

ADDITIONS TO THE FLORA OF MOUNDS STATE PARK AND PRESERVE, MADISON COUNTY, INDIANA

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ABSTRACT. Rothrock et al. (1993) documented 455 species of vascular plants at Mounds State Park and Preserve, Madison County, Indiana. During the 2009 growing season, an additional floristic survey was conducted, including a 16.6 hectare annex to the south end of the park. An additional 129 species of vascular plants, representing 98 genera in 46 families, were vouchered. Of these species, 94 (~73%) were native, 35 (~27%) were adventives, and 87 represent Madison County records. Combining the results of the two studies yielded 584 total species, 478 (~82%) native species, and 106 (~18%) adventive species. For native species, the Floristic Quality Index (FQI) = 96.2 and the mean Coefficient of Conservatism (C) = 4.4, whereas for all species, the FQI = 87.1 and the mean C = 3.6. The floristic quality data indicate that the conservation and richness of Mounds State Park and Preserve are of paramount importance from a regional perspective.

Keywords: County records — vascular plants, Madison County — flora, Mounds State Park — flora, Indiana — flora, mean C, floristic quality index, FQI

INTRODUCTION

Established in 1930, Mounds State Park is a 117.4 hectare (290 acres) property located on the east edge of the city of Anderson, Indiana (N 40°05'44.7" and W 85°37'12", entrance to the Visitor Center). The entire western side of the park is border by the White River. The park received its name because it contains some of the finest examples of earthwork and mound building in the state of Indiana. These structures were built around 150 B.C. by the Adena and Hopewell cultures primarily for religious ceremonies (Mounds State Park Brochure).

Although Mounds State Park is recognized for its botanical richness, few formal botanical studies had been conducted there prior to 1993. Most notable was the compilation of a list of wetland species sighted within the nature preserve by the Indiana Department of Natural Resources (Casebere 1990). Rothrock et al. (1993) published an inventory of the vascular flora vouchered in the park and nature preserve

and documented 455 species, including 189 Madison County records. Of the 455 species, 388 (85%) were native and 67 (15%) were exotics. Since 1993, one of the authors of this paper (KT) has kept a list of species occurring in the park that have not previously been reported. Once the number of species on the list exceeded 10% of the documented species for the park and nature preserve, an inventory of additional species was deemed appropriate.

DESCRIPTION OF THE STUDY AREA

Rothrock et al. (1993) provided a description of the physical features and topography, geology and soils, and human history of the park. They also presented a description of the plant associations within the park, including floodplain woods, wet sedge meadow (and fen), mesic ravine woods, dry to mesic upland woods, and various cultural communities, such as lawns. These associations are still present today. For community types and distribution, as well as reference points, see Figure 1 of Rothrock et al. (1993).

Since 1993, there have been a number of alterations to the landscape and purchases of new acreage within the park, and the majority

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of the additional species reported in this paper are the result of these changes or additions. The most notable of the alterations to the landscape are described here. First, the nature preserve has undergone at least six prescribed burns. Both the sedge meadow/fen and the slope woods on the eastside of the preserve were burned. These burns removed organic debris from the slope woods, increased habitat, and opened the woods to additional sunlight. Second, just south of the public swimming pool, a large, well manicured field was allowed to undergo old-field succession. This field has been in succession long enough to allow many perennial species to become established. Third, in the field around the old horse barn, several large piles of soil, which were removed from various locations within the park, are stored for future use. These piles provide disturbed soil habitat and are colonized by early successional annuals and biennials.

In addition to alternations in the landscape, a tract of forested land, approximately 16.6 hectares (41 acres), was added to the southern end of the original park and extends to Rangeline Road. The habitats within this wooded area are variable. Several habitats are similar to those in the original park, including mesic ravine woods, dry to mesic upland and slope woods, and a narrow floodplain woods close to the White River. However, this new addition includes several large, well-vegetated seeps and a young successional woodland dominated by hawthorn, honeysuckle, and osage-orange. This young woodland occurs on the hillside and uplands to the east of the White River. Lastly, there is a dry hillside, old-field community along Rangeline Road.

Within the unaltered portion of the park originally surveyed by Rothrock et al. (1993), the one habitat that was under sampled was the riverbank, sandbars, and gravel bars along the White River. Many species reported here were from these sites on the river near the boat ramp. The remaining species reported here were found in the unaltered sections of the original park.

METHODS

During the 2009 growing season, approximately one foray every 7–10 days was made into the park and nature preserve. In the early season, forays were made into every major habitat type and efforts were made to cover all

areas within these habitats. However, latter in the season, more time was spent in the altered habitats or the new woodland addition (see Description of the Study Area). Voucher specimens for each species were collected and initially deposited in the Ball State University Herbarium (BSUH). Upon publication, the voucher specimens from this study will be stored in the Friesner Herbarium, Butler University, with the specimens from the Rothrock et al. (1993) study. Notes on vegetation consisted of species lists with visual estimates of their distribution and abundance (see catalog of vascular plants, Appendix 1). Additionally, we noted the habitat(s) for each species collected. Nomenclature follows the USDA Plants Database (USDA 2010). The floristic quality index (FQI) for the site was determined using the program developed by the Conservation Research Institution (Wilhelm & Masters 2000) in conjunction with Rothrock (2004).

RESULTS

This floristic survey identified 129 new species of vascular plants in Mound State Park and Preserve, representing 98 genera in 46 families (Appendix 1). Of the 129 new species, 94 (~73%) were native, 35 (~27%) were adventives, and 87 were recorded for the first time in Madison County (county records). Of the native species, 17 were woody (eight trees, six shrubs, three woody vines), 56 were forbs, 18 were graminoids (eight grasses, ten sedges), and three were ferns. Of the exotic species, seven were woody (two trees, four shrubs, one woody vine), 18 were forbs, and 10 were graminoids (all grasses). For all 129 species, the floristic quality index (FQI) was 34.0 and the mean coefficient of conservatism (C_{avg}) was 3.0. For just the 93 native species, the FQI was 39.8 and the C_{avg} was 4.1. Twenty-one of the 93 native species have C values of 7 or higher, including *Carex careyana*, *Iris brevicaulis* and *Oligoneuron riddellii* with C = 9, *Amelanchier laevis*, *Aristolochia serpentaria*, *Asclepias exaltata*, *Carya laciniosa*, *Epifagus virginiana*, *Erigeron pulchellus*, *Trillium grandiflorum* and *Veronicastrum virginicum* with C = 8, and 10 species with C = 7 (Appendix 1). Of the 129 additional species, 23 were in the Asteraceae, 18 were in the Poaceae, 10 were in the Cyperaceae, and three were in the Orchidaceae (Appendix 1).

Table 1.—Floristic Quality summary resulting from the combination of results from the current study with those of Rothrock et al. (1993). C_{avg} = mean Coefficient of Conservatism, FQI = Floristic Quality Index. Total Species is native plus exotic species.

	Species Count	C_{avg}	FQI
Native species	478	4.4	96.2
Total species	584	3.6	87.1

Tungesvik (pers. comm.) reported other vascular plants occurring in the park since the Rothrock et al. (1993) inventory, but there are no permanent records of their occurrence, neither vouchered or photography, nor were they found in the current study. These include *Acorus calamus* L., *Frasera caroliniensis* Walter, *Lonicera reticulata* Raf., *Oxalis violacea* L., *Sabatia angularis* (L.) Pursh, and *Triodanis perfoliata* (L.) Nieuwl.

Lastly, although little effort was made to find the 455 species reported earlier, 441 of these species were observed. Thus, only 14 of the species reported in the 1993 study were not observed during this study.

DISCUSSION

Combining the results of the current study with those of the Rothrock et al. (1993) study yielded the floristic quality summary seen in Table 1 and the physiognomic analysis seen in Table 2. Swink & Wilhelm (1994) have

suggested that land with an FQI less than 20 essentially has no significance from a natural area prospective, while areas with an FQI greater than 35 possess sufficient conservation and richness to be of profound importance from a regional perspective, and areas registering in the 50s and higher are of paramount importance. The FQI = 96.2 for the native flora (FQI = 87.1 for all species) clearly signifies the “paramount importance” of the floral natural heritage of Mounds State Park and the enclosed nature preserve.

The only other site in Indiana with an FQI for the native flora that approaches that of Mounds State Park and Preserve is Yellow Birch Ravine Nature Preserve, Crawford County [Shawnee Hills Natural Region, Crawford Upland Section] with an FQI = 90.4 (Yatskievych & Yatskievych 1987). Certainly for east-central Indiana (ECI), there are no sites with such a high FQI value. The highest quality sites for ECI include Wilbur Wright Fish and Wildlife Area, Henry County, FQI = 77.3, Ginn Woods, Delaware County, FQI = 74.1, and Botany Glen, Grant County, FQI = 68.5 (Rothrock & Homoya 2005). It should be noted that the total number of species reported from a site does influence the FQI value (see Rothrock 2004, Ruch et al. 2010, Swink & Wilhelm 1994, and Taft et al. 1997). All the sites listed here have high species numbers, e.g., Mounds State Park and Preserve (478 native species/584 total species), Yellow Birch Ravine Nature Preserve (385/420), Wilbur Wright Fish

Table 2.—Physiognomic analysis resulting from the combination of results from the current study with those of Rothrock et al. (1993). A = annual, B = biennial, H = herbaceous, P = perennial, W = woody.

	Native Species Summary		Adventive Species Summary	
	Number	% of Total	Number	% of Total
# of species	478	81.8%	106	18.2%
Tree	49	8.4%	7	1.2%
Shrub	30	5.1%	14	2.4%
W-Vine	10	1.7%	2	0.3%
H-Vine	5	0.9%	0	0.0%
P-Forbs	230	39.4%	27	4.6%
B-Forbs	13	2.2%	14	2.4%
A-Forbs	45	7.7%	19	3.3%
P-Grass	25	4.3%	12	2.1%
A-Grass	5	0.9%	11	1.9%
P-Sedge	54	9.2%	0	0.0%
A-Sedge	2	0.3%	0	0.0%
Fern	10	1.7%	0	0.0%

and Wildlife Area (388/536), Ginn Woods (364/441), and Botany Glen (295/357) (Rothrock & Homoya 2005).

Swink & Wilhelm (1994) state that species inventories from sites of natural quality will attain a C_{avg} of 3.5 or higher, while those with high natural quality might be expected to have a C_{avg} of 4.5 or greater. Because the average C values in Indiana are 1.2 cohorts lower than those of the Chicago region (Rothrock & Homoya 2005), it is reasonable to anticipate that Indiana sites with high natural quality may have somewhat lower C_{avg} values than those suggested by Swink & Wilhelm (1994). Rothrock & Homoya (2005) state that the best quality reference sites in central Indiana had C_{avg} ranging from 3.8–4.1. Thus, the $C_{avg} = 4.4$ (Table 1) clearly denotes the high natural quality of Mounds State Park and its nature preserve. In comparison, the highest C_{avg} values for native flora reported for any site in ECI are 4.0 for Botany Glen in Grant County and 3.9 for the wetland complex on the IMI property in Henry County, Wilbur Wright Fish & Wildlife Area in Henry County, and Ginn Woods in Delaware County (Rothrock & Homoya 2005, Ruch et al. 2008, Stonehouse et al. 2005). Higher C_{avg} values are typically found for sites outside of ECI, such as Lime Lake Nature Preserve in Steuben County (6.3), Fox Lake in Steuben County (5.4), Wening-Sherrit Seep Springs in Dubois County (5.3), Plaster Creek Seep Springs in Martin County (5.2) and Perry County Limestone Glade (5.2) (Rothrock & Homoya 2005). The lower C_{avg} values for ECI are probably due to heavy anthropogenic impact through agriculture and urbanization.

As would be predicted, the high C_{avg} at Mounds State Park is due to the number of native species with $C \geq 7$, i.e., 113 (~23%) of the 478 native species. There are 56 species with $C = 7$, 30 species with $C = 8$, nine species with $C = 9$, and 15 species with $C = 10$ (Appendix 1). The species with $C = 10$ include *Arnoglossum plantagineum*, *Calopogon tuberosus*, *Carex bromoides*, *C. prairea*, *Deschampsia cespitosa*, *Eleocharis elliptica*, *Lobelia kalmii*, *Oligoneuron ohioense*, *Parnassia glauca*, *Ranunculus hispidus* var. *caricetorum*, *Rhynchospora capillacea*, *Saxifraga pensylvanica*, *Scleria verticillata*, *Solidago uliginosa*, and *Spiranthes lucida*.

Rothrock & Homoya (2005) state that the natural quality of a site is compromised when the adventive diversity lowers C_{avg} by more than 0.7 units. At Mounds State Park the difference between the native C_{avg} and the total C_{avg} is 0.8 units (Table 1). Plot data were not gathered in either this study or the earlier study of Rothrock et al. (1993), but based on our visual observations, the adventive species do not appear to be compromising native species except in very specific sites, such as the various cultural communities (i.e., lawns and the campground), the disturb ground near the old horse barn, the old-field in succession south of the swimming pool, the woodland edges bordering the lawns and roads, and the successional woodland at the southern end. Once into the interior of the woodland along the White River, which is most of the site, there are few adventive species. The habitats with little adventive species impact include the floodplain woods (though the recent spread of *Alliaria petiolata* is worrisome), the wet sedge meadow (and fen), mesic ravine woods, dry to mesic upland woods, and the circumneutral seeps in the recently purchased woodland.

In summary, the floristic quality data, with native FQI = 96.2 and $C_{avg} = 4.4$, reveal that Mounds State Park and Preserve retain noteworthy remnants of the region's natural heritage. In fact, the floristic quality data indicate that Mounds State Park and Preserve is the highest quality site reported to date in east-central Indiana and that plant diversity there is comparable to the best sites anywhere in Indiana.

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APPENDIX 1

CATALOG OF THE ADDITIONAL VASCULAR PLANTS AT MOUNDS STATE PARK AND NATURE PRESERVE

(Arranged alphabetically by family)

Listed are the 129 additional species vouchered from the park and enclosed nature preserve, and special notes on two species, e.g., *Arnoglossum atriplicifolium* and *Trillium recurvatum*, previously documented from the site (Rothrock et al. 1993). Additionally, three species, e.g., *Asclepias exaltata*, *Gentianella quinquefolia*, and *Silphium integrifolium*, which were not found during the current study but had been documented previously with photography, are included in the list. Lastly, six have been observed at various times in the park since 1993, but none were observed during this study nor have they been documented with photographs. These plants, which are excluded from this list, include *Acorus calamus* L., *Lonicera reticulata* Raf., *Oxalis violacea* L., *Sabatia angularis* (L.) Pursh, *Triodanis perfoliata* (L.) Nieuwl., and *Frasera caroliniensis* Walter.

Nomenclature follows the USDA Plants Database (USDA 2010). Each species report contains the following information: (1) current scientific name based on the USDA Plants Database; (2) current taxonomic synonyms, if appropriate; (3) common name(s), based primarily on Gleason & Cronquist (1991), Swink & Wilhelm (1994), and Yatskievych (2000); (4) typical habitat(s) within the study site; (5) a visual estimate of its relative abundance; (6) its coefficient of conservatism (C-value) for Indiana (Rothrock 2004); and (7) 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 or two sites; 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.

The symbols in parentheses immediately preceding each species refer to the following: * = naturalized, non-native (exotic) species, # = Madison County record, and z = vouchered as photograph only. Species were deemed unreported for Madison County (and hence considered a county record) if they did not appear in the computer database of Keller et al. (1984), which is the same list of plants for Madison County as the one at the Indiana Natural Heritage Data Center, IDNR.). Two plants documented in this study, *Carex trichocarpa* and *Prenanthes crepidinea*, are on the Divisions of Nature Preserves, Indiana Department of Natural Resources' "Watch List" (Division of Nature Preserves 2007). There are 87 Madison County records.

DIVISION POLYPODIOPHYTA

Ferns

Aspleniaceae (Spleenwort Family)

(#) *Asplenium platyneuron* (L.) Britton, Sterns & Poggenb. var. *platyneuron*; Ebony Spleenwort; Woods; Infrequent; C = 3; BSUH 16701.v

Dryopteridaceae (Wood Fern Family)

(#) *Polystichum acrostichoides* (Michx.) Schott var. *acrostichoides*; Christmas Fern; Woods; Infrequent; C = 5; BSUH 16751.

Thelypteridaceae (Marsh Fern Family)

Phegopteris hexagonoptera (Michx.) Fée; SYN: *Thelypteris hexagonoptera* (Michx.) Weath.; Broad or Southern Beech Fern; Woods in the new addition; Rare; C = 7; BSUH 16712.

DIVISION MAGNOLIOPHYTA

Angiosperms

Acanthaceae (Acanthus Family)

(#) *Ruellia humilis* Nutt.; Sessile-Leaved Hairy Ruellia, Fringeleaf Wild Petunia; Dry hillside/roadside along Rangeline Road at southwestern end of property; Rare but locally common; C = 5; BSUH 16732.

Aceraceae (Maple Family)

(#) *Acer nigrum* Michx. f.; SYN: *Acer saccharum* Marsh. ssp. *nigrum* (Michx. f.) Desmarais, *Acer saccharum* Marsh. var. *nigrum* (Michx. f.) Britton; Black Maple; Floodplain forest; Common; C = 6; BSUH 16773.

(* #) *Acer platanoides* L.; Norway Maple; Woods along Mounds Road north of entrance; Common; C = 0; BSUH 16765.

Agavaceae (Century-Plant Family)

(* #) *Yucca filamentosa* L.; SYN: *Yucca smalliana* Fernald, *Y. flaccida* Haw.; Spanish Bayonet, Adam's Needle, Weak-Leaf Yucca; Dry hillside along Rangeline Road at southwestern end of property; Rare; C = 0; BSUH 16735.

Alismataceae (Water Plantain Family)

Sagittaria latifolia Willd.; Common or Broad-Leaf Arrowhead; Fen; Common; C = 3; BSUH 16801.

Annonaceae (Custard-Apple Family)

Asimina triloba (L.) Dunal; Pawpaw; Floodplain forest; Infrequent; C = 6; BSUH 16700, 16766.

Apiaceae (Carrot Family)

(* #) *Conium maculatum* L.; Poison Hemlock; Floodplain woods; Infrequent; C = 0; BSUH 16946.

Aristolochiaceae (Birthwort Family)

(#) *Aristolochia serpentaria* L.; Virginia Snakeroot; Woods; Infrequent; C = 8; BSUH 16738.

Asclepiadaceae (Milkweed Family)

(z) *Asclepias exaltata* L.; SYN: *Asclepias phytolacoides* Pursh; Poke Milkweed; Slope woods in preserve above fen; C = 8; BSUH 16986. Special Note: Not found in this study but photographed between 1993 and 2009.

(#) *Asclepias incarnata* L. ssp. *incarnata*; Swamp Milkweed; Fen; Infrequent; C = 4; BSUH 16752.

(#) *Cynanchum laeve* (Michx.) Pers.; SYN: *Ampelamus albidus* (Nutt.) Britton, *Ampelamus laevis* (Michx.) Krings; Sandvine, Bluevine, Honeyvine; Old field; Infrequent; C = 1; BSUH 16784.

Asteraceae (Aster Family)

Arnoglossum atriplicifolium (L.) H. Rob.; SYN: *Cacalia atriplicifolia* L.; Pale Indian Plantain; Wooded ravine in preserve woods above fen; Rare but locally abundant; C = 6; BSUH 16770, 16788. Special Note: Rothrock et al. (1993) reported the following, "A single plant was sighted (but not collected) by John Bacone and HS (Helena Starks) in May 1980 on a wooded bluff; C.C. Deam (2459) collected this species on 'dry banks of wooded ravine, south side of White River about 2 mi. N of Anderson,' 11 August 1907; not seen during our 1990–1992 survey." Currently, the plant is rare (one site) but locally abundant on a wooded ravine above the fen in the preserve.

(* #) *Cichorium intybus* L.; Chicory; Dry hillside/roadside along Rangeline Road at southwestern end of property; Rare but locally common; C = 0; BSUH 16734.

Cirsium discolor (Muhl. ex Willd.) Spreng.; Field or Pasture Thistle; Old field; Infrequent; C = 3; BSUH 16783, 16791.

(* #) *Cirsium vulgare* (Savi) Ten.; Bull Thistle; Old field; Common; C = 0; BSUH 16744, 16754.

(#) *Erechtites hieraciifolia* (L.) Raf. ex DC. var. *hieraciifolia*; White Fireweed, American Burnweed; Old field; Abundant; C = 2; BSUH 16785, 16789.

(#) *Erigeron pulchellus* Michx. var. *pulchellus*; Robin's Plantain; Slope woods of preserve; Common; C = 8; BSUH 16714.

(#) *Eupatorium altissimum* L.; Tall Boneset; Tall Thoroughwort; Dry hillside/roadside along Rangeline Road at southwestern end of property; Rare but locally common; C = 1; BSUH 16805.

Heliopsis helianthoides (L.) Sweet var. *helianthoides*; False Sunflower, Smooth Oxeye; Floodplain forest near boat launch; Rare; C = 4; BSUH 16809.

(#) *Helianthus tuberosus* L.; Jerusalem Artichoke; Floodplain forest near boat launch; Rare; C = 2; BSUH 16811.

Lactuca biennis (Moench) Fernald; SYN: *Lactuca spicata* auct. non (Lam.) Hitchc.; Tall Blue Lettuce; Old field; Infrequent; C = 2; BSUH 16807.

(* #) *Lactuca serriola* L.; *Lactuca scariola* L.; Prickly Lettuce; Old field; Infrequent; C = 0; BSUH 16781.

(#) *Oligoneuron riddellii* (Frank ex Riddell) Rydb.; SYN: *Solidago riddellii* Frank ex. Riddell; Riddell's Goldenrod; Fen; Common; C = 9; BSUH 16772.

(#) *Prenanthes crepidinea* Michx.; Great White Lettuce, Nodding Rattlesnake-Root; Floodplain forest; Common; C = 7; BSUH 16695. [Watch List; S2]

Rudbeckia triloba L. var. *triloba*; Three-Lobed Coneflower, Brown-Eyed Susan; Old field; Rare; C = 3; BSUH 16790.

(#) *Silphium integrifolium* Michx. var. *integrifolium*; Entire-Leaved Rosinweed, Wholeleaf Rosinweed; Fen; Rare; C = 7; BSUH 17030.

Silphium perfoliatum L. var. *perfoliatum*; Cup Plant; Floodplain forest near boat launch; Infrequent but locally common; C = 4; BSUH 16786.

Solidago gigantea Aiton; Late or Giant Goldenrod; Floodplain woods west of fen; Rare but locally common; C = 4; BSUH 16804, 16818.

(#) *Solidago nemoralis* Aiton var. *nemoralis*; Gray or Old-Field Goldenrod; Dry hillside/roadside along Rangeline Road at southwestern end of property; Rare but locally abundant; C = 3; BSUH 16806.

Solidago ulmifolia Muhl. ex Willd. var. *ulmifolia*; Elm-Leaved Goldenrod; Slope woods in the preserve above fen; Rare but locally common; C = 5; BSUH 16796.

(* #) *Sonchus asper* (L.) Hill; Prickly or Spiny Sow Thistle; Old field; infrequent; C = 0; BSUH 16759.

(* #) *Sonchus oleraceus* L.; Common or Store-Front Sow Thistle; Riverbank; Rare; C = 0; BSUH 16780.

(#) *Symphotrichum firmum* (Nees) G.L. Nesom; SYN: *Aster firmus* Nees, *Symphotrichum puniceum* (L.) A. Löve & D. Löve var. *puniceum*;

Shining Aster; Fen; Common; C = 4; BSUH 16771.

Symphotrichum pilosum (Willd.) G.L. Nesom var. *pilosum*; SYN: *Aster pilosus* Willd.; Hairy White Old-Field Aster; Old field; Common; C = 0; BSUH 16820.

(#) *Xanthium strumarium* L. var. *glabratum* (DC.) Cronquist; SYN: *Xanthium chinense* Mill., *Xanthium strumarium* L. var. *wootonii* (Cockerell) M. Peck; Common or Rough Cocklebur; Floodplain forest and riverbank; Infrequent; C = 0; BSUH 16690.

Brassicaceae (Mustard Family)

(#) *Arabis hirsuta* (L.) Scop. var. *pyncocarpa* (M. Hopkins) Rollins; SYN: *Arabis hirsuta* (L.) Scop. var. *adpressipilis* (M. Hopkins) Rollins; Hairy Rockcress, Creamflower Rockcress; Slope woods in the new addition; Infrequent; C = 5; BSUH 16710.

(* #) *Brassica nigra* (L.) W.D.J. Koch; SYN: *Sinapis nigra* L.; Black Mustard; Riverbank and open floodplain forest; Infrequent; C = 0; BSUH 16761.

Lepidium virginicum L. var. *virginicum*; Common Peppergrass, Poor Man's Pepper, Virginia Pepperweed; Lawns and open woods near shelters; Infrequent; C = 0; BSUH 16721.

Caprifoliaceae (Honeysuckle Family)

(* #) *Lonicera morrowii* A. Gray; Morrow's Honeysuckle; Floodplain forest around fen; Common; C = 0; BSUH 16697, 16698.

Caryophyllaceae (Pink Family)

Silene virginica L. var. *virginica*; Fire Pink; Woods; Infrequent but locally common; C = 7; BSUH 16722.

Celastraceae (Staff-tree Family)

(#) *Celastrus scandens* L.; American Bittersweet; Woodland edge along Mounds Road, south of entrance; Rare; C = 2; BSUH 16731.

(#) *Euonymus atropurpureus* Jacq.; Eastern Wahoo; Floodplain forest near boat launch; Rare; C = 5; BSUH 16797.

(* #) *Euonymus fortunei* (Turcz.) Hand.-Maz. var. *radicans* (Siebold ex Miq.) Rehder; Chinese Spindle Tree, Winter Creeper; Edge of preserve along path next to river; Rare; C = 0; BSUH 16711.

Euonymus obovatus Nutt.; Running Strawberry Bush; Woods; Infrequent; C = 7; BSUH 16702.

Chenopodiaceae (Goosefoot Family)

(* #) *Chenopodium album* L. var. *album*; Lamb's Quarters, Pigweed; Disturbed soil near pool; Rare but locally common; C = 0; BSUH 16939.

Convolvulaceae (Morning-glory Family)

(#) *Calystegia sepium* (L.) R. Br.; Typical Hedge-Bindweed; Old field; Infrequent but locally common; C = 1; BSUH 16782.

Cornaceae (Dogwood Family)

(#) *Cornus obliqua* Raf.; SYN: *Cornus amomum* Mill. var. *schuetzeana* (C.A. Mey.) Rickett; Gray Dogwood; Knob-Styled Dogwood, Silky Dogwood; Floodplain woods within preserve; Rare; C = 5; BSUH 16764.

Cyperaceae (Sedge)

(#) *Carex aggregata* Mack.; SYN: *Carex sparganioides* Muhl. ex Willd. var. *aggregata* (Mack.) Gleason; Smooth Clustered Sedge, Glomerate Sedge; Moist unmowed woodland edge near Nature Center; Rare; C = 2; BSUH 16673.

(#) *Carex careyana* Torr. ex Dewey; Carey's Wood Sedge; Slope woods; Rare, one small colony; C = 9; BSUH 16705.

(#) *Carex grayi* Carey; Common Bur Sedge; Floodplain forest near the boat ramp; Rare; C = 5; BSUH 16988.

(#) *Carex lupulina* Muhl. ex Willd.; Common Hop Sedge; Floodplain forest within preserve; Infrequent but locally common; C = 4; BSUH 16762.

Carex tribuloides Wahlenb. var. *tribuloides*; Awl-Fruited Oval Sedge, Blunt Broom Sedge; Floodplain woods with preserve; Common; C = 5; BSUH 16669.

(#) *Carex trichocarpa* Muhl. ex Willd.; Hairy-Fruited Lake Sedge; Woodland seep near river; Rare but locally common; C = 4; BSUH 16670. [Watch List; S3]

(#) *Cyperus esculentus* L. var. *leptostachyus* Boeckler; Yellow or Field Nut-Sedge; Disturbed soil in old field near former horse barn; Rare; C = 0; BSUH 16674.

(#) *Cyperus odoratus* L.; Fragrant Flatsedge; Riverbank and sand/rock bar near boat launch; Rare; C = 1; BSUH 16675.

(#) *Cyperus strigosus* L.; False Nutsedge, Strawed-Colored Nutsedge; Riverbank and sand/rock bar near boat launch; Infrequent; C = 0; BSUH 16676.

Eleocharis erythropoda Steud.; Red-Rooted Spike Rush; Riverbank and sand/rock bar near boat launch; Rare but locally common; C = 2; BSUH 16668.

Elaeagnaceae (Oleaster Family)

(* #) *Elaeagnus umbellata* Thunb. var. *parvifolia* (Wall. ex Royle) C.K. Schneid.; Autumn Olive; Edge of woods, woods along Mounds Road north of entrance; Rare; C = 0; BSUH 16942.

Euphorbiaceae (Spurge Family)

(#) *Chamaesyce maculata* (L.) Small; SYN: *Euphorbia maculata* L., *Euphorbia supina* Raf.; Creeping

Spurge; Spotted Sandmat; Roadside near pool; Infrequent; C = 0; BSUH 16757.

(#) *Euphorbia corollata* L.; Flowering Spurge; Slope woods in preserve at edge of fen; Rare; C = 4; BSUH 16755, 16800.

Euphorbia dentata Michx. var. *dentata*; Toothed Spurge; Old field near former horse barn; Rare; C = 0; BSUH 16793.

Fabaceae (Pea or Bean Family)

(* #) *Securigera varia* (L.) Lassen; SYN: *Coronilla varia* L.; Crown Vetch; Disturbed ground and old field; Infrequent; C = 0; BSUH 16794.

(* #) *Trifolium hybridum* L.; Alsike Clover; Open woods along river near boat launch; Infrequent; C = 0; BSUH 16948.

(* #) *Trifolium pratense* L.; Red Clover; Old field; Rare; C = 0; BSUH 16940.

(#) *Wisteria frutescens* (L.) Poir.; American Wisteria; Dry hillside/roadside along Rangeline Road at southwestern end of property; Rare; C = 4; BSUH 16733.

Fagaceae (Beech Family)

(#) *Quercus imbricaria* Michx.; Shingle Oak; Woods along Mounds Road north of entrance; Rare (several trees); C = 3; BSUH 16769.

(#) *Quercus palustris* Münchh.; Pin Oak; Edge of woods, woods along Mounds Road north of entrance; Rare (one tree); C = 3; BSUH 16943.

Quercus shumardii Buckley; Shumard Oak; Woods in the new addition; Infrequent; C = 7; BSUH 16728.

Fumariaceae (Fumitory Family)

(#) *Dicentra canadensis* (Goldie) Walp.; Squirrel Corn; Woods in the new addition; Rare (one colony); C = 7; BSUH 16696.

(#) *Dicentra cucullaria* (L.) Bernh.; Dutchman's Breeches; Woods in the new addition and on the southern ravine in the original acreage; Common; C = 6; BSUH 16694.

Gentianaceae (Gentian Family)

(z) *Gentianella quinquefolia* (L.) Small ssp. *occidentalis* (A. Gray) J.M. Gille; SYN: *Gentiana quinquefolia* L.; Stiff Gentian, Agueweed; Border between slope woods and fen in preserve; Rare; C = 5; BSUH 16985. Special Note: Not found in this study but photographed between 1993 and 2009.

Hamamelidaceae (Witch Hazel Family)

(#) *Hamamelis virginiana* L.; American Witch Hazel; Steep slope woods between preserve and boat launch; Infrequent; C = 5; BSUH 16813.

Iridaceae (Iris Family)

(#) *Iris brevicaulis* Raf.; SYN: *Iris brevipes* Small; Short-Stemmed Iris, Lamance Iris, Zigzag Iris;

Floodplain woods in preserve; Rare but locally common; C = 9; BSUH 16716.

(#) *Sisyrinchium albidum* Raf.; Common or White Blue-Eyed-Grass; Steep slope woods; Rare; C = 4; BSUH 16709.

Juglandaceae (Walnut Family)

(#) *Carya laciniosa* (Michx. f.) G. Don; Shellbark Hickory; Floodplain woods; Rare; C = 8; BSUH 16936.

Lamiaceae (Mint Family)

(* #) *Chaiturus marrubiastrum* (L.) Rechb.; SYN: *Leonurus marrubiastrum* L.; Horehound Motherwort, Lion's Tail; Floodplain woods; Rare; C = 0; BSUH 16810.

Scutellaria incana Biehler var. *incana*; Downy or Hoary Skullcap; Floodplain woods in preserve; Common; C = 4; BSUH 16749.

Scutellaria lateriflora L. var. *lateriflora*; Mad-Dog or Blue Skullcap; Slope woods; Infrequent but locally common; C = 4; BSUH 16774.

Liliaceae (Lily Family)

(#) *Lilium michiganense* Farw.; Michigan Lily; Floodplain forest; Infrequent; C = 5; BSUH 16703, 16746.

(#) *Maianthemum stellatum* (L.) Link; SYN: *Smilacina stellata* (L.) Desf.; Starry Solomon's Plume, starry false lily of the valley; Around a large seep in the new addition; Rare but locally abundant; C = 6; BSUH 16715.

Polygonatum biflorum (Walter) Elliott var. *commutatatum* (Schult. & Schult. f.) Morong; SYN: *Polygonatum commutatatum* (Schult. & Schult. f.) A. Dietr.; Great Smooth Solomon's Seal; Woods along Mounds Road north of entrance; Infrequent; C = 4; BSUH 16938.

(#) *Trillium grandiflorum* (Michx.) Salisb.; Large-Flowered White Trillium; Woods near Nature Center; Rare; C = 8; BSUH 16707.

Trillium recurvatum Beck; Prairie Trillium (Yellow Form), Bloody Butcher; C = 4; BSUH 16706. Special Note: Rothrock et al. (1993) reported this species. We are reporting the yellow form of the species, which is uncommon in woods.

Trillium sessile L.; Sessile Trillium, Toadshade; C = 4; Woods in the new addition; Common; BSUH 16693.

Malvaceae (Mallow Family)

(* #) *Malva neglecta* Wallr.; Common Mallow, Cheeses; Lawn near Nature Center; Rare; C = 0; BSUH 16737.

Moraceae (Mulberry Family)

Morus rubra L. var. *rubra*; Red Mulberry; Woods in the new addition; Infrequent; C = 4; BSUH 16727.

Orchidaceae (Orchid Family)

- Aplectrum hyemale* (Muhl. ex Willd.) Torr.; Putty Root, Adam-and-Eve; Slope woods near river; Rare; C = 7; BSUH 16692.
- (#) *Galearis spectabilis* (L.) Raf.; SYN: (*Orchis spectabilis* L., *Galeorchis spectabilis* (L.) Rydb.; Showy Orchis, Showy Orchid; Woods near creek; Rare; C = 7; BSUH 16713.
- (#) *Liparis liliifolia* (L.) Rich. ex Ker Gawl.; Purple Twayblade, Brown Widelpip Orchid; Dry hilltop woods near river; Rare; C = 3; BSUH 16725.

Orobanchaceae (Broom-Rape Family)

- Epifagus virginiana* (L.) W. Barton; SYN: *Leptanidium virginianum* (L.) Raf.; Beech-Drops; Woods; Frequent; C = 8; BSUH 16814, 16815.

Poaceae (Grass Family)

- (* #) *Agrostis gigantea* Roth; SYN: *Agrostis alba* auct. non L.; Redtop; Old field; Infrequent but locally abundant; C = 0; BSUH 16743.
- (*) *Bromus arvensis* L.; SYN: *Bromus japonicus* Thunb.; Field Brome, Japanese Chess; Dry hillside/roadside along Rangeline Road at southwestern end of property; Infrequent; C = 0; BSUH 16729.
- (*) *Bromus racemosus* L.; SYN: *Bromus commutatus* Schrad.; Hairy Chess, Bald Brome; Disturbed soil in old field near former horse barn; Rare but locally common; C = 0; BSUH 16756.
- Dichanthelium latifolium* (L.) Gould & C.A. Clark; SYN: *Panicum latifolium* L.; Broad-Leaved Panic Grass, Broad-Leave Rosette Grass; Slope woods of the preserve; Common at this site; C = 6; BSUH 16679.
- (*) *Digitaria sanguinalis* (L.) Scop.; Hairy or Northern Crab-Grass; Disturbed ground near former horse barn; Infrequent; C = 0; BSUH 16755.
- (#) *Echinochloa muricata* (P. Beauv.) Fernald var. *muricata*; Rough Barnyard Grass; Sandy/gravel sandbar near boat launch; Rare; C = 1; BSUH 16686.
- (#) *Eragrostis hypnoides* (Lam.) BSP.; Creeping or Teal Love Grass; Muddy areas and sandbars of the White River; Infrequent but locally common; C = 3; BSUH 16684, 16685.
- (* #) *Eragrostis minor* Host; SYN: *Eragrostis poaeoides* P. Beauv. ex Roem. & Schult.; Low or Little Love-Grass; Disturbed soil in old field near former horse barn; Rare; C = 0; BSUH 16681.
- Eragrostis pectinacea* (Michx.) Nees ex Steud.; Small, Tufted or Carolina Lovegrass; Disturbed soil in old field near former horse barn; Infrequent; C = 0; BSUH 16682.
- (*) *Hordeum jubatum* L.; Foxtail Barley; Dry hillside/roadside along Rangeline Road at southwestern end of property; Rare; C = 0; BSUH 16730.
- Leersia oryzoides* (L.) Sw.; Rice Cut-Grass; Floodplain woods near boat launch; Rare; C = 2; BSUH 16817.

- (#) *Muhlenbergia tenuiflora* (Willd.) BSP.; Slender Satin Grass, Slim-Flower Muhly; Slope woods of preserve; Abundant; C = 7; BSUH 16937.
- (#) *Panicum dichotomiflorum* Michx. var. *dichotomiflorum*; Knee Grass, Fall Panic Grass; Floodplain woods along riverbank in open areas; Common; C = 0; BSUH 16819.
- (#) *Panicum philadelphicum* Benth. ex Trin.; Philadelphia Panic Grass; Floodplain woods along path and riverbank in open areas; Common; C = 4; BSUH 16680.
- (*) *Poa compressa* L.; Canada Bluegrass; Woods; Abundant; C = 0; BSUH 16720.
- (* #) *Poa trivialis* L.; Rough Bluegrass; Floodplain woods in new addition; Common; C = 0; BSUH 16677.
- (* #) *Schedonorus phoenix* (Scop.) Holub; SYN: *Festuca arundinacea* Schreb., *Festuca elatior* L. ssp. *arundinacea* (Schreb.) Hack., *Lolium arundinaceum* (Schreb.) S.J. Darbyshire, *Schedonorus arundinaceus* (Schreb.) Dumort., nom. illeg.; Tall Fescue; Old fields; Common and locally abundant; C = 0; BSUH 16726.
- (* #) *Setaria viridis* (L.) P. Beauv. var. *viridis*; Green Foxtail, Green Bristle-Grass; Disturbed soil in old field near former horse barn; Infrequent; C = 0; BSUH 16792.

Polygonaceae (Smartweed Family)

- (#) *Polygonum lapathifolium* L. var. *lapathifolium*; SYN: *Persicaria lapathifolia* (L.) Gray; Dock-Leaved Smartweed, Curly-Top Knotweed, Heart's-Ease; Floodplain forest along river; Infrequent; C = 0; BSUH 16799.

Primulaceae (Primrose Family)

- (#) *Samolus valerandi* L. ssp. *parviflorus* (Raf.) Hultén; SYN: *Samolus floribundus* Kunth, *Samolus parviflorus* Raf.; Water Pimpernel, Brookweed, Seaside Brookweed; Floodplain woods around boat launch; Infrequent; C = 5; BSUH 16760.

Ranunculaceae (Buttercup Family)

- (#) *Ranunculus sceleratus* L. var. *sceleratus*; Cursed Buttercup, Cursed Crowfoot; Sandy riverbank; Rare; C = 3; BSUH 16808.

Rosaceae (Rose Family)

- (#) *Agrimonia gryposepala* Wallr.; Common or Tall Agrimony; Woods; Infrequent; C = 2; BSUH 16750.
- (#) *Amelanchier laevis* Wiegand; SYN: *Amelanchier arborea* (Michx. f.) Fernald ssp. *laevis* (Wiegand) S. McKay ex Landry; Smooth or Allegheny Serviceberry; Steep slope woods next to river; Rare; C = 8; BSUH 16691.
- (* #) *Duchesnea indica* (Andrews) Focke; SYN: *Fragaria indica* Andrews; Indian or Mock Strawberry; Roadside and fields; Common; C = 0; BSUH 16947.

- (* #) *Prunus cerasus* L.; Sour Cherry; Edge of woods, woods along Mounds Road, north of entrance; Rare (two trees); Woodland edge, woods along Mounds Road north of entrance; Rare; C = 0; BSUH 16945.
- (* #) *Rhodotypos scandens* (Thunb.) Makino; SYN: *Rhodotypos tetrapetalus* (Siebold) Makino; Jet-bead; Woods along Mounds Road north of entrance; Rare; C = 0; BSUH 16768. Special Note: this species was incorrectly reported as *Philadelphus inodorus* L. in the earlier inventory (Rothrock et al. 1993).

Rubiaceae (Madder Family)

- (#) *Cephalanthus occidentalis* L.; Common Button-bush; Swamp woods between fen and river; Rare; C = 5; BSUH 16767.

Salicaceae (Willow Family)

- (#) *Salix interior* Rowlee; SYN: *Salix exigua* Nutt. ssp. *interior* (Rowlee) Cronquist; Sandbar Willow; Riverbank and sandy shore; Rare; C = 1; BSUH 16798.

Santalaceae (Sandalwood Family)

- (#) *Comandra umbellata* (L.) Nutt. ssp. *umbellata*; Bastard Toadflax; Slope woods in preserve above fen; Rare but locally common; C = 7; BSUH 16719.

Scrophulariaceae (Figwort Family)

- (* #) *Chaenorhinum minus* (L.) Lange; SYN: *Antirrhinum minus* L.; Small or Dwarf Snapdragon, Lesser Toadflax; Woodland edge along Mounds Road; Common; C = 0; BSUH 16736.
- Mimulus alatus* Aiton; Winged or Sharpwing Monkey-Flower; Floodplain forest and riverbank; Infrequent; C = 4; BSUH 16776.
- (* #) *Verbascum thapsus* L.; Common or Woolly Mullein; Disturbed ground near former horse barn; Rare; C = 0; BSUH 16944.
- (* #) *Veronica arvensis* L.; Corn Speedwell; Open woods and lawns near shelters; Infrequent; Lawns near shelters; Infrequent; C = 0; BSUH 16708.
- (#) *Veronicastrum virginicum* (L.) Farw.; SYN: *Veronica virginica* L., *Leptandra virginica* (L.) Nutt.; Culver's-Root; Eastern edge of fen; Rare; C = 8; BSUH 16775, 16987.

Smilacaceae (Catbrier Family)

- (#) *Smilax tamnoides* L.; SYN: *Smilax hispida* Muhl. ex Torr., *Smilax tamnoides* L. var. *hispida* (Muhl. ex Torr.) Fernald; Bristly or Hispid Greenbrier; Woods; Common; C = 3; BSUH 16699. Special Note: this species was incorrectly reported as *Smilax rotundifolia* L. in the earlier inventory (Rothrock et al. 1993).

Solanaceae (Nightshade Family)

- Physalis longifolia* Nutt. var. *subglabrata* (Mack. & Bush) Cronquist; SYN: *Physalis subglabrata* Mack. & Bush; Long-Leaved Ground Cherry; Floodplain forest along the river; Infrequent; C = 0; BSUH 16742.
- (#) *Solanum carolinense* L. var. *carolinense*; Carolina Horse Nettle, Carolina Poppy; Old Fields and campground; Infrequent; C = 0; BSUH 16745.
- (* #) *Solanum dulcamara* L. var. *dulcamara*; Bittersweet Nightshade, Climbing Nightshade; Edge of woods, woods along Mounds Road, north of entrance; Rare (one site); C = 0; BSUH 16941.

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