *hastata* – RC; Infrequent; C = 3; BSUH 19466.

Verbena urticifolia L. var. *leiocarpa* L.M. Perry & Fernald – RC, SC; Common; C = 3; BSUH 19470.

VIOLACEAE (Violet Family)

Viola sororia Willd. var. *sororia* – RS; Common; C = 1; BSUH 19588.

Viola striata Aiton – MSW; Common; C = 4; BSUH 19426.

VITACEAE (Grape Family)

Parthenocissus quinquefolia (L.) Planch. – FPW, MSW; Common; C = 2; BSUH 19341.

Vitis riparia Michx. – FPW, MSW; Common; C = 1; BSUH 19308.

Vitis vulpina L. – RS; Rare; C = 3; BSUH 19652.

MAGNOLIOPHYTA

LILIOPSIDA (Monocotyledons)

ALISMATACEAE (Water-Plantain Family)

Alisma subcordatum Raf. – RC; Infrequent; C = 2; BSUH 19504.

AMARYLLIDACEAE (Amaryllis Family)

Allium burdickii (Hanes) A.G. Jones (= *Allium tricoccum* Aiton var. *burdickii* Hanes) – MSW; Infrequent; C = 6; BSUH 19411.

Allium canadense L. var. *canadense* – FPW, RC; Common; C = 1; BSUH 19342.

ALLIUM VINEALE L. ssp. *VINEALE* – FPW; Abundant; C = 0; BSUH 19590.

ARACEAE (Arum Family)

Lemna minor L. – RC; Rare but locally abundant; C = 3; BSUH 19633.

ASPARAGACEAE (Asparagus Family)

Camassia scilloides (Raf.) Cory – RS (southern end); Rare; C = 5; BSUH 19261.

ORNITHOGALUM UMBELLATUM L. – RS; Rare; C = 0; BSUH 19362.

Polygonatum biflorum (Walter) Ell. var. *biflorum* – MSW; Common; C = 4; BSUH 19602.

Polygonatum biflorum (Walter) Ell. var. *commutatum* (Schult. & Schult. f.) Morong – RS; Rare; C = 4; BSUH 19300.

COMMELINACEAE (Spiderwort Family)

COMMELINA COMMUNIS L. – RC; Infrequent; C = 0; BSUH 19317.

Tradescantia subaspera Ker Gawl. – FPW; Common; C = 4; BSUH 19326.

CYPERACEAE (Sedge Family)

Carex aggregata Mack. – RS; Infrequent; C = 2; BSUH 19264, 19357.

Carex amphibola Steud. – MSW; Infrequent; C = 8; BSUH 19380.

Carex blanda Dewey – MSW; Common; C = 1; BSUH 19355.

Carex conjuncta Boott – RS; Infrequent but locally common; C = 6; BSUH 19356.

Carex grisea Wahlenb. – FPW, RC; Infrequent; C = 3; BSUH 19354.

Carex vulpinoidea Michx. – RS; Infrequent; C = 2; BSUH 19306.

Cyperus erythrorhizos Muhl. – RC; Rare; C = 1; BSUH 19381.

Cyperus odoratus L. – RC; Infrequent; C = 1; BSUH 19581, 19659.

Cyperus strigosus L. – RC; Infrequent; C = 0; BSUH 19564, 19619.

Eleocharis erythropoda Steud. – RC (big island); Rare; C = 2; BSUH 19526.

Schoenoplectus tabernaemontani (C.C. Gmel.) Palla – RC (big island); Rare; C = 4; BSUH 19544.

Scirpus atrovirens Willd. – RS; Infrequent; C = 4; BSUH 19305.

JUNCACEAE (Rush Family)

Juncus dudleyi Wieg. – RS; Rare; C = 2; BSUH 19447.

Juncus tenuis Willd. – MSW; Infrequent; C = 0; BSUH 19303.

LILIACEAE (Lily Family)

Erythronium americanum Ker Gawl. ssp. *americanum* – MSW; Rare; C = 5; BSUH 19598.

POACEAE (Grass Family)

AGROSTIS STOLONIFERA L. var. *STOLONIFERA* – RC, RS; Infrequent but locally abundant; C = 0; BSUH 19312, 19472.

BROMUS INERMIS Leyss. ssp. *INERMIS* – RC, RS; Infrequent; C = 0; BSUH 19290.

BROMUS JAPONICUS Thunb. ex Mur. – RC; Rare; C = 0; BSUH 19358.

BROMUS RACEMOSUS L. – RS; Rare; C = 0; BSUH 19386.

BROMUS TECTORUM L. – RS; Infrequent; C = 0; BSUH 19452.

Cinna arundinacea L. – FPW; Common; C = 4; BSUH 19559.

DACTYLIS GLOMERATA L. – RS; Common; C = 0; BSUH 19455.

Dichanthelium clandestinum (L.) Gould – FPW; Rare; C = 3; BSUH 19291.

DIGITARIA CILIARIS (Retz.) Köler – RC, RS; Infrequent but locally common; C = 0; BSUH 19510, 19547.

DIGITARIA ISCHAEMUM (Schreb.) Muhl. – RS; Infrequent; C = 0; BSUH 19648.

DIGITARIA SANGUINALIS (L.) Scop. – RS; Infrequent; C = 0; BSUH 19657.

ECHINOCHLOA CRUSGALLI (L.) P. Beauv. – RC, RS; Infrequent; C = 0; BSUH 19473, 19548, 19565.

Echinochloa muricata (P. Beauv.) Fernald var. *muricata* – RC; Abundant; C = 1; BSUH 19495.

ELEUSINE INDICA (L.) Gaertn. – RC (big island), RS; Abundant; C = 0; BSUH 19491.

Elymus macgregorii R.E. Brooks & J.J.N. Campb. – FPW; Abundant; C = 3; BSUH 19359.

ELYMUS REPENS (L.) Gould – RS; Rare; C = 0; BSUH 19366.

Elymus riparius Wieg. – FPW, RC; Infrequent but locally common; C = 5; BSUH 19658.

Elymus virginicus L. var. *virginicus* – FPW, RC, RS; Common; C = 3; BSUH 19311, 19656.

Eragrostis frankii Steud. – RC; Infrequent; C = 2; BSUH 19650.

Eragrostis hypnoides (Lam.) Britton, Sterns & Poggenb. – RC; Common; C = 3; BSUH 19610.

Eragrostis pectinacea (Michx.) Nees var. *pectinacea* – RC, RS; Common; C = 0; BSUH 19493, 19546, 19651.

Festuca subverticillata (Pers.) Alexeev – MSW, RS; Common; C = 4; BSUH 19353.

Glyceria striata (Lam.) Hitchc. – SC; Common; C = 4; BSUH 19543.

(#) *HORDEUM VULGARE* L. – RS; Rare; C = 0; BSUH 19385.

Leersia oryzoides (L.) Sw. – FPW, RC; Infrequent; C = 2; BSUH 19646.

Leersia virginica Willd. – FPW, SC; Common; C = 4; BSUH 19554.

Muhlenbergia frondosa (Poir.) Fernald – MSW; Infrequent but locally abundant; C = 3; BSUH 19649.

Muhlenbergia schreberi J.F. Gmel. – RS; Common; C = 0; BSUH 19644.

Panicum dichotomiflorum Michx. var. *dichotomiflorum* – RC; Infrequent; C = 0; BSUH 19647.

Panicum philadelphicum Bernh. ex Trin. ssp. *gatteringeri* (Nash) Freckman & Lelong – RC; Infrequent; C = 4; BSUH 19582, 19583.

Paspalum setaceum Michx. – RS; Infrequent but locally common; C = 3; BSUH 19310.

Phalaris arundinacea L. – RC; Rare but locally abundant; C = 0; BSUH 19352.

PHLEUM PRATENSE L. – RS; Rare; C = 0; BSUH 19365.

POA ANNUA L. – RS; Common; C = 0; BSUH 19439.

POA PRATENSIS L. – RS; Abundant; C = 0; BSUH 19456.

Poa sylvestris A. Gray – SC; Rare; C = 5; BSUH 19260.

POA TRIVIALIS L. – FPW; Common; C = 0; BSUH 19382, 19457.

SCHEDONORUS ARUNDINACEUS (Schreb.) Dumort. – RS; Abundant; C = 0; BSUH 19383.

SETARIA FABERI Herrm. – RC; Common; C = 0; BSUH 19495, 19620.

SETARIA PUMILA (Poir.) Roem. & Schult ssp. *pumila* – RC, RS; Common; C = 0; BSUH 19562.

SETARIA VIRIDIS (L.) P. Beauv. var. *viridis* – RC; Rare; C = 0; BSUH 19502.

SMILACACEAE (Carrion-flower Family)

Smilax hispida Raf. – MSW; Infrequent; C = 3; BSUH 19408.

TRILLIACEAE (Trillium Family)

Trillium sessile L. – MSW; Common; C = 4; BSUH 19431.

Trillium sessile L. f. *luteum* – MSW; Infrequent; C = 4; BSUH 19596.

XANTHORRHOACEAE (Day-lily Family)

HEMEROCALLIS FULVA (L.) L. – RS; Rare; C = 0; BSUH 19335.

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