An Ecological Interpretation of the Humbug Marsh Unit, Detroit River International Wildlife Refuge, Wayne County, Michigan

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Cover photograph: Disturbed forest with open-grown “wolf trees,” June 26, 2015. All photographs in report by B.S. Slaughter.

EXECUTIVE SUMMARY

In 2015, the United States Fish and Wildlife Service (USFWS), Detroit River International Wildlife Refuge, contracted with Michigan Natural Features Inventory (MNFI), Michigan State University Extension (MSUE), to survey and identify remnant natural communities at Humbug Marsh and several other local conservation areas to produce information that Refuge staff will use to help develop a management plan and an accurate interpretive message to the public for Humbug Marsh. The focus of the surveys was not only to identify existing natural communities, but also to interpret landform and soils, hydrology, past land use, and current natural and anthropogenic processes and disturbances at each site.

After reviewing field data, aerial imagery, and other information, we identified and surveyed Humbug Marsh and remnant forested communities on Grosse Ile and at Oakwoods Metropark. Field assessment of natural communities included compiling a thorough list of dominant and representative vascular plant species, describing site-specific structural attributes and ecological processes, analyzing soils and apparent hydrological features (e.g., seasonally inundated depressions), noting current and historical anthropogenic disturbances, evaluating potential threats, taking representative digital photos and GPS points at significant locations, evaluating each site's natural community delineation and classification, and noting significant management needs and restoration opportunities.

Based on field surveys and other data sources such as the original General Land Office (GLO) survey notes, historical plat maps, historical literature, aerial photographs, studies on regional landscape ecosystems and ecoregions, USDA NRCS digital soil maps, and the International Vegetation Classification, we identified the highest quality field survey sites as examples of wet-mesic flatwoods, a state imperiled forested natural community of low-relief lake plain characterized by mixed hardwood dominance on relatively impermeable, seasonally wet to dry soils. The study area at Humbug Marsh was interpreted primarily as old agricultural field in early stages of succession, with remnant areas of historically cleared and grazed, mostly mesic oak – hickory forest. None of the study sites supported significant concentrations of conservative vascular plant species or species typical of oak savanna or prairie habitats.

If forest is the future desired condition of Humbug Marsh, land management practices such as the planting of trees, selective harvest and canopy gap creation, reduction of the white-tailed deer population, and control of invasive woody and herbaceous species (e.g., common buckthorn and garlic mustard) should be considered in an experimental context. An alternative conservation management option is to maintain and enhance early successional habitats at Humbug Marsh for declining wildlife species and shade-intolerant plants. Although there is scant evidence of restorable savanna or prairie communities at Humbug Marsh, Refuge staff could consider creating a demonstration planting of plant species native to local savanna and prairie remnants to educate visitors about these critically imperiled ecosystems. Given the sizable human population and presence of several colleges and universities in metropolitan Detroit, Humbug Marsh is ideally situated for academic research, which should be conducted in conjunction with land management activities to assess progress in a statistically rigorous manner and in turn help refine conservation goals and land management techniques.

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INTRODUCTION

The Detroit River International Wildlife Refuge manages the Humbug Marsh mainland and adjacent Humbug and Calf Islands totaling about 240 acres (97 hectares) of land with approximately 170 additional acres (69 hectares) of bottomlands in the Detroit River. In 2015, the United States Fish and Wildlife Service (USFWS), Detroit River International Wildlife Refuge, contracted with Michigan Natural Features Inventory (MNFI), Michigan State University Extension (MSUE), to survey and identify remnant natural communities at Humbug Marsh and several other local conservation areas to produce information that Refuge staff will use to help develop a management plan and an accurate interpretive message to the public for Humbug Marsh. The focus of the surveys was not only to identify existing natural communities, but also to interpret landform and soils, hydrology, past land use, and current natural and anthropogenic processes and disturbances at each site. This comparative analysis of several conservation tracts in the region is intended to help direct regional land management and restoration efforts towards the broader goal of improving the long-term viability of lakeplain natural communities and populations of associated plants and animals.

METHODS

Prior to field surveys, we reviewed and compiled existing field data from Humbug Marsh and other protected and managed conservation lands in southeastern Wayne County to assist with identifying the best sites for field survey. After reviewing this information, we decided to focus surveys on remnant natural communities at Grosse Ile and Oakwoods Metropark, in addition to Humbug Marsh (Figure 1). Field surveys at Humbug Marsh were conducted on June 24, June 26, August 19, and September 17, 2015. Surveys on Grosse Ile were conducted on June 24, June 25, and August 21, 2015. The survey at Oakwoods Metropark was conducted on August 18, 2015.

Field assessment of natural communities included compiling a thorough list of dominant and representative vascular plant species, describing site-specific structural attributes and ecological processes, analyzing soils and apparent hydrological features (e.g., seasonally inundated depressions), noting current and historical anthropogenic disturbances, evaluating potential threats, taking representative digital photos and GPS points at significant locations, evaluating each site's natural community delineation and classification, and noting significant management needs and restoration opportunities. Natural communities were identified following Kost et al. (2007). Vascular plant species lists were entered into the Universal FQA Calculator (Freyman and Masters 2013) following the Michigan Floristic Quality Assessment Database (Reznicek et al. 2014; but see Herman et al. 2001 for detailed methodology). Vouchers of endangered, threatened, and special concern species documented during the surveys were collected and deposited at the University of Michigan Herbarium (MICH).

Following methodical field assessments of Humbug Marsh, Grosse Ile, and Oakwoods Metropark, we consulted additional resources to assist with ecological interpretation and comparisons among sites. These resources included the original General Land Office (GLO) survey notes, circa 1800 vegetation as interpreted from GLO notes and other resources (Comer et al. 1995a), historical plat maps, historical literature, aerial photographs (1937 or 1949 – present), studies on regional landscape ecosystems and

ecoregions (Albert 1995; Omernik & Bryce 2010), USDA NRCS digital soil maps (USDA NRCS 2015), and the International Vegetation Classification (NatureServe 2015).

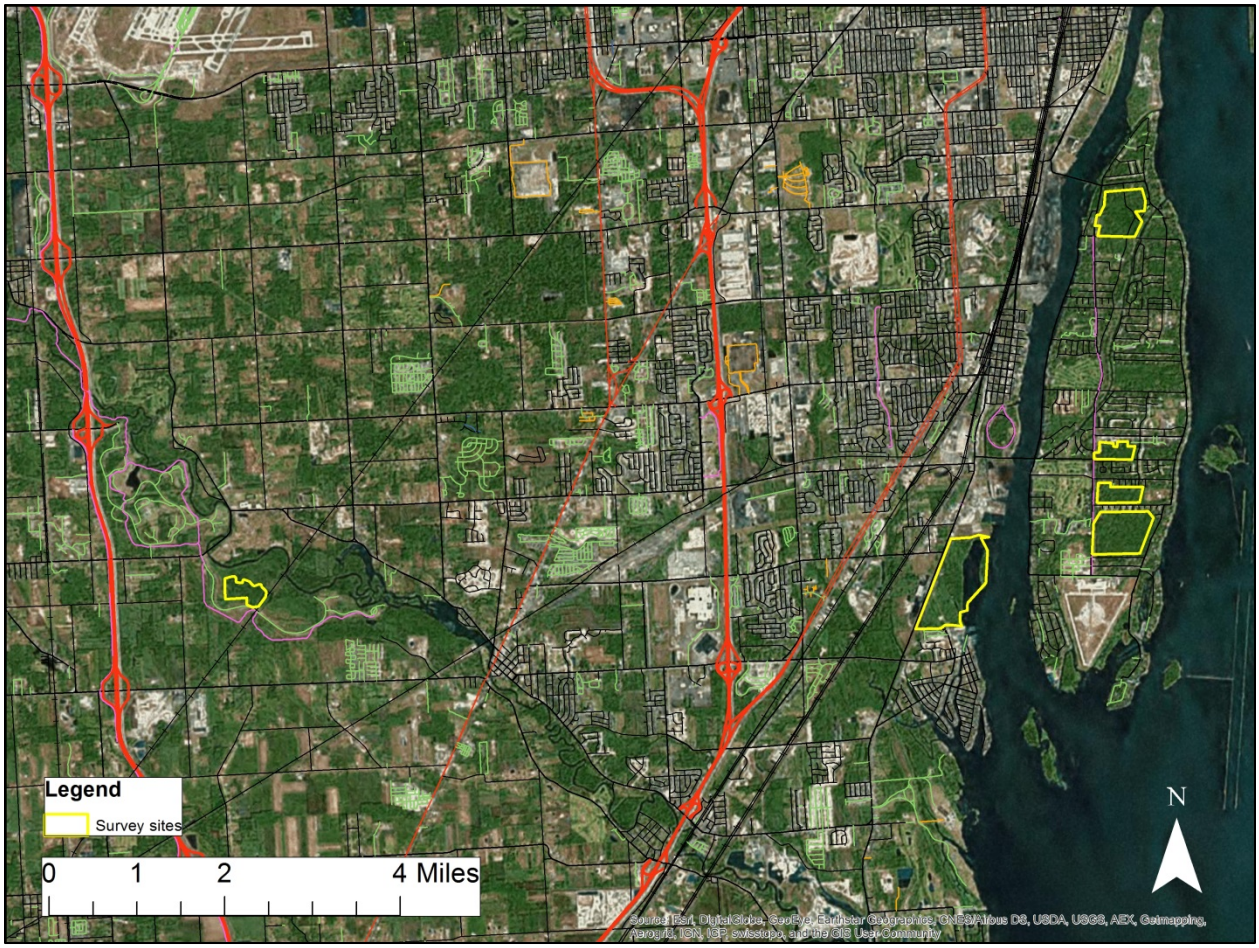

Figure 1. Field survey sites, Wayne County, MI. From west (L) to east (R) to north (up): Oakwoods Metropark – Salamander Woods; Humbug Marsh; Grosse Ile South (three sites); Grosse Ile North (one site).

RESULTS

Humbug Marsh

Site History

The General Land Office survey by Joseph Fletcher, conducted in 1817, found and described mixed forests over much of the vicinity of Humbug Marsh, with oaks (*Quercus* spp.), hickories (*Carya* spp.), ashes (*Fraxinus* spp.), elms (*Ulmus* spp.), basswood (*Tilia americana*), and beech (*Fagus grandifolia*) on higher ground and low, wet swamps with ashes, elms, maples (*Acer* spp.), cottonwood (*Populus deltoides*), and oaks. Oak – hickory associations tended to be found along the Detroit River shoreline, whereas mixed hardwood associations dominated extensive areas of clay lake plain west of the shoreline (Albert 1995; Comer et al. 1995a) (Figure 2). Limited areas of "wet prairie" were located along streams and marshy shorelines, and limited areas of oak savanna and barrens were also noted, although

these communities were much more prevalent west of the study area on sand lake plain (Albert 1995; Comer et al. 1995a). Our understanding of the original vegetation of the Humbug Marsh tract, however, is limited by the exclusion of most of the area from the original survey due to a land claim (known as the French plats) that predated the U.S. Government's public land survey system initiated in the early 1800s.

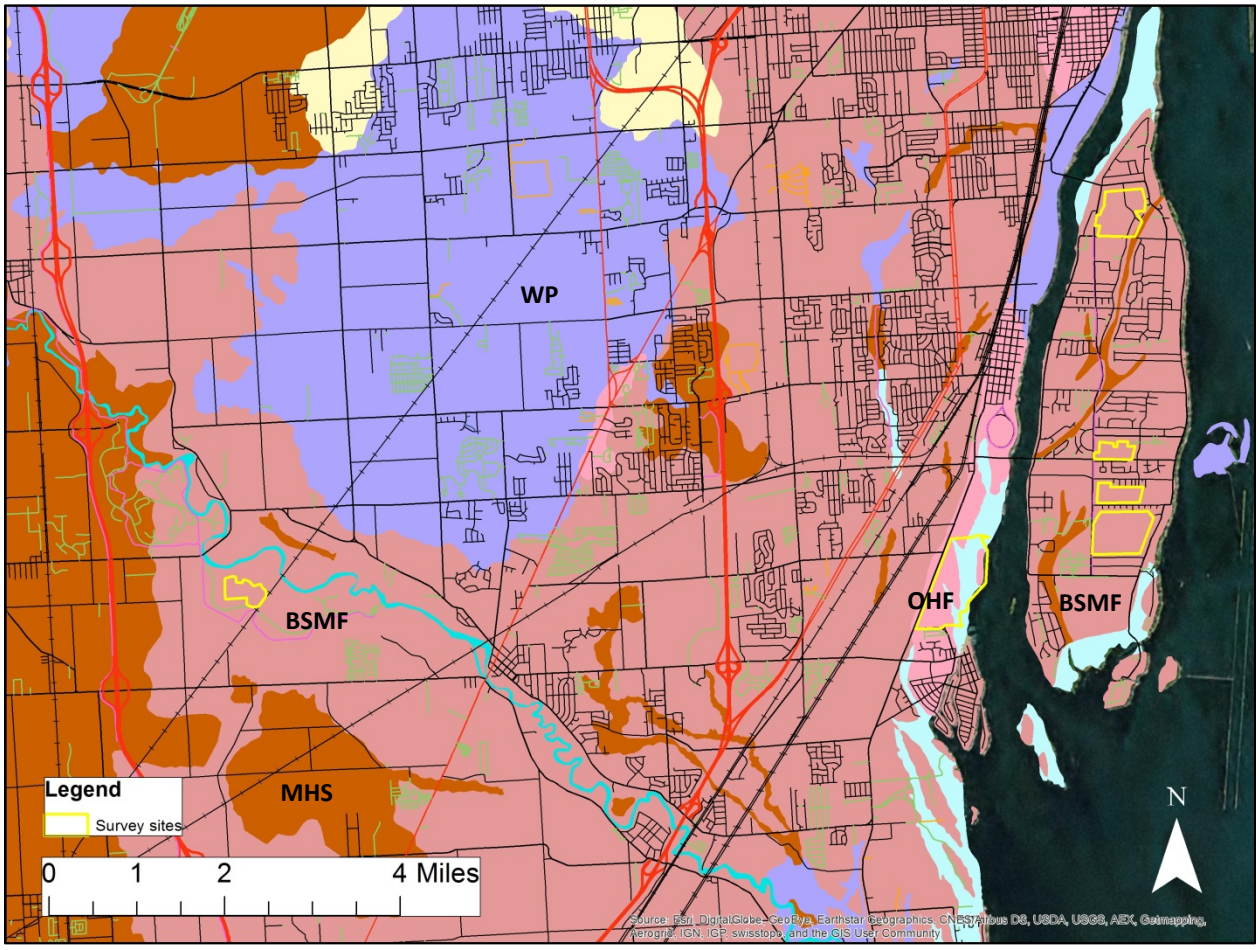

Figure 2. Field survey sites superimposed on interpreted circa 1800 land cover (Comer et al. 1995a). From west (L) to east (R) to north (up): Oakwoods Metropark – Salamander Woods; Humbug Marsh; Grosse Ile South (three sites); Grosse Ile North (one site). BSMF = Beech – Sugar Maple Forest; OHF = Oak – Hickory Forest; MHS = Mixed Hardwood Swamp; WP = Wet Prairie (sensu lato).

In about 1837, Giles B. Slocum began acquiring what was to total 2,000 acres (809 hectares) of land along the Detroit River, including the tract that supports the present-day Humbug Marsh (Michigan Historical Commission 1886). These land holdings are reported to have been "heavily timbered," and Slocum cleared the forests and began raising sheep on his lands, thus becoming the largest wool-grower in Michigan by the mid-1800s (Michigan Historical Commission 1886). The majority of the tract continued to be in agricultural production until at least the 1960s, evident on historical aerial photographs by the cleared fields and restriction of trees to ditch margins and a grazed woodlot. By 1981, agricultural activity had ceased, and shrubs and trees had begun to recolonize the former agricultural fields. Since that time, woody succession has continued, although woody cover was

temporarily set back by land clearing activities for a planned development circa 1998 (G. Norwood, pers. comm.).

Ecological Assessment

Approximately 70% of the study area (ca. 160 acres, or 65 hectares) is comprised of former agricultural fields. These areas currently support locally dense thickets of *Cornus drummondii* (rough-leaved dogwood), associated with *Crataegus mollis* (downy hawthorn), *Acer saccharinum* (silver maple), and young *Fraxinus pennsylvanica* (green ash) and *Ulmus americana* (American elm). Other common shrubs and woody vines include *Toxicodendron radicans* (poison-ivy), *Vitis riparia* (riverbank grape), *Parthenocissus quinquefolia* (Virginia creeper), and the highly invasive *Rosa multiflora* (multiflora rose), *Lonicera maackii* (Amur honeysuckle), and *Ligustrum vulgare* (common privet). The ground layer is dominated by native, weedy species, including *Glyceria striata* (fowl manna grass), *Leersia oryzoides* (cut grass), *Geum canadense* (white avens), *Juncus tenuis* (path rush), *Carex molesta* (sedge), *C. tribuloides* (sedge), *Persicaria virginiana* (jumpseed), *Agrimonia parviflora* (swamp agrimony), *Fragaria virginiana* (wild strawberry), *Erigeron strigosus* (daisy fleabane), and *Symphyotrichum lateriflorum* (calico aster). The herbaceous layer in these thickets is sparse where dogwoods restrict light from reaching the ground, but dense where shrubs are sparser and where woody vegetation has been cleared by volunteer stewardship crews (Figure 3). However, species composition is similar in both cleared and uncleared areas.

Figure 3. Herbaceous vegetation is especially dense where volunteer stewardship crews have cleared woody vegetation.

Ditches and swales in these formerly cleared fields support a similar species composition, with increased importance of fowl manna grass, sedges, and cut grass, often associated with *Impatiens capensis* (spotted touch-me-not), *Asclepias incarnata* (swamp milkweed), *Iris virginica* (southern blue flag), and the invasive grasses *Phalaris arundinacea* (reed canary grass) and *Phragmites australis* var. *australis* (common reed). Bands of trees are concentrated along the main ditches and narrow drainages, with silver maple generally dominant, associated with green ash, American elm, *Populus deltoides* (cottonwood), rough-leaved dogwood, and downy hawthorn.

There are two forested areas within the Humbug Marsh study area. At the northern end of the tract near the future visitor center is a small stand of *Carya ovata* (shagbark hickory) of less than 5 ac (2 ha). A much larger forested tract of ca. 30 – 35 ac (12 – 14 ha) occurs on the southern portion of the peninsula between the Detroit River and Handler Drain. Based on historical aerial photographs, this area was selectively cut and then grazed, with many old oaks, primarily *Quercus alba* (white oak) remaining from the original forest. These old oaks exhibit wide crowns and low branching that likely developed in response to clearing of the forest and subsequent grazing (Figure 4). Since cessation of grazing, the forest has closed in. The current canopy is composed of white oak, *Quercus rubra* (red oak), *Q. macrocarpa* (bur oak), *Prunus serotina* (black cherry), and shagbark hickory, with shagbark hickory common in the understory. The tall shrub layer supports downy hawthorn and dense stands of the invasive *Rhamnus cathartica* (common buckthorn), much of which has been cleared from the stand by recent stewardship efforts. The ground layer is patchy and comprised primarily of ubiquitous native species, including Virginia creeper, poison-ivy, jumpseed, white avens, *Circaea canadensis* (enchanter's-nightshade), *Hackelia virginiana* (beggar's lice), *Pilea pumila* (clearweed), and fowl manna grass. Non-native invasive species, too, are widespread. Among these are *Alliaria petiolata* (garlic mustard), *Poa compressa* (Canada bluegrass), and *Cirsium arvense* (Canada thistle).

Narrow areas of the Detroit River shoreline, including the mouths of drains, support a disturbed Great Lakes marsh community, which includes zones of southern wet meadow, emergent marsh, and submergent marsh. The wet meadow zone supports dense stands of *Calamagrostis canadensis* (blue-joint), *Carex lacustris* (lake sedge), the state special concern *C. trichocarpa* (hairy-fruited sedge), and reed canary grass. The wet meadow grades into a deeper water emergent marsh with *Typha angustifolia* (narrow-leaved cat-tail), *T.* x*glauca* (hybrid cat-tail), common reed, *Scirpus atrovirens* (bulrush), *Echinochloa walteri* (salt-marsh cockspur grass), *Persicaria amphibia* (water smartweed), and a variety of other graminoids and forbs. *Lemna minor* (common duckweed) is common in stagnant open water, particularly in Handler Drain.

Floristics

A total of 214 vascular plant taxa were identified to the species level, including 164 native taxa (77%) (Table 1; Appendix 1). Total $\overline{C}$ was 2.6 and native $\overline{C}$ was 3.4. Sixty-one taxa (29%) are generalist native or non-native taxa with little to no fidelity to natural areas (*C*=0) (Herman et al. 2001), and only 20 taxa (9%) assigned *C*>5 were documented (Figure 5; Appendix 1). The wetness index ($\overline{W}$) was -0.3 for all taxa and -0.9 for native taxa only (Table 1).

Figure 4. Scattered large, old white oaks occur in the forested area of Humbug Marsh. These "wolf trees" exhibit low branching and wide crowns, the result of land management activities that reduced woody competition.

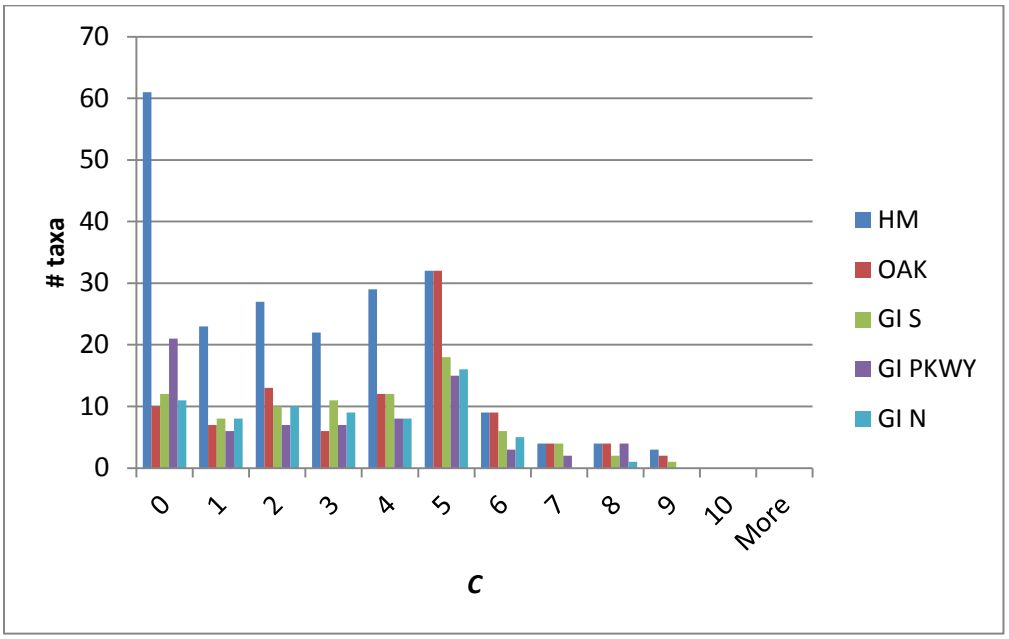

Figure 5. Distribution of coefficients of conservatism (*C*) for vascular plant taxa documented at all study sites. HM = Humbug Marsh; OAK = Oakwoods Metropark – Salamander Woods; GI S = Grosse Ile South (2 sites); GI PKWY = Grosse Ile Parkway Woods (1 site; lumped within Grosse Ile South elsewhere in text); GI N = Grosse Ile North (1 site).

Soils

The principal soil units at Humbug Marsh are Blount Loam (BfA) and Nappanee Silt Loam (NaB), both fine-textured, clay-containing soil units developed on wave-worked tills and till-floored lake plains (NRCS 2015) (Appendix 2). Several soil samples were taken and assessed in the field. At all sample locations, the surface layer, ranging from 6 to 14 inches (15 – 35 cm), was characterized by clay loams, ranging from slightly acidic (pH= 6.5) to moderately alkaline (pH= 6.5 – 8.2) near the surface. In the main forested area, a very strongly acid to strongly acid (pH= 5.0 – 6.0) subsurface layer of clay loam with occasional gravel occurred at approximately 4 inches (10 cm) depth. In all areas, the subsoil was mottled, mildly to moderately alkaline (pH= 7.5 – 8.2) clay to greater than 36 inches (91 cm) depth.

Natural Communities

No high quality examples of natural communities were identified at Humbug Marsh, although a previously documented Great Lakes marsh community in the Detroit River was only surveyed at the periphery and was not the focus of this survey.

Rare Species

Populations of two state-listed vascular plants were documented at Humbug Marsh. The state special concern *Carex trichocarpa* (hairy-fruited sedge) was noted from two populations, each in bands of wet meadow at the margins of emergent marsh communities along the Detroit River (Figures 6 and 7). This is the first documented record for the species in Wayne County. In September, a very small population of the state threatened *Spiranthes ovalis* (oval ladies'-tresses) was documented along the spoils bank of the lower portion of Handler Drain (Figure 7). This is the first documented record for this orchid species in Wayne County.

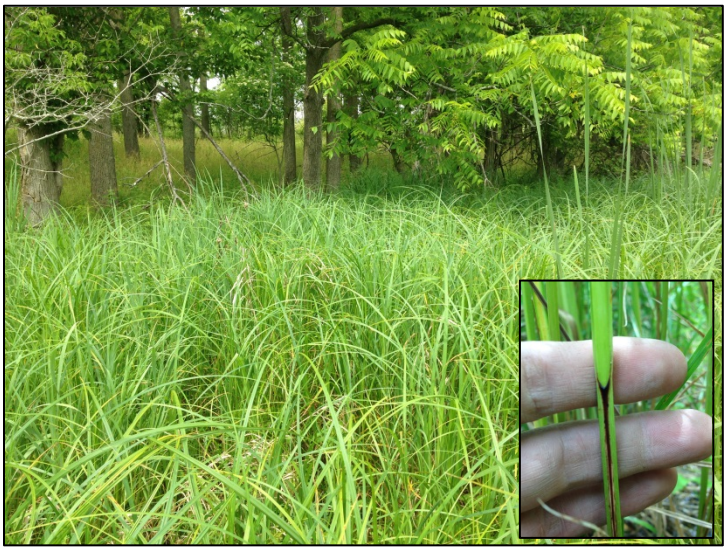

Figure 6. The state special concern *Carex trichocarpa* (hairy-fruited sedge) was noted from marsh borders near the Detroit River. The shiny red-purple leaf sheath apices (inset) are diagnostic.

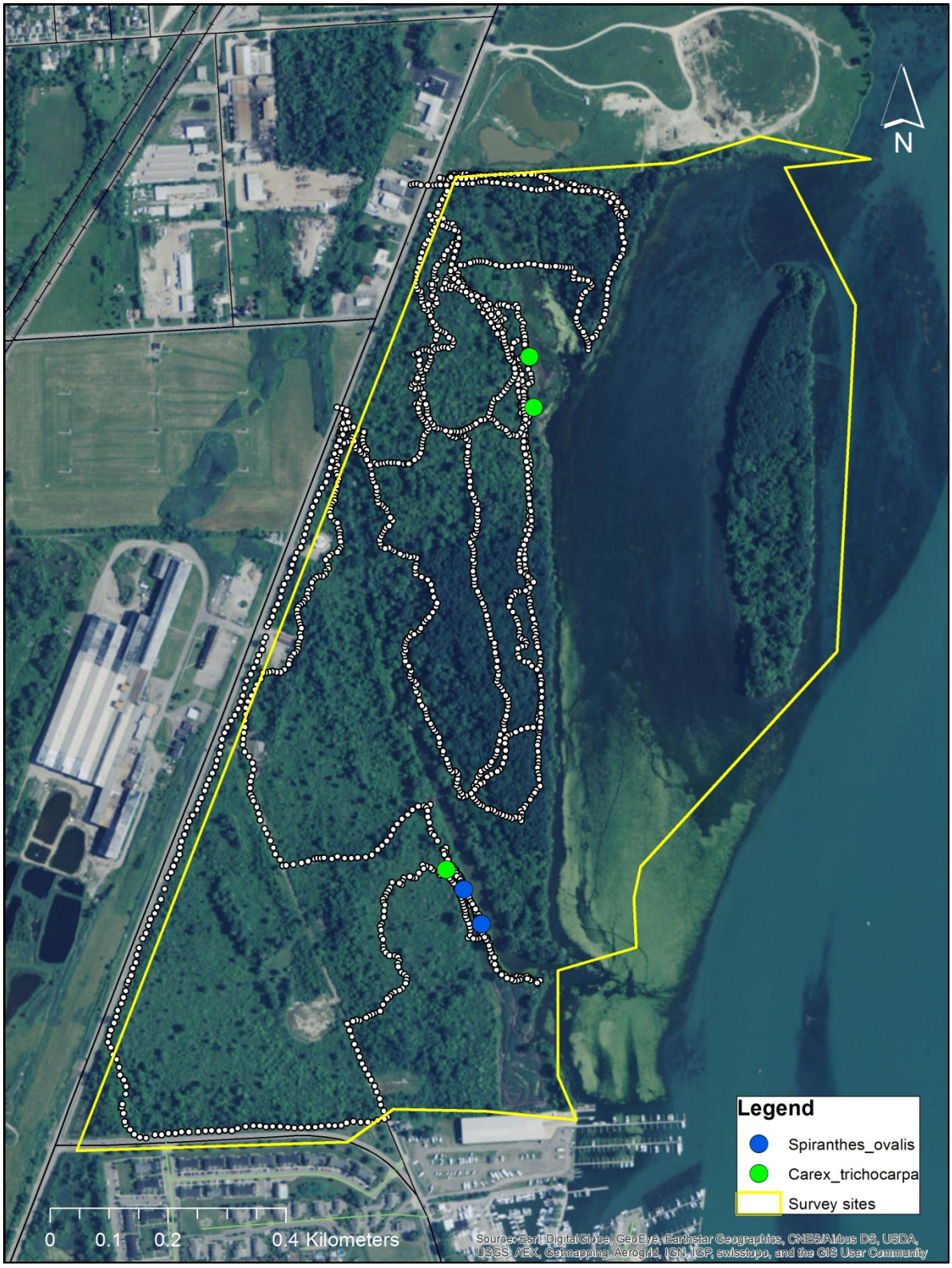

Figure 7. Survey tracks and locations of rare plant populations, Humbug Marsh.

Grosse Ile

Site History

Our understanding of the original vegetation of Grosse Ile is limited by the exclusion of most of the tract from the original survey due to land claims (known as the French plats) that predated the U.S. Government's public land survey system initiated in the early 1800s. Based on historical forest cover as inferred from GLO surveys on the adjacent mainland, in addition to current vegetation and soil characteristics, Comer et al. (1995a) hypothesized beech – sugar maple forest covered the majority of the island, although this cover type was treated broadly in southeastern Michigan, as ashes (*Fraxinus* spp.), elms (*Ulmus* spp.), basswood (*Tilia americana*), oaks (*Quercus* spp.), and hickories (*Carya* spp.) were apparently frequent based on original survey notes.

By 1883, the majority of Grosse Ile consisted of rectangular lots with shoreline access. Homes occurred along the shoreline, especially on the eastern side of the island. Subdivision and development continued into the early 1900s, with the Island Country Club and Grosse Ile Golf & Country Club appearing by 1925. The first aerial imagery consulted, dating to the late 1940s, shows development was still concentrated along the shoreline, although new roads and subdivisions were scattered across the island's interior. The majority of the island had been cleared for agriculture, with forest cover concentrated in a few woodlots, many of which showed evidence of historic logging or clearing (Table 1). Development increased significantly in the 1980s – 1990s, and much of the remaining open space and natural cover has since been protected by the Grosse Ile Nature & Land Conservancy (GINLC), which formed in 1993 to protect and steward natural resources on the island and educate residents about their value (GINLC 2015).

Ecological Assessment

All of the study areas on Grosse Ile were predominantly forested. The majority of the acreage supports mixed hardwood forest on seasonally wet (and locally ponded) clay plain, with canopies generally dominated by the state special concern *Quercus shumardii* (Shumard's oak), *Q. macrocarpa* (bur oak), *Carya ovata* (shagbark hickory), *C. laciniosa* (shellbark hickory), *Populus deltoides* (cottonwood), and *Tilia americana* (basswood). *Acer saccharinum* (silver maple) is also common, and dominates the wettest swales. The understories support basswood, *Acer saccharum* (sugar maple), *A. rubrum* (red maple), *A. nigrum* (black maple), *Fraxinus pennsylvanica* (green ash), *Ulmus americana* (American elm), *Ostrya virginiana* (ironwood), and *Carpinus caroliniana* (hornbeam). American elm and green ash were likely important canopy components until Dutch elm disease and emerald ash borer, respectively, killed the majority of the larger individuals.

The ground layer in the Grosse Ile forests ranged from nearly bare to dense (especially in wet, fairly open swales). Characteristic species include *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (poison-ivy), *Impatiens capensis* (spotted touch-me-not), *Persicaria virginiana* (jumpseed), *Glyceria striata* (fowl manna grass), *Elymus virginicus* (Virginia wild-rye), *Leersia oryzoides* (cut grass), the sedges *Carex lupulina*, *C. muskingumensis*, *C. tribuloides*, and *C. vulpinoidea*, *Geum canadense* (white avens), and the non-native, invasive *Lysimachia nummularia* (moneywort).

Floristics

Separate inventories of vascular plants were taken from the northern part of Grosse Ile (vicinity of The Wildlife Sanctuary) and the southern part of the island (vicinity of Manchester Woods, Centennial Farm & Open Space, and Parkway Woods).

On the southern part of Grosse Ile, a total of 107 vascular plant taxa were identified to the species level, including 87 native taxa (81%) (Table 1; Appendix 1). Total $\overline{C}$ was 3.3 and native $\overline{C}$ was 4.1. Twenty-three taxa (21%) are generalist native or non-native taxa with little to no fidelity to natural areas (*C*=0) (Herman et al. 2001), and only 17 taxa (16%) assigned *C*>5 were documented (Figure 5; Appendix 1). The wetness index ($\overline{W}$) was -0.2 for all taxa and -0.7 for native taxa only (Table 1; Appendix 1).

In and near The Wildlife Sanctuary on the northern part of Grosse Ile, 68 vascular plant taxa were identified to the species level, including 58 native taxa (85%) (Table 1; Appendix 1). Total $\overline{C}$ was 3.0 and native $\overline{C}$ was 3.5. Eleven taxa (16%) are generalist native or non-native taxa with little to no fidelity to natural areas (*C*=0) (Herman et al. 2001), and only six taxa (9%) assigned *C*>5 were documented (Figure 5; Appendix 1). The wetness index ($\overline{W}$) was 0.4 for all taxa and 0.0 for native taxa only (Table 1; Appendix 1).

Soils

The principal soil units at the Grosse Ile survey sites are Blount Loam (BfA) and Pewamo Loam (Pe), both fine-textured, clay-containing soil units developed on wave-worked tills and till-floored lake plains (NRCS 2015) (Appendix 2). Several soil samples were taken and assessed in the field. At all sample locations, a shallow horizon of 8 to 12 inches (20 – 30 cm) clay loam, in places nearly black with organic content, occurred over a deep horizon of mottled clay to greater than 36 inches (91 cm). Saturated zones at 26 – 28 inches (66 – 71 cm) were noted in two profiles. Surface layers were generally neutral to strongly alkaline (pH= 7.0 – 8.5), with slightly more acidic (pH= 6.5 – 7.5) subhorizons in two of the profiles. Mottled clay layers were moderately to strongly alkaline (pH= 8.0 – 8.5) below 24 inches (61 cm).

Natural Communities

The generally mature hardwood forest comprising portions of Manchester Woods, Wright Woods Preserve, and Centennial Farm & Open Space met MNFI criteria for documentation and tracking as a natural community element occurrence for wet-mesic flatwoods with embedded areas of southern hardwood swamp (Figure 8). The other study sites also predominantly supported wet-mesic flatwoods, but were more fragmented and disturbed and do not currently qualify as high quality examples of wet-mesic flatwoods.

Figure 8. Mature wet-mesic flatwoods dominated by the state special concern *Quercus shumardii* (Shumard's oak) and several other hardwoods comprises large portions of several open space and nature preserve tracts on Grosse Ile. Note the narrow, shiny, vertical bark plates (similar to those observed in *Quercus rubra*, red oak) and the typically buttressed tree base.

Rare Species

Two state-listed species were documented at several sites on Grosse Ile. The state special concern sedge *Carex squarrosa* was noted in several forested natural areas on the southern part of the island (Figures 9 and 10). This species was collected on Grosse Ile between 1912 and 1932, but no more specific locations were documented, and no more recent records were known prior to this survey. The state special concern *Quercus shumardii* (Shumard's oak) is common in the wet clay forests on the island (Figure 8). Although Shumard's oak is known from several locations in Wayne County, including Belle Isle, it had apparently not been documented on Grosse Ile prior to the 2015 surveys.

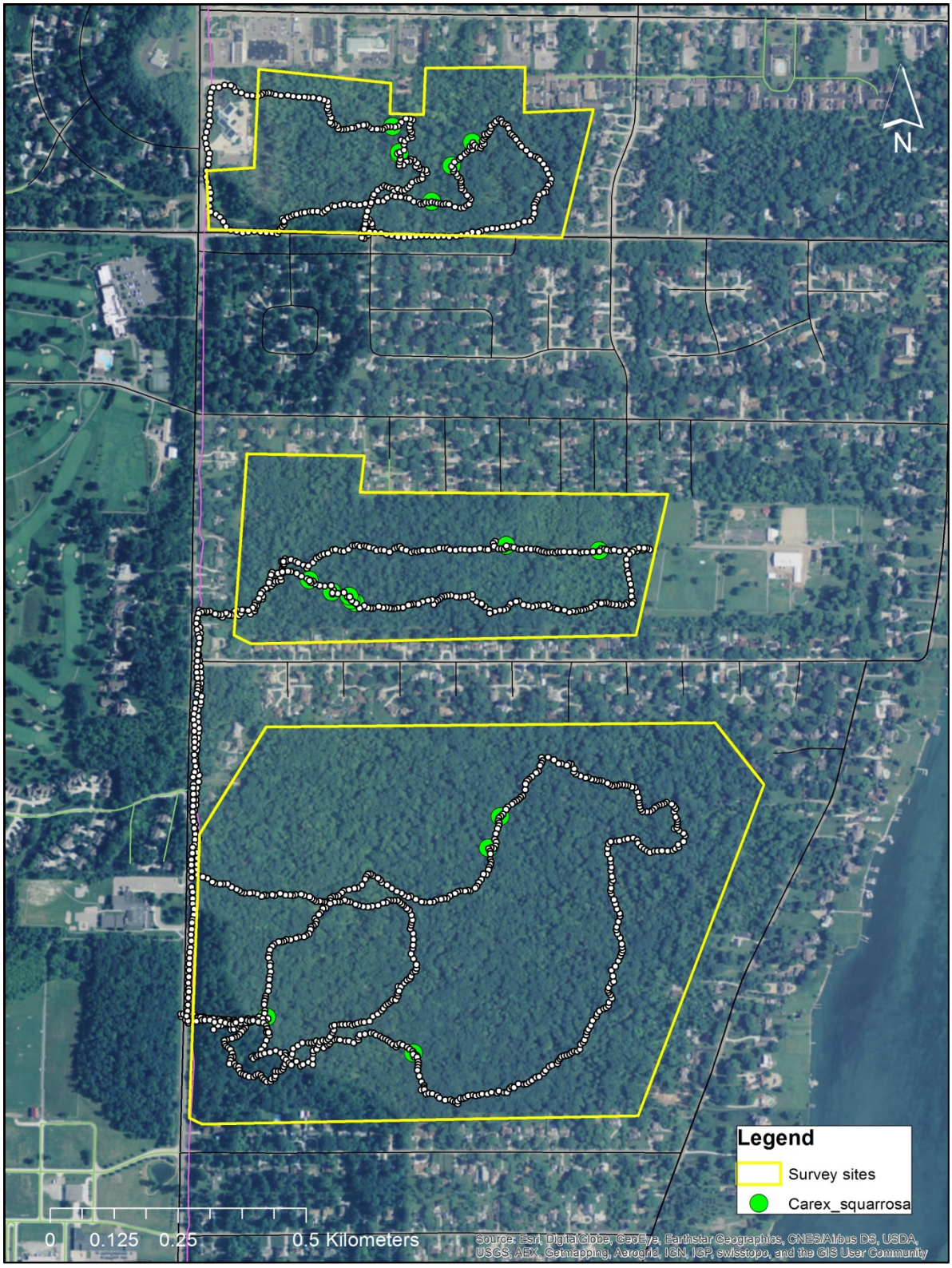

Figure 9. Survey tracks and locations of *Carex squarrosa* populations, Grosse Ile South. No rare species were noted at Grosse Ile North and thus a map and survey tracks for that area is not included in this report.

Figure 10. The state special concern sedge *Carex squarrosa* is widespread and locally common on the southern part of Grosse Ile. Note the plump, single spikes with perigynia at the apex and the long, straight perigynium beaks, which radiate in all directions (inset).

Oakwoods Metropark (Salamander Woods)

Site History

Based on General Land Office survey notes and tree data, Comer et al. (1995a) mapped the majority of Oakwoods Metropark as beech – sugar maple forest. On the lake plain, these mesic forests typically contained a diverse mix of tree species and in some places were dominated by species other than American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) (Kost and O'Connor 2003). In the area now occupied by Oakwoods Metropark, the forest was apparently characterized primarily by white oak (*Quercus alba*), white ash (*Fraxinus americana*), and American elm (*Ulmus americana*) (Kost and O'Connor 2003).

By 1876, the Chicago and Canada Southern Railway had been constructed through the area now occupied by Oakwoods Metropark. Otherwise, the area supported large-tract holdings that were presumably cleared for agriculture. Notably, by 1925, Henry Ford and Ford Motor Company owned significant tracts within and adjacent to the current park area. The first aerial imagery consulted, dating

to the late 1940s, shows the majority of the tracts within the current park were agricultural fields, with isolated woodlots along the Huron River and on land comprising the field survey site (Salamander Woods). These forests were thinned and possibly grazed (Table 1). The area was acquired for a park by the Huron – Clinton Metropolitan Authority in the 1970s, and currently supports old fields, extensive grassland plantings, and several woodlots characterized by floodplain forest, wet-mesic flatwoods, and dry-mesic southern forest (Kost and O'Connor 2003).

Ecological Assessment

Salamander Woods supports a mixed hardwood canopy, characterized by the state special concern *Quercus shumardii* (Shumard's oak), *Q. rubra* (red oak), *Q. alba* (white oak), *Carya ovata* (shagbark hickory), *Prunus serotina* (black cherry), *Populus deltoides* (cottonwood), and *Tilia americana* (basswood). *Acer saccharinum* (silver maple) dominates the lowest, wettest areas, where it occurs with *Fraxinus nigra* (black ash) and *Cephalanthus occidentalis* (buttonbush). Common understory species include *Acer rubrum* (red maple), *Carya* spp. (hickories), *Tilia americana* (basswood), *Ulmus americana* (American elm), *Carpinus caroliniana* (hornbeam), and *Ostrya virginiana* (ironwood). *Zanthoxylum americanum* (prickly-ash), *Lindera benzoin* (spicebush), and the invasive, non-native *Frangula alnus* (glossy buckthorn) are common shrubs. Higher, sandier ground in the southern portion of the woodlot supports dry-mesic southern forest dominated by *Quercus velutina* (black oak), white oak, and hickories, with an understory of red maple, *Hamamelis virginiana* (witch-hazel), and *Viburnum acerifolium* (maple-leaved viburnum).

The patchy ground layer is characterized by seedlings of *Fraxinus pennsylvanica* (green ash) and *F. americana* (white ash), *Persicaria virginiana* (jumpseed), *Cinna arundinacea* (wood reedgrass), *Toxicodendron radicans* (poison-ivy), *Parthenocissus quinquefolia* (Virginia creeper), *Geranium maculatum* (wild geranium), *Geum canadense* (white avens), *Glyceria striata* (fowl manna grass), *Leersia virginica* (white grass), *Symphyotrichum lateriflorum* (calico aster), *Lysimachia ciliata* (fringed loosestrife), *Circaea canadensis* (enchanter's-nightshade), *Impatiens capensis* (spotted touch-me-not), and the sedges *Carex bromoides* and *C. hyalinolepis*.

Floristics

A total of 99 vascular plant taxa were identified to the species level, including 91 native taxa (92%) (Table 1; Appendix 1). Total $\overline{C}$ was 3.9 and native $\overline{C}$ was 4.3. Ten taxa (10%) are generalist native or non-native taxa with little to no fidelity to natural areas (*C*=0) (Herman et al. 2001), and only 19 taxa (19%) assigned *C*>5 were documented (Figure 5; Appendix 1). The wetness index ($\overline{W}$) was 0.3 for all taxa and 0.9 for native taxa only (Table 1; Appendix 1).

Soils

The principal soil unit at Oakwoods Metropark, Salamander Woods is Pewamo Loam (Pe), a fine-textured, clay-containing soil characteristic of depressions on till-floored lake plains (Appendix 2). Smaller areas mapped as Oakville Fine Sand (OaB) occur at the margins of the woodlot. A soil profile taken near the center of the site consisted of 10 inches (25 cm) slightly acid to neutral (pH= 6.5 – 7.0)

dark brown loam to clay loam over slightly acid to neutral gleyed sandy loam with some clay to >20 inches (51 cm).

Natural Communities

Salamander Woods was identified as a high quality dry-mesic southern forest by Kost and O'Connor (2003). Originally classified as a dry-mesic southern forest due to the importance of oaks and hickories in the canopy, the site was reclassified to wet-mesic flatwoods following its inclusion in the revised MNFI Natural Community Classification (Kost et al. 2007; Slaughter et al. 2010) (Figure 11). The small area of dry-mesic southern forest noted in 2015 is included within the wet-mesic flatwoods occurrence.

Rare Species

Previously documented populations of the state special concern *Quercus shumardii* (Shumard's oak) and the state special concern sedge *Carex squarrosa* were observed, and a new population of the state threatened *Juncus brachycarpus* (short-fruited rush) was documented along the park drive adjacent to the wet-mesic flatwoods (Figures 12 and 13).

Figure 11. The wet-mesic flatwoods at Oakwoods Metropark supports scattered mature oaks within a matrix of younger trees.

Figure 12. The state threatened *Juncus brachycarpus* (short-fruited rush) was noted along the park road adjacent to Salamander Woods. This species is local on sandy lake plain soils in southeastern and southwestern Michigan.

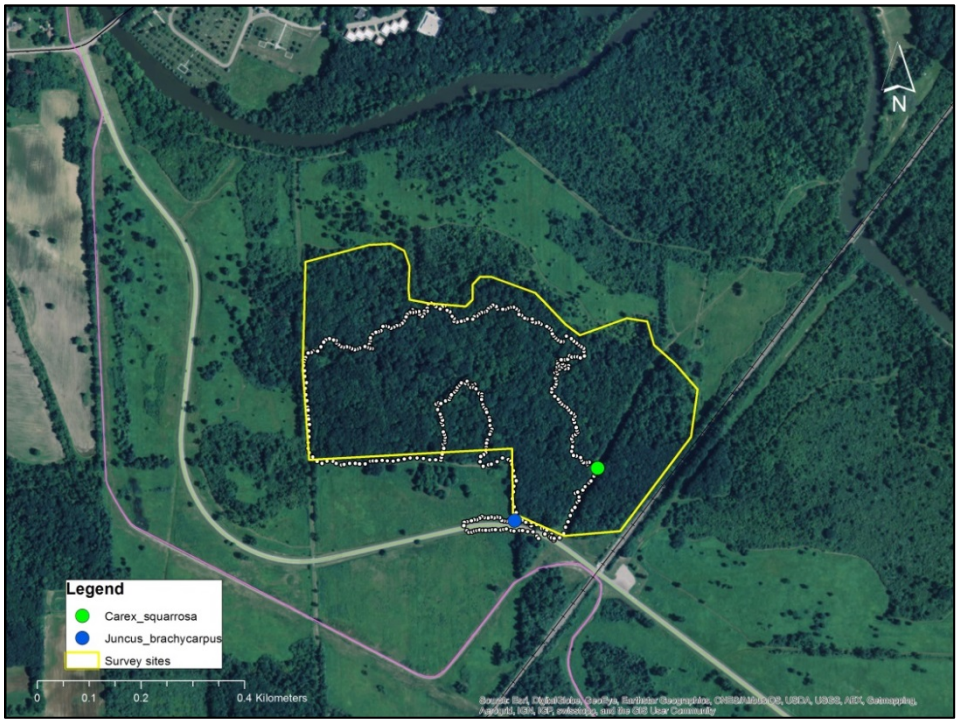

Figure 13. Survey tracks and locations of rare plant populations, Salamander Woods. Shumard's oak (not mapped) is widespread within the woodlot.

Table 1. Comparison of abiotic and biotic components and land use history of field survey sites.

Site	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile North
Landform and Soils				
Ecoregion (Albert 1995)	Maumee Lake Plain	Maumee Lake Plain	Maumee Lake Plain	Maumee Lake Plain
Soil Map- Major Unit (USDA NRCS 2015)	Pewamo Loam	Blount Loam; Nappanee Silt Loam	Pewamo Loam	Blount Loam
Soil Map- Minor Unit(s) (USDA NRCS 2015)	Oakville Fine Sand	Metamora Sandy Loam; Glynwood Loam; Ziegenfuss Clay	Blount Loam	Pewamo Loam
Soil Texture (Field; Upper 30")	Loam; Sandy Loam; Loamy Sand w/ some clay	Clay Loam over Clay	Clay Loam; Clay	Clay Loam; Clay
Soil pH (Field)	4.5 – 7.0	6.5 – 8.2	7.0 – 8.2	7.0 – 8.2
Cover Type, Land Use, and Site History				
Circa 1800 Vegetation (Comer et al. 1995a)	Beech – Sugar Maple Forest	Oak – Hickory Forest; Shrub Swamp/Emergent Marsh	Beech – Sugar Maple Forest	Beech – Sugar Maple Forest
Land Use: 1937	Not Reviewed	Cleared fields; grazed open forest; reforesting swale; local orchards; ditched and diked marsh with cat-tail clones	Not Reviewed	Not Reviewed
Disturbances	N/A	Clearing; grazing; dikes and ditches; roads and a few homes	N/A	N/A
Land Use: 1949	Forest; Shrub-carr; Open wetland	Same as 1937	Forest	Forest; Cleared fields
New Disturbances	Clearing; mowing?	None	Ditches; Thinning	Clearing (SW); ditch network (N-S & E-W) throughout
Land Use: 1957 – 1961	Forest; Shrub-carr	Same as 1949	Forest	Forest; Reverting fields
New Disturbances	Utility corridor through forest	Development (esp. S); New spur road; Factory W of site	None	Homes (local)
Land Use: 1967	Forest; Shrub-carr	Same as 1961	Forest	Forest; Reverting fields

Site	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile North
New Disturbances	Home/structure in NE	More ditches; limited expansion of development	Subdivision in NE	None
Land Use: 1981	Forest	Forest; shrub thickets; old field; Emergent Marsh	Forest	Forest
New Disturbances	Homes removed after park acquisition; Park loop road constructed S and W of woodlot	Dikes removed; open water in Detroit River	Subdivision extended W, fragmenting main forest into two blocks	A few homes NE; Clearing for subdivision roads N
Land Use: 1998	Forest	Same as 1981 but old field succeeded to shrub thicket/young forest	Forest	Forest
New Disturbances	None	New service building on Jefferson Ave.	Home construction in existing subdivisions and a few homes along Meridian Rd.; Equestrian Center on Centennial Farm	Homes and Subdivision N
Land Use/Natural Communities: 2015	Wet-mesic Flatwoods	Early successional shrub thickets; Wet-mesic Flatwoods (degraded); Great Lakes Marsh	Wet-mesic Flatwoods; Southern Hardwood Swamp	Wet-mesic Flatwoods
New Disturbances	None	Brush-hogging circa 1998; local soil disturbance	None	Small road extension
Floristics				
# Vascular Plant Spp.	99	214	107	68
# Native Vascular Plant Spp.	91 (92%)	164 (77%)	87 (81%)	58 (85%)
Total $\overline{C}$	3.9	2.6	3.3	3.0
Native $\overline{C}$	4.3	3.4	4.1	3.5
Total $\overline{W}$	0.3	-0.3	-0.2	0.4
Native $\overline{W}$	0.2	-0.9	-0.7	0.0

DISCUSSION

Site Comparisons

Site History

A commonality among the four discrete sites surveyed during this inventory (Humbug Marsh, Grosse Ile North, Grosse Ile South, and Oakwoods Metropark – Salamander Woods) is that all of these areas have experienced significant disturbance following European settlement, ranging from selective logging and attempts at drainage to tillage and animal husbandry. It is unclear, however, as to the influence that established Native Americans may have had on the natural communities first observed by surveyors from the General Land Office (GLO). Further investigation of historical resources would thus be needed for the discovery of relevant information about occupation sites, indigenous agricultural practices, and natural resource use. Upland forests and grasslands, for example, as initially observed by government GLO surveyors, may have originated from or were influenced by the indigenous use of fire for site management. Humbug Marsh occurs along the shoreline of the Detroit River, where GLO surveys suggest several areas of oak-hickory forest and limited areas of oak savanna occurred on slightly elevated landforms (Comer et al. 1995a). The presence of these pyrogenic ecosystems suggests fires, likely at least partly cultural, were historically important (Cohen 2001).

Ecological Assessment

The clay lake plain of southeastern Lower Michigan was predominantly forested when it was surveyed by the General Land Office (GLO), with vegetation composition shaped by slope and drainage (Albert 1995). The 2015 field surveys documented abiotic and biotic characteristics that are consistent with historically forested conditions. In addition to long-term forested conditions as indicated by historical aerial photographs and the dominance of the least disturbed sites (i.e., Grosse Ile South) by mature, forest-grown trees, the species identified at all of the survey sites are predominantly native generalists characteristic of wet to mesic soils in such habitats as floodplain forest, wet-mesic flatwoods, and southern hardwood swamp (Goforth et al. 2001; Kost et al. 2007; Reznicek et al. 2011). Very few species indicative of oak savanna (i.e., Lakeplain Oak Openings) or prairies (i.e., Lakeplain Wet Prairie, Lakeplain Wet-mesic Prairie, or Mesic Sand Prairie) were documented during field surveys. Those species noted at Humbug Marsh in shrub thickets and open forests that are frequently found in savanna and/or prairie habitats, such as *Cirsium discolor* (pasture thistle), *Desmodium perplexum* (tick-trefoil), *Elymus hystrix* (bottlebrush grass), *Monarda fistulosa* (wild-bergamot), and *Pycnanthemum virginianum* (common mountain mint), may reflect the historical use of fire and land clearing activities, although these taxa, too, are generalists that also occur in less pyrogenic habitats (Kost et al. 2007; Reznicek et al. 2011). Modal species and indicators of oak savanna and prairie in the region, such as *Andropogon gerardii* (big bluestem), *Sorghastrum nutans* (Indian grass), *Coreopsis tripteris* (tall coreopsis), *Liatris spicata* (marsh blazing-star), *Baptisia tinctoria* (wild indigo), and the state special concern *Scleria triglomerata* (tall nut-rush), *Angelica venenosa* (hairy angelica), and *Trichophorum clintonii* (Clinton's bulrush), among others (Comer et al. 1995b; Kost et al. 2007), were not documented from naturally occurring populations at Humbug Marsh. Warm-season grasses have been introduced locally by USFWS staff and volunteers, and

there is a recent sight record for *Aletris farinosa* (colic root) which was not confirmed during the 2015 surveys. Nevertheless, the vegetation at Humbug Marsh provided little evidence of remnant prairie or savanna.

In contrast with the hardwood forests that currently characterize or historically characterized Humbug Marsh and the other field survey sites on the clay plain of southeastern Lower Michigan, oak savanna and prairie communities (i.e., Lakeplain Oak Openings, Lakeplain Wet Prairie, Lakeplain Wet-mesic Prairie, and Mesic Sand Prairie) occurred historically primarily on sand lake plain (Albert 1995; Comer et al. 1995a). Extant remnants in the vicinity of King and Sibley Roads, just west of Humbug Marsh, occur on a variety of soil series characterized by loamy sands or sandy loams over fine sand, with restrictive clay layers occurring at depths greater than 80 inches (203 cm) (USDA NRCS 2015). This is in sharp contrast to the forest soils at Humbug Marsh and Grosse Ile, which are characterized by relatively shallow, fine-textured A-horizons over deep layers of calcareous clay (USDA NRCS 2015). The wet-mesic flatwoods at Oakwoods Metropark is somewhat of an outlier with its greater topographic relief and apparently heterogeneous soil profile. The single soil profile taken in 2015 indicated a much greater concentration of sand and less calcareous conditions here than at Humbug Marsh or Grosse Ile, although previously collected soil samples apparently found heavy clay here, too (Kost and O'Connor 2003).

Floristics

A total of 289 vascular plant taxa identified at the species level were documented from the study sites, including 226 native taxa, or approximately 13% of the native species known from Michigan (Reznicek et al. 2011) (Appendix 3). As field surveys were only conducted during June – September, and only once at most sites, we recommend that comprehensive floristic inventories be conducted to more thoroughly document the flora and assess the contribution of Humbug Marsh, Grosse Ile, and Oakwoods Metropark to the conservation of plant diversity at the regional and statewide scale.

Based on our surveys, none of the study sites are important for the conservation of highly conservative plant species. In fact, although nearly 23% of Michigan's native vascular plant taxa are considered indicative of high quality, relatively undisturbed natural habitats (*C*=10), none of these species were documented at Humbug Marsh, Grosse Ile, or Oakwoods Metropark – Salamander Woods, and relatively few species assigned *C*>5, indicating fidelity to somewhat disturbed to undisturbed conditions, were documented (Figure 5). In fact, the 15 native vascular plant taxa that occurred at all study sites are all generalist species with *C* values ≤5 (Table 2). Although statistically robust native $\overline{C}$ reference values have not been developed for wet-mesic flatwoods or other natural community types in Michigan (Slaughter et al. 2015), $\overline{C}$ values for the Grosse Ile and Oakwoods Metropark study sites are in line with values reported for floristically similar floodplain forests in southern Lower Michigan (Goforth et al. 2001). At Humbug Marsh, the significant discrepancy between total $\overline{C}$ and native $\overline{C}$ is due to the preponderance of non-native taxa that are widespread and common on the site, reflecting historical tilling and post-1967 succession (Table 1). Despite this discrepancy, native $\overline{C}$ at Humbug Marsh was the lowest of all study sites.

Although none of the study sites support concentrations of conservative vascular plant taxa, they are for the most part dominated by native species and serve as important reservoirs of plant diversity (in addition to providing habitat for a variety of wildlife) in the highly modified, urbanized landscape of metropolitan Detroit. They also support populations of five state-listed plants: the state special concern *Carex trichocarpa* (hairy-fruited sedge) and state threatened *Spiranthes ovalis* (oval ladies'-tresses) at Humbug Marsh; the state special concern *Quercus shumardii* (Shumard's oak) and sedge *Carex squarrosa* at Grosse Ile; and Shumard's oak, *Carex squarrosa*, and the state threatened *Juncus brachycarpus* (short-fruited rush) at Oakwoods Metropark – Salamander Woods. The populations of the two sedges and Shumard's oak, in particular, are large and significant from a statewide perspective.

Table 2. Vascular plant taxa noted at all five study sites (Humbug Marsh, Grosse Ile South, Grosse Ile Parkway [considered part of Grosse Ile South elsewhere in this report], Grosse Ile North, Oakwoods Metropark – Salamander Woods).

Species	Common Name	*C*	*W*	Physiognomy	Life Cycle
Acer saccharinum	silver maple	2	-3	tree	perennial
Carex tribuloides	sedge	3	-3	sedge	perennial
Carya ovata	shagbark hickory	5	3	tree	perennial
Frangula alnus	glossy buckthorn	0	0	shrub	perennial
Fraxinus pennsylvanica	red ash	2	-3	tree	perennial
Geum canadense	white avens	1	0	forb	perennial
Glyceria striata	fowl manna grass	4	-5	grass	perennial
Impatiens capensis	spotted touch-me-not	2	-3	forb	annual
Juglans nigra	black walnut	5	3	tree	perennial
Parthenocissus quinquefolia	Virginia creeper	5	3	vine	perennial
Persicaria virginiana	jumpseed	4	0	forb	perennial
Populus deltoides	cottonwood	1	0	tree	perennial
Quercus alba	white oak	5	3	tree	perennial
Toxicodendron radicans	poison-ivy	2	0	vine	perennial
Ulmus americana	American elm	1	-3	tree	perennial
Vitis riparia	river-bank grape	3	0	vine	perennial

Natural Community Element Occurrences

Field surveys reconfirmed a previously documented element occurrence of wet-mesic flatwoods at Oakwoods Metropark – Salamander Woods and documented a new element occurrence of wet-mesic flatwoods at Grosse Ile, comprising portions of several open space and nature preserve tracts on the southern part of the island. The previously identified Lakeplain Oak Openings at Humbug Marsh was reinterpreted to be a degraded, historically cut and grazed oak or oak – hickory forest based on General Land Office survey notes, historical literature, current vegetation, and soils. As such, the Lakeplain Oak Openings element occurrence for Humbug Marsh was removed from the MNFI natural heritage database. Another previously identified natural community element occurrence at Humbug Marsh, a Great Lakes Marsh in and adjacent to the Detroit River, occurs mostly outside the study area and was not thoroughly inventoried.

Conservation Management Recommendations for Humbug Marsh

Of all the survey sites inventoried during this project, Humbug Marsh appears to have experienced the most change, owing to being extensively timbered and cleared and then subsequently used for agriculture and sheep grazing. As noted earlier, most of the tract remained largely in use for agriculture and grazing until the late 20th century, when these activities were abandoned and – with the exception of some clearing for a planned development that did not proceed in 1998 – continued old field and woody plant succession to the present time. As is typical in such significantly modified areas, a number of non-native species have become established, including in the two forested areas. Woody plant succession has been the most vigorous in former agricultural fields, which make up the majority of this site, and it is in these areas that restoration management has been initiated by Refuge staff through cutting and selective herbiciding.

Although Humbug Marsh was very likely predominantly forested circa 1800, clearing and conversion to agricultural use post-1837 has altered site conditions to such a degree that the pre-agricultural nature of the tract cannot be inferred in great detail. Profound changes caused by regional landscape fragmentation, drainage, and development, the establishment and spread of non-native, invasive plant species, the introduction and spread of destructive forest pathogens and pests such as elm canker and the emerald ash borer, and the reduction of top predators and subsequent increases in populations of white-tailed deer have altered successional dynamics to such a degree that a return to relatively "natural" forest conditions at Humbug Marsh is likely not attainable, even with directed land management. If forest is the future desired condition of Humbug Marsh, land management practices such as the planting of trees, selective harvest and canopy gap creation, reduction of the white-tailed deer population, and control of invasive woody and herbaceous species (e.g., common buckthorn and garlic mustard) should be considered in an experimental context. Seeds or plugs of appropriate conservative plant species may have to be introduced to the site, as the ground layer is dominated by weedy generalists and conservative species have largely been eliminated from the site by the aforementioned disturbances.

An alternative conservation management option is to maintain and enhance early successional habitats at Humbug Marsh for declining wildlife species and shade-intolerant plants. The old fields and shrub thickets at Humbug Marsh support many plant species that were not documented on nearby Grosse Ile, where most of the remaining undeveloped land is forested (Appendix 3). Although most of these plants are not of conservation concern at a statewide scale, Humbug Marsh is one of the few undeveloped tracts near the Detroit River that provides open field and shrub thicket habitat, and thus is an important site for local conservation of common species and local genotypes. Restoration and maintenance of early successional habitats can continue via hydro-axing and appropriate herbicide application to shrubs and small trees that have spread over much of the tract. Once the dense and dominating stands of woody vegetation are cut and herbicided, we recommend the application of prescribed fire to further control and eliminate woody vegetation and non-native species while encouraging the growth of graminoids and the potential emergence of additional native species that may be present in the seed bank. Prescribed burns may also be beneficial to the wet meadow zones identified at the margins of emergent marsh communities adjacent to the Detroit River.

Although there is scant evidence of restorable savanna or prairie communities at Humbug Marsh, Refuge staff could consider creating a demonstration planting of plant species native to local savanna and prairie remnants to educate visitors about these critically imperiled ecosystems. The majority of extant prairie acreage in Wayne County is privately owned, and the few protected tracts are generally small, degraded, and inaccessible to the public. The creation of a demonstration "prairie" at Humbug Marsh would increase public exposure to these ecosystems and their characteristic plant and animal species, and potentially help foster the conservation of naturally occurring remnants elsewhere on the lake plain. Although the soils at Humbug Marsh are dense clays and not the sandy-textured soils typical of the native remnants, there appears to be sufficient topographic relief at Humbug Marsh to support plantings of clay-tolerant species of wet to mesic conditions. Depending on the scale of the planting(s), hydrological features on the property could be identified and flagged to aid in the selection of appropriate species for different soil conditions. Ideally, prairie species introduced to the site would reflect local genotypes, perhaps seeds collected from relict populations of prairie species along roads and railroads in the vicinity of Humbug Marsh. Success of these plantings would depend primarily on successful germination and survival of the species introduced to the site, in conjunction with woody species control and the application of prescribed fire.

Of the two rare species identified at Humbug Marsh during field surveys, *Carex trichocarpa* (hairy-fruited sedge), which was found in two wet meadow areas, likely requires only qualitative monitoring (e.g., photo monitoring) to periodically check its status over time. This sedge should continue to be sought in other areas of Humbug Marsh as refuge staff become familiar with the species. Based on the presence of several culms in areas recently cleared of common buckthorn, continued removal of woody species at marsh borders, in addition to prescribed fire, would likely benefit this species. The conservation and management of *Spiranthes ovalis* (oval ladies'-tresses) is less clear, and perhaps the best strategy for this rare orchid species is simply to monitor it where it has been identified and seek other colonies within the refuge. As in states adjacent to Michigan, this orchid was once known as a very localized and sparse rarity, but there are now data demonstrating that oval ladies'-tresses is presently much more frequent and may represent the advent of a disturbance-adapted ecotype (Homoya 1993). The recent discovery and documentation of oval ladies'-tresses in Monroe County, several sites in Ann Arbor (Washtenaw County), and elsewhere in southern Michigan corroborates the observations of Homoya (MNFI 2015).

Ideally, all restoration activities should proceed within the context of a monitoring plan which is essential to ascertaining management success, and to that end the Michigan Floristic Quality Assessment (Reznicek et al. 2014) could be used as one measure to track habitat improvement and restoration success over time. Given the sizable human population and presence of several colleges and universities in metropolitan Detroit, Humbug Marsh is ideally situated for academic research, which should be conducted in conjunction with land management activities to assess progress in a statistically rigorous manner and in turn help refine conservation goals and land management techniques. Ultimately, responsible stewardship of the ecosystems and component natural communities found at Humbug Marsh will ensure the long-term significance of the site for local biodiversity conservation and environmental education. These values would be further enhanced by the identification, conservation,

and stewardship of other biologically rich tracts in the area before they are lost to development or neglect.

ACKNOWLEDGMENTS

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LITERATURE CITED

Albert, D.A. 1995. Regional landscape ecosystems of Michigan, Minnesota, and Wisconsin: A working map and classification. Gen. Tech. Rep. NC-178. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. Northern Prairie Wildlife Research Center Home Page. Available http://www.npwrc.usgs.gov/resource/1998/rlandscp/rlandscp.htm (Version 03JUN98) (Accessed: November 19, 2015).

Cohen, J.G. 2001. Natural community abstract for lakeplain oak openings. Michigan Natural Features Inventory, Lansing, MI. 10 pp.

Comer, P. J., D. A. Albert, H. A.Wells, B. L. Hart, J. B. Raab, D. L. Price, D. M. Kashian, R. A. Corner, and D.W. Schuen. 1995a. Michigan's native landscape, as interpreted from the General Land Office Surveys 1816–1856. Report to the U.S. E.P.A. Water Division and the Wildlife Division, Michigan Department of Natural Resources. Michigan Natural Features Inventory, Lansing, MI. 76 pp.

Comer, P.J., W.A. MacKinnon, M.L. Rabe, D.L. Cuthrell, M.R. Penskar, and D.A. Albert. 1995b. A survey of lakeplain prairie in Michigan. Michigan Natural Features Inventory, Report No. 1995-08, Lansing, MI. 240 pp.

Freyman, W.A. and L.A. Masters. 2013. The Universal Floristic Quality Assessment (FQA) Calculator [Computer program]. Available at http://universalFQA.org (Accessed: September 29, 2015).

Goforth, R.R., D. Stagliano, J. Cohen, M. Penskar, Y. Lee, and J. Cooper. 2001. Biodiversity analysis of selected riparian ecosystems within a fragmented landscape. Michigan Natural Features Inventory, Report No. 2001-06, Lansing, MI. 100 pp. + appendices.

Grosse Ile Nature and Land Conservancy (GINLC). 2015. Homepage. Available at http://www.ginlc.org/ (Accessed: December 2, 2015).

Herman, K.D., L.A. Masters, M.R. Penskar, A.A. Reznicek, G.S. Wilhelm, W.W. Brodovich, and K.P. Gardiner. 2001. Floristic quality assessment with wetland categories and examples of computer applications for the State of Michigan – Revised, 2nd Edition. Michigan Department of Natural Resources, Wildlife, Natural Heritage Program. Lansing, MI. 19 pp. + appendices.

Kost, M.A., and R.P. O'Connor. 2003. Natural features inventory and management recommendations for Kensington and Oakwoods Metroparks. Michigan Natural Features Inventory, Report No. 2003-10, Lansing, MI. 94 pp.

Kost, M.A., D.A. Albert, J.G. Cohen, B.S. Slaughter, R.K. Schillo, C.R. Weber, and K.A. Chapman. 2007. Natural communities of Michigan: Classification and description. Michigan Natural Features Inventory, Report No. 2007-21, Lansing, MI. 314 pp.

Michigan Historical Commission. 1886. Report of the Pioneer Society of the State of Michigan, together with reports of County, Town, and District Pioneer Societies. Vol. VII. Thorp and Godfrey, Lansing, MI. 709 pp.

Michigan Natural Features Inventory (MNFI). 2015. Natural heritage database. Michigan Natural Features Inventory, Lansing, MI.

Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment database. Herbarium, University of Michigan, Ann Arbor, Mich., and Michigan Natural Features Inventory, Michigan State University Extension, Lansing, MI. Available at http://www.michiganflora.net/home.aspx. (Accessed: November 19, 2015).

Slaughter, B.S., J.G. Cohen, and M.A. Kost. 2010. Natural community abstract for wet-mesic flatwoods. Michigan Natural Features Inventory, Lansing, MI. 14 pp.

Slaughter, B.S., A.A. Reznicek, M.R. Penskar, and B.S. Walters. 2015. Notes on the third edition of the Floristic Quality Assessment of Michigan. Wetland Science and Practice 32: 28-32.

United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). 2015. Web Soil Survey. Available at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. (Accessed: December 2, 2015).

Appendix 1. Floristic Quality Assessments for Humbug Marsh, Grosse Ile South, Grosse Ile North, and Oakwoods Metropark – Salamander Woods.

Humbug Marsh Unit, Detroit River IWR

06/26/2015

Humbug Marsh
Trenton
Wayne
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter
Latitude:	42.111487
Longitude:	-83.191309
Weather Notes:	
Duration Notes:	
Community Type Notes:	Old field, successional thickets, Great Lakes marsh, Wet-mesic flatwoods (+/-)
Other Notes:	Additional inventory by B. Slaughter and M. Penskar 19 August and by B. Slaughter 17 September. Also noted: Galium sp., Veronica sp. Andropogon ger & Sorghastrum nut were planted.

Conservatism-Based Metrics:

Total Mean C:	2.6
Native Mean C:	3.4
Total FQI:	38
Native FQI:	43.5
Adjusted FQI:	29.8
% C value 0:	28.5
% C value 1-3:	33.6
% C value 4-6:	32.7
% C value 7-10:	5.1
Native Tree Mean C:	3.8

Native Shrub Mean C:	3.4	
Native Herbaceous Mean C:	3.4	
Species Richness:		
Total Species:	214	
Native Species:	164	76.60%
Non-native Species:	50	23.40%
Species Wetness:		
Mean Wetness:	-0.3	
Native Mean Wetness:	-0.9	
Physiognomy Metrics:		
Tree:	21	9.80%
Shrub:	16	7.50%
Vine:	7	3.30%
Forb:	121	56.50%
Grass:	22	10.30%
Sedge:	25	11.70%
Rush:	0	0%
Fern:	2	0.90%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	25	11.70%
Perennial:	178	83.20%
Biennial:	11	5.10%
Native Annual:	19	8.90%
Native Perennial:	141	65.90%
Native Biennial:	4	1.90%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acalypha rhomboidea	Euphorbiaceae	ACARHO	native	0	3	forb	annual	three-seeded mercury

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	box-elder
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Achillea millefolium	Asteraceae	ACHMIL	native	1	3	forb	perennial	yarrow
Agastache nepetoides	Lamiaceae	AGANEP	native	5	3	forb	perennial	yellow giant hyssop
Agrimonia gryposepala	Rosaceae	AGRGRY	native	2	3	forb	perennial	tall agrimony
Agrimonia parviflora	Rosaceae	AGRPAR	native	4	0	forb	perennial	swamp agrimony
Agrostis gigantea	Poaceae	AGRGIG	non-native	0	-3	grass	perennial	redtop
Alisma subcordatum; a. plantago-aquatica	Alismataceae	ALISUB	native	1	-5	forb	perennial	southern water-plantain
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Ambrosia artemisiifolia	Asteraceae	AMBART	native	0	3	forb	annual	common ragweed
Anemone canadensis	Ranunculaceae	ANECAN	native	4	-3	forb	perennial	canada anemone
Anemone quinquefolia	Ranunculaceae	ANEQUI	native	5	3	forb	perennial	wood anemone
Apocynum androsaemifolium	Apocynaceae	APOAND	native	3	5	forb	perennial	spreading dogbane
Apocynum cannabinum; a. sibiricum	Apocynaceae	APOCAN	native	3	0	forb	perennial	indian-hemp
Arctium minus	Asteraceae	ARCMIN	non-native	0	3	forb	biennial	common burdock
Asclepias incarnata	Apocynaceae	ASCINC	native	6	-5	forb	perennial	swamp milkweed
Asclepias syriaca	Apocynaceae	ASCSYR	native	1	5	forb	perennial	common milkweed
Athyrium filix-femina	Athyriaceae	ATHFIL	native	4	0	fern	perennial	lady fern
Barbarea vulgaris	Brassicaceae	BARVUL	non-native	0	0	forb	biennial	yellow rocket
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Bidens discoidea	Asteraceae	BIDDIS	native	7	-3	forb	annual	swamp beggar-ticks
Boehmeria cylindrica	Urticaceae	BOECYL	native	5	-5	forb	perennial	false nettle
Bolboschoenus fluviatilis; scirpus f.	Cyperaceae	BOLFLU	native	6	-5	sedge	perennial	bulrush
Calamagrostis canadensis	Poaceae	CALCAN	native	3	-5	grass	perennial	blue-joint
Carex alopecoidea	Cyperaceae	CXALOP	native	3	-3	sedge	perennial	sedge
Carex blanda	Cyperaceae	CXBLAN	native	1	0	sedge	perennial	sedge
Carex bromoides	Cyperaceae	CXBROM	native	6	-3	sedge	perennial	sedge
Carex brunnescens	Cyperaceae	CXBRUN	native	5	-3	sedge	perennial	sedge
Carex cephalophora	Cyperaceae	CXCEPP	native	3	3	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex gracillima	Cyperaceae	CXGRAA	native	4	3	sedge	perennial	sedge
Carex granularis	Cyperaceae	CXGRAN	native	2	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Carex hyalinolepis	Cyperaceae	CXHYAL	native	4	-5	sedge	perennial	sedge
Carex jamesii	Cyperaceae	CXJAME	native	8	5	sedge	perennial	james sedge
Carex lacustris	Cyperaceae	CXLACU	native	6	-5	sedge	perennial	sedge
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge
Carex molesta	Cyperaceae	CXMOLE	native	2	0	sedge	perennial	sedge
Carex pellita; c. lanuginosa	Cyperaceae	CXPELL	native	2	-5	sedge	perennial	sedge
Carex radiata; c. rosea	Cyperaceae	CXRADI	native	2	0	sedge	perennial	straight-styled wood sedge
Carex stipata	Cyperaceae	CXSTIP	native	1	-5	sedge	perennial	sedge
Carex stricta	Cyperaceae	CXSTRI	native	4	-5	sedge	perennial	sedge
Carex tenera	Cyperaceae	CXTENE	native	4	0	sedge	perennial	sedge
Carex tribuloides	Cyperaceae	CXTRIB	native	3	-3	sedge	perennial	sedge
Carex trichocarpa	Cyperaceae	CXTRIC	native	8	-5	sedge	perennial	hairy-fruited sedge
Carex vulpinoidea	Cyperaceae	CXVULP	native	1	-5	sedge	perennial	sedge
Carya laciniosa	Juglandaceae	CARLAC	native	9	-3	tree	perennial	shellbark hickory
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory
Catalpa speciosa	Bignoniaceae	CATSPE	non-native	0	3	tree	perennial	northern catalpa
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Cephalanthus occidentalis	Rubiaceae	CEPOCC	native	7	-5	shrub	perennial	buttonbush
Cerastium fontanum	Caryophyllaceae	CERFON	non-native	0	3	forb	perennial	mouse-ear chickweed
Cichorium intybus	Asteraceae	CICINT	non-native	0	3	forb	perennial	chicory
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Cirsium arvense	Asteraceae	CIRARV	non-native	0	3	forb	perennial	canada thistle
Cirsium discolor	Asteraceae	CIRDIS	native	4	5	forb	biennial	pasture thistle
Cirsium vulgare	Asteraceae	CIRVUL	non-native	0	3	forb	biennial	bull thistle
Clematis virginiana	Ranunculaceae	CLEVIR	native	4	0	vine	perennial	virgins bower
Conyza canadensis	Asteraceae	CONCAN	native	0	3	forb	annual	horseweed
Cornus drummondii	Cornaceae	CORDRU	native	6	0	shrub	perennial	rough-leaved dogwood
Cornus foemina	Cornaceae	CORFOE	native	1	0	shrub	perennial	gray dogwood
Crataegus mollis	Rosaceae	CRAMOL	native	2	0	tree	perennial	hawthorn
Cyperus strigosus	Cyperaceae	CYPSTR	native	3	-3	sedge	perennial	long scaled nut sedge
Dactylis glomerata	Poaceae	DACGLO	non-native	0	3	grass	perennial	orchard grass
Daucus carota	Apiaceae	DAUCAR	non-native	0	5	forb	biennial	queen-annes-lace

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Desmodium perplexum; d. paniculatum	Fabaceae	DESPER	native	5	5	forb	perennial	tick-trefoil
Dianthus armeria	Caryophyllaceae	DIAARM	non-native	0	5	forb	annual	deptford pink
Dichanthelium implicatum; panicum i.	Poaceae	DICIMP	native	3	0	grass	perennial	panic grass
Dipsacus fullonum	Dipsacaceae	DIPFUL	non-native	0	3	forb	perennial	wild teasel
Echinochloa muricata	Poaceae	ECHMUR	native	1	-5	grass	annual	barnyard grass
Echinochloa walteri	Poaceae	ECHWAL	native	7	-5	grass	annual	salt-marsh cockspur grass
Elaeagnus umbellata	Elaeagnaceae	ELAUMB	non-native	0	3	shrub	perennial	autumn-olive
Elymus hystrix; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epilobium coloratum	Onagraceae	EPICOL	native	3	-5	forb	perennial	cinnamon willow-herb
Erechtites hieraciifolius	Asteraceae	EREHIE	native	2	3	forb	annual	fireweed
Erigeron philadelphicus	Asteraceae	ERIPHI	native	2	0	forb	perennial	philadelphia fleabane
Erigeron strigosus	Asteraceae	ERISTR	native	4	3	forb	perennial	daisy fleabane
Eupatorium altissimum	Asteraceae	EUPALT	non-native	0	5	forb	perennial	tall boneset
Eupatorium perfoliatum	Asteraceae	EUPPER	native	4	-3	forb	perennial	boneset
Euphorbia serpens	Euphorbiaceae	EUPSER	non-native	0	-3	forb	annual	spurge
Euthamia graminifolia	Asteraceae	EUTGRA	native	3	0	forb	perennial	grass-leaved goldenrod
Fallopia japonica; polygonum cuspidatum	Polygonaceae	FALJAP	non-native	0	3	forb	perennial	japanese knotweed
Festuca subverticillata; f. obtusa	Poaceae	FESSUB	native	5	3	grass	perennial	nodding fescue
Fragaria virginiana	Rosaceae	FRAVIR	native	2	3	forb	perennial	wild strawberry
Frangula alnus; rhamnus frangula	Rhamnaceae	FRAALN	non-native	0	0	shrub	perennial	glossy buckthorn
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium aparine	Rubiaceae	GALAPA	native	0	3	forb	annual	annual bedstraw
Galium asprellum	Rubiaceae	GALASP	native	5	-5	vine	perennial	rough bedstraw
Galium obtusum	Rubiaceae	GALOBT	native	5	-3	forb	perennial	wild madder
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum aleppicum	Rosaceae	GEUALE	native	3	0	forb	perennial	yellow avens
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hieracium caespitosum	Asteraceae	HIECAE	non-native	0	5	forb	perennial	king devil

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Hordeum jubatum	Poaceae	HORJUB	non-native	0	0	grass	perennial	squirrel-tail grass
Hypericum punctatum	Hypericaceae	HYPPUN	native	4	0	forb	perennial	spotted st. johns-wort
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Iris pseudacorus	Iridaceae	IRIPSE	non-native	0	-5	forb	perennial	yellow flag
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut
Juncus effusus	Juncaceae	JUNEFF	native	3	-5	forb	perennial	soft-stemmed rush
Juncus tenuis	Juncaceae	JUNTEN	native	1	0	forb	perennial	path rush
Juncus torreyi	Juncaceae	JUNTOR	native	4	-3	forb	perennial	torreys rush
Lactuca biennis	Asteraceae	LACBIE	native	2	0	forb	biennial	tall blue lettuce
Leersia oryzoides	Poaceae	LEEORY	native	3	-5	grass	perennial	cut grass
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass
Lemna minor	Araceae	LEMMIN	native	5	-5	forb	perennial	common duckweed
Leonurus cardiaca	Lamiaceae	LEOCAR	non-native	0	5	forb	perennial	motherwort
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet
Lobelia siphilitica	Campanulaceae	LOBSIP	native	4	-3	forb	perennial	great blue lobelia
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Lonicera morrowii	Caprifoliaceae	LONMOR	non-native	0	3	shrub	perennial	morrow honeysuckle
Lycopus americanus	Lamiaceae	LYCAME	native	2	-5	forb	perennial	common water horehound
Lycopus rubellus	Lamiaceae	LYCRUB	native	8	-5	forb	perennial	stalked water horehound
Lycopus uniflorus	Lamiaceae	LYCUNI	native	2	-5	forb	perennial	northern bugle weed
Lysimachia thyrsiflora	Myrsinaceae	LYSTHY	native	6	-5	forb	perennial	tufted loosestrife
Lythrum salicaria	Lythraceae	LYTSAL	non-native	0	-5	forb	perennial	purple loosestrife
Malus pumila	Rosaceae	MALPUM	non-native	0	5	tree	perennial	apple
Medicago lupulina	Fabaceae	MEDLUP	non-native	0	3	forb	annual	black medick
Melilotus officinalis	Fabaceae	MELLOF	non-native	0	3	forb	biennial	yellow sweet-clover
Menispermum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed
Mentha spicata	Lamiaceae	MENSPI	non-native	0	-3	forb	perennial	spearmint
Mentha Ã—piperita	Lamiaceae	MENPIP	non-native	0	-5	forb	perennial	peppermint
Mimulus ringens	Phrymaceae	MIMRIN	native	5	-5	forb	perennial	monkey-flower
Monarda fistulosa	Lamiaceae	MONFIS	native	2	3	forb	perennial	wild-bergamot
Morus alba	Moraceae	MORALB	non-native	0	3	tree	perennial	white mulberry
Muhlenbergia mexicana	Poaceae	MUHMEX	native	3	-3	grass	perennial	leafy satin grass

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Oenothera biennis	Onagraceae	OENBIE	native	2	3	forb	biennial	common evening-primrose
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Panicum capillare	Poaceae	PANCAP	native	0	0	grass	annual	witch grass
Parietaria pensylvanica	Urticaceae	PARPEN	native	2	3	forb	annual	pellitory
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Penstemon digitalis	Plantaginaceae	PENDIG	native	2	0	forb	perennial	foxglove beard-tongue
Penthorum sedoides	Penthoraceae	PENSED	native	3	-5	forb	perennial	ditch stonecrop
Persicaria amphibia; polygonum a.	Polygonaceae	PERAMP	native	6	-5	forb	perennial	water smartweed
Persicaria hydropiper; polygonum h.	Polygonaceae	PERHYR	native	1	-5	forb	annual	water-pepper
Persicaria maculosa; polygonum persicaria	Polygonaceae	PERMAC	non-native	0	0	forb	annual	ladys-thumb
Persicaria punctata; polygonum p.	Polygonaceae	PERPUN	native	5	-5	forb	annual	smartweed
Persicaria sagittata; polygonum s.	Polygonaceae	PERSAG	native	5	-5	forb	annual	arrow-leaved tear-thumb
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Phragmites australis var. australis	Poaceae	PHRAUU	non-native	0	-3	grass	perennial	reed
Pilea fontana	Urticaceae	PILFON	native	5	-3	forb	annual	bog clearweed
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed
Plantago rugelii	Plantaginaceae	PLARUG	native	0	0	forb	perennial	red-stalked plantain
Poa compressa	Poaceae	POACOM	non-native	0	3	grass	perennial	canada bluegrass
Poa pratensis	Poaceae	POAPRA	non-native	0	3	grass	perennial	kentucky bluegrass
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Potentilla norvegica	Rosaceae	POTNOR	native	0	0	forb	annual	rough cinquefoil
Prunella vulgaris	Lamiaceae	PRUVUL	native	0	0	forb	perennial	self-heal
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Pycnanthemum virginianum	Lamiaceae	PYCVIR	native	5	-3	forb	perennial	common mountain mint
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Ranunculus hispidus	Ranunculaceae	RANHIS	native	5	0	forb	perennial	swamp buttercup
Ranunculus pensylvanicus	Ranunculaceae	RANPEN	native	6	-5	forb	annual	bristly crowfoot

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Ranunculus recurvatus	Ranunculaceae	RANREC	native	5	-3	forb	perennial	hooked crowfoot
Ranunculus sceleratus	Ranunculaceae	RANSCE	native	1	-5	forb	annual	cursed crowfoot
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Rhus typhina	Anacardiaceae	RHUTYP	native	2	3	shrub	perennial	staghorn sumac
Ribes americanum	Grossulariaceae	RIBAME	native	6	-3	shrub	perennial	wild black currant
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rubus allegheniensis	Rosaceae	RUBALL	native	1	3	shrub	perennial	common blackberry
Rubus occidentalis	Rosaceae	RUBOCC	native	1	5	shrub	perennial	black raspberry
Rumex obtusifolius	Polygonaceae	RUMOBT	non-native	0	0	forb	perennial	bitter dock
Rumex orbiculatus	Polygonaceae	RUMORB	native	9	-5	forb	perennial	great water dock
Sanicula marilandica	Apiaceae	SANMAR	native	4	3	forb	perennial	black snakeroot
Scirpus atrovirens	Cyperaceae	SCIATV	native	3	-5	sedge	perennial	bulrush
Scrophularia marilandica	Scrophulariaceae	SCRMAR	native	5	3	forb	perennial	late figwort
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Setaria pumila; s. glauca	Poaceae	SETPUM	non-native	0	0	grass	annual	yellow foxtail
Sisyrinchium angustifolium	Iridaceae	SISANG	native	4	0	forb	perennial	stout blue-eyed-grass
Solanum dulcamara	Solanaceae	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade
Solidago altissima	Asteraceae	SOLALT	native	1	3	forb	perennial	tall goldenrod
Solidago canadensis	Asteraceae	SOLCAN	native	1	3	forb	perennial	canada goldenrod
Sphenopholis intermedia	Poaceae	SPHINT	native	4	0	grass	perennial	slender wedgegrass
Spiranthes ovalis	Orchidaceae	SPIOVA	native	9	0	forb	perennial	oval ladies-tresses
Stachys hispida; s. tenuifolia	Lamiaceae	STAHIS	native	5	-3	forb	perennial	hedge-nettle
Symphyotrichum cordifolium; aster c.	Asteraceae	SYMCOR	native	4	5	forb	perennial	heart-leaved aster
Symphyotrichum lanceolatum; aster l.	Asteraceae	SYMLAN	native	2	-3	forb	perennial	panicled aster
Symphyotrichum lateriflorum; aster l.	Asteraceae	SYMLAT	native	2	0	forb	perennial	calico aster
Symphyotrichum novae-angliae; aster n.	Asteraceae	SYMNOV	native	3	-3	forb	perennial	new england aster
Symphyotrichum pilosum; aster p.	Asteraceae	SYMPIL	native	1	3	forb	perennial	hairy aster
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-3	forb	perennial	wood-sage
Torilis japonica	Apiaceae	TORJAP	non-native	0	3	forb	annual	hedge-parsley
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Trifolium hybridum	Fabaceae	TRIHYB	non-native	0	3	forb	perennial	alsike clover
Trifolium repens	Fabaceae	TRIREP	non-native	0	3	forb	perennial	white clover

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Typha angustifolia	Typhaceae	TYPANG	non-native	0	-5	forb	perennial	narrow-leaved cat-tail
Typha latifolia	Typhaceae	TYPLAT	native	1	-5	forb	perennial	broad-leaved cat-tail
Typha Ã—glauca	Typhaceae	TYPGLA	non-native	0	-5	forb	perennial	hybrid cat-tail
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Ulmus rubra	Ulmaceae	ULMRUB	native	2	0	tree	perennial	slippery elm
Urtica dioica	Urticaceae	URTDIO	native	1	0	forb	perennial	stinging nettle
Verbascum thapsus	Scrophulariaceae	VERTHA	non-native	0	5	forb	biennial	common mullein
Verbena hastata	Verbenaceae	VERHAS	native	4	-3	forb	perennial	blue vervain
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Vernonia missurica	Asteraceae	VERMIS	native	4	0	forb	perennial	missouri ironweed
Veronica serpyllifolia	Plantaginaceae	VERSER	non-native	0	0	forb	perennial	thyme-leaved speedwell
Viburnum lentago	Adoxaceae	VIBLEN	native	4	0	shrub	perennial	nannyberry
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash

Grosse Ile South

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Grosse Ile

Wayne
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter, Mike Penskar
Latitude:	42.114622
Longitude:	-83.154093
Weather Notes:	
Duration Notes:	
Community Type Notes:	Wet-mesic Flatwoods EO #5 EOID: 20411 (in part); inclusions of Southern Hardwood Swamp
Other Notes:	B. Slaughter 24 June 2015; Also B. Slaughter 25 June 2015; B. Slaughter and M. Penskar 21 August 2015. Also noted: Bidens sp., Prenanthes sp.

Conservatism-Based Metrics:

Total Mean C:	3.3
Native Mean C:	4.1
Total FQI:	34.1
Native FQI:	38.2
Adjusted FQI:	37
% C value 0:	21.5
% C value 1-3:	28
% C value 4-6:	40.2
% C value 7-10:	10.3
Native Tree Mean C:	4.8
Native Shrub Mean C:	5

Native Herbaceous Mean C:	3.8	
Species Richness:		
Total Species:	107	
Native Species:	87	81.30%
Non-native Species:	20	18.70%
Species Wetness:		
Mean Wetness:	-0.2	
Native Mean Wetness:	-0.7	
Physiognomy Metrics:		
Tree:	25	23.40%
Shrub:	13	12.10%
Vine:	3	2.80%
Forb:	33	30.80%
Grass:	11	10.30%
Sedge:	20	18.70%
Rush:	0	0%
Fern:	2	1.90%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	2	1.90%
Perennial:	103	96.30%
Biennial:	2	1.90%
Native Annual:	2	1.90%
Native Perennial:	84	78.50%
Native Biennial:	1	0.90%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer nigrum; a. saccharum	Sapindaceae	ACENIG	native	4	3	tree	perennial	black maple
Acer platanoides	Sapindaceae	ACEPLA	non-native	0	5	tree	perennial	norway maple

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple
Aesculus hippocastanum	Sapindaceae	AESHIP	non-native	0	5	tree	perennial	horse-chestnut
Agastache nepetoides	Lamiaceae	AGANEP	native	5	3	forb	perennial	yellow giant hyssop
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Allium canadense	Alliaceae	ALLCAN	native	4	3	forb	perennial	wild garlic
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Boehmeria cylindrica	Urticaceae	BOECYL	native	5	-5	forb	perennial	false nettle
Carex alopecoidea	Cyperaceae	CXALOP	native	3	-3	sedge	perennial	sedge
Carex blanda	Cyperaceae	CXBLAN	native	1	0	sedge	perennial	sedge
Carex bromoides	Cyperaceae	CXBROM	native	6	-3	sedge	perennial	sedge
Carex cephaloidea	Cyperaceae	CXCEPD	native	5	3	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex gracillima	Cyperaceae	CXGRAA	native	4	3	sedge	perennial	sedge
Carex granularis	Cyperaceae	CXGRAN	native	2	-3	sedge	perennial	sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge
Carex jamesii	Cyperaceae	CXJAME	native	8	5	sedge	perennial	james sedge
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge
Carex muskingumensis	Cyperaceae	CXMUSK	native	6	-5	sedge	perennial	sedge
Carex radiata; c. rosea	Cyperaceae	CXRADI	native	2	0	sedge	perennial	straight-styled wood sedge
Carex sparganioides	Cyperaceae	CXSPAR	native	5	3	sedge	perennial	sedge
Carex squarrosa	Cyperaceae	CXSQUA	native	7	-5	sedge	perennial	sedge
Carex tribuloides	Cyperaceae	CXTRIB	native	3	-3	sedge	perennial	sedge
Carex vulpinoidea	Cyperaceae	CXVULP	native	1	-5	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech
Carya cordiformis	Juglandaceae	CARCOR	native	5	0	tree	perennial	bitternut hickory
Carya glabra	Juglandaceae	CARGLA	native	5	3	tree	perennial	pignut hickory
Carya laciniosa	Juglandaceae	CARLAC	native	9	-3	tree	perennial	shellbark hickory
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Cirsium arvense	Asteraceae	CIRARV	non-native	0	3	forb	perennial	canada thistle
Cornus drummondii	Cornaceae	CORDRU	native	6	0	shrub	perennial	rough-leaved dogwood
Crataegus crus-galli; c. fontanesiana	Rosaceae	CRACRU	native	5	0	tree	perennial	cockspur thorn
Dactylis glomerata	Poaceae	DACGLO	non-native	0	3	grass	perennial	orchard grass
Dryopteris carthusiana	Dryopteridaceae	DRYCAR	native	5	-3	fern	perennial	spinulose woodfern
Elymus hystrix; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epilobium coloratum	Onagraceae	EPICOL	native	3	-5	forb	perennial	cinnamon willow-herb
Erigeron philadelphicus	Asteraceae	ERIPHI	native	2	0	forb	perennial	philadelphia fleabane
Frangula alnus; rhamnus frangula	Rhamnaceae	FRAALN	non-native	0	0	shrub	perennial	glossy buckthorn
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Gleditsia triacanthos	Fabaceae	GLETRI	native	8	0	tree	perennial	honey locust
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut
Juncus tenuis	Juncaceae	JUNTEN	native	1	0	forb	perennial	path rush
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Leersia oryzoides	Poaceae	LEEORY	native	3	-5	grass	perennial	cut grass
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet
Lindera benzoin	Lauraceae	LINBEN	native	7	-3	shrub	perennial	spicebush
Lobelia cardinalis	Campanulaceae	LOBCAR	native	7	-5	forb	perennial	cardinal-flower
Lobelia siphilitica	Campanulaceae	LOBSIP	native	4	-3	forb	perennial	great blue lobelia
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Lonicera morrowii	Caprifoliaceae	LONMOR	non-native	0	3	shrub	perennial	morrow honeysuckle
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia nummularia	Myrsinaceae	LYSNUM	non-native	0	-3	forb	perennial	moneywort
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Ostrya virginiana	Betulaceae	OSTVIR	native	5	3	tree	perennial	ironwood; hop-hornbeam
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Penthorum sedoides	Penthoraceae	PENSED	native	3	-5	forb	perennial	ditch stonecrop
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Phragmites australis var. australis	Poaceae	PHRAUU	non-native	0	-3	grass	perennial	reed
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed
Poa sylvestris	Poaceae	POASYL	native	8	0	grass	perennial	woodland bluegrass
Poa trivialis	Poaceae	POATRI	non-native	0	-3	grass	perennial	bluegrass
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Potentilla simplex	Rosaceae	POTSIM	native	2	3	forb	perennial	old-field cinquefoil
Prunella vulgaris	Lamiaceae	PRUVUL	native	0	0	forb	perennial	self-heal
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus shumardii	Fagaceae	QUESHU	native	8	-3	tree	perennial	shumard oak
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rumex obtusifolius	Polygonaceae	RUMOBT	non-native	0	0	forb	perennial	bitter dock
Rumex verticillatus	Polygonaceae	RUMVER	native	7	-5	forb	perennial	water dock
Sanicula marilandica	Apiaceae	SANMAR	native	4	3	forb	perennial	black snakeroot
Scirpus atrovirens	Cyperaceae	SCIATV	native	3	-5	sedge	perennial	bulrush
Scirpus pendulus	Cyperaceae	SCIPEN	native	3	-5	sedge	perennial	bulrush
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Sphenopholis intermedia	Poaceae	SPHINT	native	4	0	grass	perennial	slender wedgegrass
Symphoricarpos orbiculatus	Caprifoliaceae	SYMORB	non-native	0	3	shrub	perennial	coralberry
Symphyotrichum ontarionis; aster o.	Asteraceae	SYMONT	native	6	0	forb	perennial	lake ontario aster
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Viburnum lentago	Adoxaceae	VIBLEN	native	4	0	shrub	perennial	nannyberry
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Vinca minor	Apocynaceae	VINMIN	non-native	0	5	shrub	perennial	periwinkle
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash

Bird Sanctuary and Vicinity

06/25/2015

Grosse Ile

Wayne
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter
Latitude:	42.166439
Longitude:	-83.151531
Weather Notes:	
Duration Notes:	
Community Type Notes:	Wet-mesic flatwoods
Other Notes:	

Conservatism-Based Metrics:	
Total Mean C:	3
Native Mean C:	3.5
Total FQI:	24.7
Native FQI:	26.7
Adjusted FQI:	32.3
% C value 0:	16.2
% C value 1-3:	39.7
% C value 4-6:	42.6
% C value 7-10:	1.5
Native Tree Mean C:	4.1
Native Shrub Mean C:	3
Native Herbaceous Mean C:	3.3

Species Richness:		
Total Species:	68	
Native Species:	58	85.30%
Non-native Species:	10	14.70%
Species Wetness:		
Mean Wetness:	0.4	
Native Mean Wetness:	0	
Physiognomy Metrics:		
Tree:	20	29.40%
Shrub:	6	8.80%
Vine:	5	7.40%
Forb:	19	27.90%
Grass:	5	7.40%
Sedge:	13	19.10%
Rush:	0	0%
Fern:	0	0%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	1	1.50%
Perennial:	67	98.50%
Biennial:	0	0%
Native Annual:	1	1.50%
Native Perennial:	57	83.80%
Native Biennial:	0	0%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Agrimonia gryposepala	Rosaceae	AGRGRY	native	2	3	forb	perennial	tall agrimony
Allium canadense	Alliaceae	ALLCAN	native	4	3	forb	perennial	wild garlic
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Carex blanda	Cyperaceae	CXBLAN	native	1	0	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex gracillima	Cyperaceae	CXGRAA	native	4	3	sedge	perennial	sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge
Carex lacustris	Cyperaceae	CXLACU	native	6	-5	sedge	perennial	sedge
Carex muskingumensis	Cyperaceae	CXMUSK	native	6	-5	sedge	perennial	sedge
Carex radiata; c. rosea	Cyperaceae	CXRADI	native	2	0	sedge	perennial	straight-styled wood sedge
Carex sparganioides	Cyperaceae	CXSPAR	native	5	3	sedge	perennial	sedge
Carex tribuloides	Cyperaceae	CXTRIB	native	3	-3	sedge	perennial	sedge
Carex vulpinoidea	Cyperaceae	CXVULP	native	1	-5	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech
Carya cordiformis	Juglandaceae	CARCOR	native	5	0	tree	perennial	bitternut hickory
Carya glabra	Juglandaceae	CARGLA	native	5	3	tree	perennial	pignut hickory
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory
Catalpa speciosa	Bignoniaceae	CATSPE	non-native	0	3	tree	perennial	northern catalpa
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Convallaria majalis	Convallariaceae	CONMAJ	non-native	0	5	forb	perennial	lily-of-the-valley
Crataegus mollis	Rosaceae	CRAMOL	native	2	0	tree	perennial	hawthorn
Elymus hystrix; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epilobium coloratum	Onagraceae	EPICOL	native	3	-5	forb	perennial	cinnamon willow-herb
Epipactis helleborine	Orchidaceae	EPIHEL	non-native	0	0	forb	perennial	helleborine
Erigeron philadelphicus	Asteraceae	ERIPHI	native	2	0	forb	perennial	philadelphia fleabane
Euonymus fortunei	Celastraceae	EUOFOR	non-native	0	5	vine	perennial	wintercreeper
Frangula alnus; rhamnus frangula	Rhamnaceae	FRAALN	non-native	0	0	shrub	perennial	glossy buckthorn
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Galium asprellum	Rubiaceae	GALASP	native	5	-5	vine	perennial	rough bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut
Juncus tenuis	Juncaceae	JUNTEN	native	1	0	forb	perennial	path rush
Leersia oryzoides	Poaceae	LEEORY	native	3	-5	grass	perennial	cut grass
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Ostrya virginiana	Betulaceae	OSTVIR	native	5	3	tree	perennial	ironwood; hop-hornbeam
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Potentilla simplex	Rosaceae	POTSIM	native	2	3	forb	perennial	old-field cinquefoil
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus shumardii	Fagaceae	QUESHU	native	8	-3	tree	perennial	shumard oak
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Sanicula marilandica	Apiaceae	SANMAR	native	4	3	forb	perennial	black snakeroot
Scirpus pendulus	Cyperaceae	SCIPEN	native	3	-5	sedge	perennial	bulrush
Solidago altissima	Asteraceae	SOLALT	native	1	3	forb	perennial	tall goldenrod
Sphenopholis intermedia	Poaceae	SPHINT	native	4	0	grass	perennial	slender wedgegrass
Symphyotrichum ontarionis; aster o.	Asteraceae	SYMONT	native	6	0	forb	perennial	lake ontario aster
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Vinca minor	Apocynaceae	VINMIN	non-native	0	5	shrub	perennial	periwinkle
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash

Salamander Woods

08/18/2015

Oakwoods Metropark
New Boston
Wayne
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter, Mike Penskar
Latitude:	42.109599
Longitude:	-83.348348
Weather Notes:	
Duration Notes:	
Community Type Notes:	Wet-mesic flatwoods EO #1 EOID: 16728
Other Notes:	Also noted: Amelanchier sp., Prenanthes sp., Sanicula sp.

Conservatism-Based Metrics:	
Total Mean C:	3.9
Native Mean C:	4.3
Total FQI:	38.8
Native FQI:	41
Adjusted FQI:	41.2
% C value 0:	10.1
% C value 1-3:	26.3
% C value 4-6:	53.5
% C value 7-10:	10.1
Native Tree Mean C:	5
Native Shrub Mean C:	4.5
Native Herbaceous Mean C:	3.9

Species Richness:		
Total Species:	99	
Native Species:	91	91.90%
Non-native Species:	8	8.10%
Species Wetness:		
Mean Wetness:	0.3	
Native Mean Wetness:	0.2	
Physiognomy Metrics:		
Tree:	26	26.30%
Shrub:	15	15.20%
Vine:	9	9.10%
Forb:	30	30.30%
Grass:	3	3%
Sedge:	10	10.10%
Rush:	0	0%
Fern:	6	6.10%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	5	5.10%
Perennial:	94	94.90%
Biennial:	0	0%
Native Annual:	5	5.10%
Native Perennial:	86	86.90%
Native Biennial:	0	0%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name	Abundance
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple	C-A
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple	LO
Actaea pachypoda	Ranunculaceae	ACTPAC	native	7	5	forb	perennial	dolls-eyes	O
Agrimonia pubescens	Rosaceae	AGRPUB	native	5	5	forb	perennial	soft agrimony	O
Amphicarpaea bracteata	Fabaceae	AMPBRA	native	5	0	vine	annual	hog-peanut	O
Anemone quinquefolia	Ranunculaceae	ANEQUI	native	5	3	forb	perennial	wood anemone	O

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name	Abundance
Aralia nudicaulis	Araliaceae	ARANUD	native	5	3	forb	perennial	wild sarsaparilla	LC
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit	O
Athyrium filix-femina	Athyriaceae	ATHFIL	native	4	0	fern	perennial	lady fern	U-O
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry	U
Bidens frondosa	Asteraceae	BIDFRO	native	1	-3	forb	annual	common beggar-ticks	O
Boehmeria cylindrica	Urticaceae	BOECYL	native	5	-5	forb	perennial	false nettle	LC
Carex bromoides	Cyperaceae	CXBROM	native	6	-3	sedge	perennial	sedge	C
Carex crinita	Cyperaceae	CXCRIN	native	4	-5	sedge	perennial	sedge	LA
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge	O
Carex hyalinolepis	Cyperaceae	CXHYAL	native	4	-5	sedge	perennial	sedge	LA
Carex lacustris	Cyperaceae	CXLACU	native	6	-5	sedge	perennial	sedge	LA
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge	LC
Carex muskingumensis	Cyperaceae	CXMUSK	native	6	-5	sedge	perennial	sedge	O
Carex pensylvanica	Cyperaceae	CXPENS	native	4	5	sedge	perennial	sedge	U-LC
Carex rosea; c. convoluta	Cyperaceae	CXROSE	native	2	5	sedge	perennial	curly-styled wood sedge	O
Carex tribuloides	Cyperaceae	CXTRIB	native	3	-3	sedge	perennial	sedge	O
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech	C
Carya glabra	Juglandaceae	CARGLA	native	5	3	tree	perennial	pignut hickory	O
Carya laciniosa	Juglandaceae	CARLAC	native	9	-3	tree	perennial	shellbark hickory	O
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory	C
Celastrus orbiculatus	Celastraceae	CELORB	non-native	0	5	vine	perennial	oriental bittersweet	U
Cephalanthus occidentalis	Rubiaceae	CEPOCC	native	7	-5	shrub	perennial	buttonbush	LC
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass	C
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade	C
Cornus florida	Cornaceae	CORFLO	native	8	3	tree	perennial	flowering dogwood	O
Corylus americana	Betulaceae	CORAMA	native	5	3	shrub	perennial	hazelnut	U
Dryopteris carthusiana	Dryopteridaceae	DRYCAR	native	5	-3	fern	perennial	spinulose woodfern	O
Epilobium coloratum	Onagraceae	EPICOL	native	3	-5	forb	perennial	cinnamon willow-herb	O
Erechtites hieraciifolius	Asteraceae	EREHIE	native	2	3	forb	annual	fireweed	LC
Euonymus alatus	Celastraceae	EUOALA	non-native	0	5	shrub	perennial	winged euonymus	U
Frangula alnus; rhamnus frangula	Rhamnaceae	FRAALN	non-native	0	0	shrub	perennial	glossy buckthorn	O-LC
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash	O
Fraxinus nigra	Oleaceae	FRANIG	native	6	-3	tree	perennial	black ash	O-C
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash	C
Galium concinnum	Rubiaceae	GALCON	native	5	3	forb	perennial	shining bedstraw	U

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name	Abundance
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw	O
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium	C
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens	C
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass	C
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel	LC
Ilex verticillata	Aquifoliaceae	ILEVER	native	5	-3	shrub	perennial	michigan holly	O
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not	O-LC
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag	O
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut	U
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass	C
Lindera benzoin	Lauraceae	LINBEN	native	7	-3	shrub	perennial	spicebush	O
Liriodendron tulipifera	Magnoliaceae	LIRTUL	native	9	3	tree	perennial	tulip tree	U
Lonicera dioica	Caprifoliaceae	LONDIO	native	5	3	vine	perennial	red honeysuckle	U
Lycopus uniflorus	Lamiaceae	LYCUNI	native	2	-5	forb	perennial	northern bugle weed	LC
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife	C
Maianthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard	U-LC
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern	O
Osmunda cinnamomea	Osmundaceae	OSMCIN	native	5	-3	fern	perennial	cinnamon fern	U
Ostrya virginiana	Betulaceae	OSTVIR	native	5	3	tree	perennial	ironwood; hop-hornbeam	C
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper	C
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed	C
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple	O-LC
Polygonatum pubescens	Convallariaceae	POLPUB	native	5	5	forb	perennial	downy solomon seal	U
Populus alba	Salicaceae	POPALB	non-native	0	5	tree	perennial	white poplar	U
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood	C
Populus grandidentata	Salicaceae	POPGRA	native	4	3	tree	perennial	big-tooth aspen	LC-U
Potentilla simplex	Rosaceae	POTSIM	native	2	3	forb	perennial	old-field cinquefoil	U
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry	C
Prunus virginiana	Rosaceae	PRUVIR	native	2	3	shrub	perennial	choke cherry	LC
Pteridium aquilinum	Dennstaedtiaceae	PTEAQU	native	0	3	fern	perennial	bracken fern	LC
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak	O
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak	O
Quercus palustris	Fagaceae	QUEPAL	native	8	-3	tree	perennial	pin oak	U
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak	U-LC
Quercus shumardii	Fagaceae	QUESHU	native	8	-3	tree	perennial	shumard oak	O-C

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name	Abundance
Quercus velutina	Fagaceae	QUEVEL	native	6	5	tree	perennial	black oak	LO-LC
Ranunculus abortivus	Ranunculaceae	RANABO	native	0	0	forb	perennial	small-flowered buttercup	U
Ranunculus pensylvanicus	Ranunculaceae	RANPEN	native	6	-5	forb	annual	bristly crowfoot	C-O
Ribes cynosbati	Grossulariaceae	RIBCYN	native	4	3	shrub	perennial	prickly or wild gooseberry	LC
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose	O
Rubus allegheniensis	Rosaceae	RUBALL	native	1	3	shrub	perennial	common blackberry	U
Sassafras albidum	Lauraceae	SASALB	native	5	3	tree	perennial	sassafras	O
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap	O-C
Smilax hispida; s. tamnoides	Smilacaceae	SMIHIS	native	5	0	vine	perennial	bristly greenbrier	U
Solanum dulcamara	Solanaceae	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade	U
Solidago rugosa	Asteraceae	SOLRUG	native	3	0	forb	perennial	rough-leaved goldenrod	LC
Symphyotrichum lateriflorum; aster l.	Asteraceae	SYMLAT	native	2	0	forb	perennial	calico aster	C
Thelypteris noveboracensis	Thelypteridaceae	THENOV	native	5	0	fern	perennial	new york fern	U
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood	C
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy	C
Trillium grandiflorum	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium	U
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm	C
Viburnum acerifolium	Adoxaceae	VIBACE	native	6	5	shrub	perennial	maple-leaved viburnum	LC
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry	U
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet	C
Vitis aestivalis	Vitaceae	VITAES	native	6	3	vine	perennial	summer grape	O
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape	C
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash	C

Appendix 2. USDA NRCS Soil Maps for Humbug Marsh, Grosse Ile South, Grosse Ile North, and Oakwoods Metropark – Salamander Woods.


Soil Map—Wayne County Area, Michigan
(Humbug Marsh Unit, Detroit River IWR)
83° 12' 9" W
83° 10' 45" W
42° 7' 12" N
42° 5' 48" N
318000
318300
318600
318900
319200
319500
319800
4665300
4665000
4664700
4664400
4664100
4663800
4663500
4663200
4662900
Pe
BfA
Cu
Sl
MeA
GnB
ESO
SLP
ZfsabA
Mb
W
OwB
Ma
NaB
Park St
Map Scale: 1:12,500 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County Area, Michigan
Survey Area Data: Version 12, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 14, 2012—Jun 15, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Wayne County Area, Michigan (MI602)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BfA	Blount loam, Erie-Huron Lake Plain, 0 to 2 percent slopes	154.7	19.9%
Cu	Cut and fill land	72.7	9.4%
GnB	Glynwood loam, 2 to 6 percent slopes	39.4	5.1%
Ma	Made land	9.1	1.2%
Mb	Marsh	9.9	1.3%
MeA	Metamora sandy loam, 0 to 3 percent slopes	41.5	5.4%
NaB	Nappanee silt loam, 0 to 4 percent slopes	79.8	10.3%
OwB	Owosso-Morley complex, 2 to 6 percent slopes	0.9	0.1%
Pe	Pewamo loam	34.6	4.5%
Sl	Sewage lagoon	1.0	0.1%
W	Water	271.3	34.9%
ZfsabA	Ziegenfuss clay, 0 to 1 percent slopes	61.5	7.9%
Totals for Area of Interest		**776.5**	**100.0%**


Soil Map—Wayne County Area, Michigan
(Grosse Ile - South)
83° 9' 56" W
83° 8' 20" W
42° 7' 59" N
42° 6' 24" N
321100
321400
321700
322000
322300
322600
322900
323200
4666700
4666400
4666100
4665800
4665500
4665200
4664900
4664600
4664300
4664000
Hickory Dr
Grays Dr
Grosse Ile
Parkway Dr
Parke Ln
E River Rd
Frenchman Creek
5th St
Meridian
Groh
MoC
MoD
BfA
Pe
Cu
W
SLP
Map Scale: 1:14,200 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0
200
400
800
1200
Feet
0
500
1000
2000
3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
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- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County Area, Michigan
Survey Area Data: Version 12, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 14, 2012—Jun 15, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Wayne County Area, Michigan (MI602)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BfA	Blount loam, Erie-Huron Lake Plain, 0 to 2 percent slopes	715.4	68.3%
Cu	Cut and fill land	12.1	1.2%
MoC	Morley loam, 6 to 12 percent slopes	0.3	0.0%
MoD	Morley loam, 12 to 18 percent slopes	2.9	0.3%
Pe	Pewamo loam	262.1	25.0%
W	Water	54.6	5.2%
Totals for Area of Interest		**1,047.4**	**100.0%**

Soil Map—Wayne County Area, Michigan
(Grosse Ile - North)

Map Scale: 1:14,600 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 200 400 800 1200

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
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- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County Area, Michigan
Survey Area Data: Version 12, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

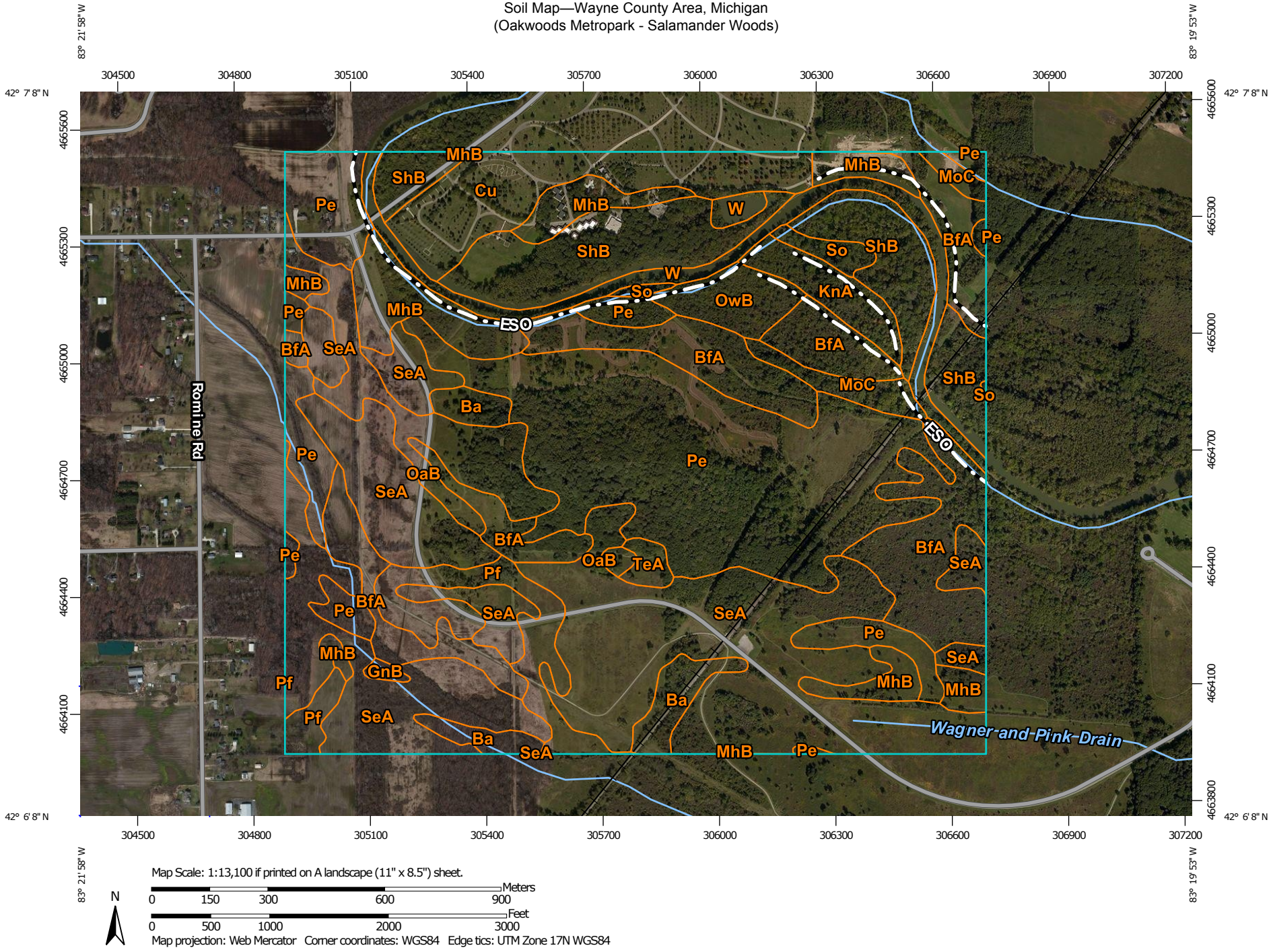
Date(s) aerial images were photographed: Mar 14, 2012—Jun 15, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Wayne County Area, Michigan (MI602)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BfA	Blount loam, Erie-Huron Lake Plain, 0 to 2 percent slopes	507.4	66.0%
GnB	Glynwood loam, 2 to 6 percent slopes	25.7	3.3%
Mb	Marsh	9.9	1.3%
MoC	Morley loam, 6 to 12 percent slopes	17.9	2.3%
Pe	Pewamo loam	73.7	9.6%
W	Water	134.7	17.5%
Totals for Area of Interest		**769.3**	**100.0%**

Soil Map—Wayne County Area, Michigan
(Oakwoods Metropark - Salamander Woods)



Map Scale: 1:13,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
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- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
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- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County Area, Michigan
Survey Area Data: Version 12, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 14, 2012—Sep 27, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Wayne County Area, Michigan (MI602)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ba	Belleville loamy fine sand	15.4	2.2%
BfA	Blount loam, Erie-Huron Lake Plain, 0 to 2 percent slopes	91.5	13.2%
Cu	Cut and fill land	35.6	5.1%
GnB	Glynwood loam, 2 to 6 percent slopes	1.0	0.2%
KnA	Kibbie fine sandy loam, 0 to 3 percent slopes	10.8	1.6%
MhB	Metea loamy sand, 2 to 6 percent slopes	39.7	5.7%
MoC	Morley loam, 6 to 12 percent slopes	8.8	1.3%
OaB	Oakville fine sand, 0 to 6 percent slopes	28.1	4.1%
OwB	Owosso-Morley complex, 2 to 6 percent slopes	11.0	1.6%
Pe	Pewamo loam	153.1	22.1%
Pf	Pewamo clay loam	24.9	3.6%
SeA	Selfridge loamy sand, 0 to 3 percent slopes	178.3	25.7%
ShB	Shoals silt loam	64.8	9.4%
So	Sloan silt loam, wet	4.6	0.7%
TeA	Tedrow loamy fine sand, 0 to 2 percent slopes	3.0	0.4%
W	Water	22.6	3.3%
Totals for Area of Interest		**693.3**	**100.0%**

Appendix 3. Summary List of Vascular Plants Documented at Humbug Marsh, Grosse Ile South, Grosse Ile Parkway, Grosse Ile North, and Oakwoods Metropark – Salamander Woods.

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Acalypha rhomboidea	three-seeded mercury		•			
Acer negundo	box-elder		•			
Acer nigrum	black maple			•		
Acer platanoides	norway maple				•	
Acer rubrum	red maple	•		•		•
Acer saccharinum	silver maple	•	•	•	•	•
Acer saccharum	sugar maple			•	•	•
Achillea millefolium	yarrow		•			
Actaea pachypoda	dolls-eyes	•				
Aesculus hippocastanum	horse-chestnut				•	
Agastache nepetoides	yellow giant hyssop		•		•	
Agrimonia gryposepala	tall agrimony		•			•
Agrimonia parviflora	swamp agrimony		•			
Agrimonia pubescens	soft agrimony	•				
Agrostis gigantea	redtop		•			
Alisma subcordatum	southern water-plantain		•			
Alliaria petiolata	garlic mustard		•		•	
Allium canadense	wild garlic			•	•	•
Ambrosia artemisiifolia	common ragweed		•			
Amphicarpaea bracteata	hog-peanut	•				
Anemone canadensis	canada anemone		•			
Anemone quinquefolia	wood anemone	•	•			
Apocynum androsaemifolium	spreading dogbane		•			
Apocynum cannabinum	indian-hemp		•			
Aralia nudicaulis	wild sarsaparilla	•				
Arctium minus	common burdock		•			
Arisaema triphyllum	jack-in-the-pulpit	•		•	•	•
Asclepias incarnata	swamp milkweed		•			
Asclepias syriaca	common milkweed		•			

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Athyrium filix-femina	lady fern	•	•			
Barbarea vulgaris	yellow rocket		•			
Berberis thunbergii	japanese barberry	•	•	•		•
Bidens discoidea	swamp beggar-ticks		•			
Bidens frondosa	common beggar-ticks	•				
Boehmeria cylindrica	false nettle	•	•	•		
Bolboschoenus fluviatilis	bulrush		•			
Calamagrostis canadensis	blue-joint		•			
Carex alopecoidea	sedge		•	•	•	
Carex blanda	sedge		•	•		•
Carex bromoides	sedge	•	•	•		
Carex brunnescens	sedge		•			
Carex cephaloidea	sedge			•		
Carex cephalophora	sedge		•			
Carex crinita	sedge	•				
Carex cristatella	sedge		•	•	•	•
Carex gracillima	sedge		•	•		•
Carex granularis	sedge		•	•	•	
Carex grayi	sedge			•		•
Carex grisea	sedge		•	•	•	•
Carex hirtifolia	sedge	•		•		•
Carex hyalinolepis	sedge	•	•			
Carex jamesii	james sedge		•		•	
Carex lacustris	sedge	•	•			•
Carex lupulina	sedge	•	•		•	
Carex molesta	sedge		•			
Carex muskingumensis	sedge	•		•	•	•
Carex pellita	sedge		•			
Carex pensylvanica	sedge	•				
Carex radiata	straight-styled wood sedge		•	•		•
Carex rosea	curly-styled wood sedge	•				
Carex sparganioides	sedge			•		•
Carex squarrosa (SC)	sedge			•	•	
Carex stipata	sedge		•			
Carex stricta	sedge		•			
Carex tenera	sedge		•			

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Carex tribuloides	sedge	•	•	•	•	•
Carex trichocarpa (SC)	hairy-fruited sedge		•			
Carex vulpinoidea	sedge		•	•	•	•
Carpinus caroliniana	blue-beech	•		•		•
Carya cordiformis	bitternut hickory			•	•	•
Carya glabra	pignut hickory	•			•	•
Carya laciniosa	shellbark hickory	•	•	•		
Carya ovata	shagbark hickory	•	•	•	•	•
Catalpa speciosa	northern catalpa		•			•
Celastrus orbiculatus	oriental bittersweet	•				
Celtis occidentalis	hackberry		•		•	•
Cephalanthus occidentalis	buttonbush	•	•			
Cerastium fontanum	mouse-ear chickweed		•			
Cichorium intybus	chicory		•			
Cinna arundinacea	wood reedgrass	•	•	•		
Circaea canadensis	enchanters-nightshade	•	•	•		•
Cirsium arvense	canada thistle		•		•	
Cirsium discolor	pasture thistle		•			
Cirsium vulgare	bull thistle		•			
Clematis virginiana	virgins bower		•			
Convallaria majalis	lily-of-the-valley					•
Conyza canadensis	horseweed		•			
Cornus drummondii	rough-leaved dogwood		•	•	•	
Cornus florida	flowering dogwood	•				
Cornus foemina	gray dogwood		•			
Corylus americana	hazelnut	•				
Crataegus crus-galli	cockspur thorn			•		
Crataegus mollis	hawthorn		•			•
Cyperus strigosus	long scaled nut sedge		•			
Dactylis glomerata	orchard grass		•		•	

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Daucus carota	queen-annes-lace		•			
Desmodium perplexum	tick-trefoil		•			
Dianthus armeria	deptford pink		•			
Dichanthelium implicatum	panic grass		•			
Dipsacus fullonum	wild teasel		•			
Dryopteris carthusiana	spinulose woodfern	•		•		
Echinochloa muricata	barnyard grass		•			
Echinochloa walteri	salt-marsh cockspur grass		•			
Elaeagnus umbellata	autumn-olive		•			
Elymus hystrix	bottlebrush grass		•	•	•	•
Elymus virginicus	virginia wild-rye		•	•	•	•
Epilobium coloratum	cinnamon willow-herb	•	•	•		•
Epipactis helleborine	helleborine					•
Erechtites hieraciifolius	fireweed	•	•			
Erigeron philadelphicus	philadelphia fleabane		•	•	•	•
Erigeron strigosus	daisy fleabane		•			
Euonymus alatus	winged euonymus	•				
Euonymus fortunei	wintercreeper					•
Eupatorium altissimum	tall boneset		•			
Eupatorium perfoliatum	boneset		•			
Euphorbia serpens	spurge		•			
Euthamia graminifolia	grass-leaved goldenrod		•			
Fallopia japonica	japanese knotweed		•			
Festuca subverticillata	nodding fescue		•			
Fragaria virginiana	wild strawberry		•			
Frangula alnus; rhamnus frangula	glossy buckthorn	•	•	•	•	•
Fraxinus americana	white ash	•	•			
Fraxinus nigra	black ash	•				

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Fraxinus pennsylvanica	red ash	•	•	•	•	•
Galium aparine	annual bedstraw		•			
Galium asprellum	rough bedstraw		•			•
Galium concinnum	shining bedstraw	•				
Galium obtusum	wild madder		•			
Galium triflorum	fragrant bedstraw	•	•			
Geranium maculatum	wild geranium	•	•	•		•
Geum aleppicum	yellow avens		•			
Geum canadense	white avens	•	•	•	•	•
Gleditsia triacanthos	honey locust				•	
Glyceria striata	fowl manna grass	•	•	•	•	•
Hackelia virginiana	beggars lice		•	•	•	
Hamamelis virginiana	witch-hazel	•				
Hieracium caespitosum	king devil		•			
Hordeum jubatum	squirrel-tail grass		•			
Hypericum punctatum	spotted st. johns-wort		•			
Ilex verticillata	michigan holly	•				
Impatiens capensis	spotted touch-me-not	•	•	•	•	•
Iris pseudacorus	yellow flag		•			
Iris virginica	southern blue flag	•	•			
Juglans nigra	black walnut	•	•	•	•	•
Juncus effusus	soft-stemmed rush		•			
Juncus tenuis	path rush		•	•	•	•
Juncus torreyi	torreys rush		•			
Lactuca biennis	tall blue lettuce		•			
Laportea canadensis	wood nettle			•	•	
Leersia oryzoides	cut grass		•	•		•
Leersia virginica	white grass	•	•			
Lemna minor	common duckweed		•			
Leonurus cardiaca	motherwort		•			
Ligustrum vulgare	common privet		•	•	•	
Lindera benzoin	spicebush	•			•	

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Liriodendron tulipifera	tulip tree	•				
Lobelia cardinalis	cardinal-flower			•		
Lobelia siphilitica	great blue lobelia		•	•		
Lonicera dioica	red honeysuckle	•				
Lonicera maackii	amur honeysuckle		•		•	•
Lonicera morrowii	morrow honeysuckle		•	•	•	
Lycopus americanus	common water horehound		•			
Lycopus rubellus	stalked water horehound		•			
Lycopus uniflorus	northern bugle weed	•	•			
Lysimachia ciliata	fringed loosestrife	•		•		
Lysimachia nummularia	moneywort			•	•	
Lysimachia thyrsiflora	tufted loosestrife		•			
Lythrum salicaria	purple loosestrife		•			
Maianthemum racemosum	false spikenard	•				
Malus pumila	apple		•			
Medicago lupulina	black medick		•			
Melilotus officinalis	yellow sweet-clover		•			
Menispermum canadense	moonseed		•			
Mentha xpiperita	peppermint		•			
Mentha spicata	spearmint		•			
Mimulus ringens	monkey-flower		•			
Monarda fistulosa	wild-bergamot		•			
Morus alba	white mulberry		•			
Muhlenbergia mexicana	leafy satin grass		•			
Oenothera biennis	common evening-primrose		•			
Onoclea sensibilis	sensitive fern	•	•	•	•	

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Osmunda cinnamomea	cinnamon fern	•				
Ostrya virginiana	ironwood; hop-hornbeam	•		•	•	•
Oxalis stricta	yellow wood-sorrel		•	•	•	•
Panicum capillare	witch grass		•			
Parietaria pensylvanica	pellitory		•			
Parthenocissus quinquefolia	virginia creeper	•	•	•	•	•
Penstemon digitalis	foxglove beard-tongue		•			
Penthorum sedoides	ditch stonecrop		•	•		
Persicaria amphibia	water smartweed		•			
Persicaria hydropiper	water-pepper		•			
Persicaria maculosa	ladys-thumb		•			
Persicaria punctata	smartweed		•			
Persicaria sagittata	arrow-leaved tear-thumb		•			
Persicaria virginiana	jumpseed	•	•	•	•	•
Phalaris arundinacea	reed canary grass		•		•	
Phragmites australis var. australis	reed		•	•	•	
Pilea fontana	bog clearweed		•		•	
Pilea pumila	clearweed		•			
Plantago rugelii	red-stalked plantain		•			
Poa compressa	canada bluegrass		•			
Poa pratensis	kentucky bluegrass		•			
Poa sylvestris	woodland bluegrass				•	
Poa trivialis	bluegrass			•		
Podophyllum peltatum	may-apple	•	•	•		•
Polygonatum pubescens	downy solomon seal	•				
Populus alba	white poplar	•				
Populus deltoides	cottonwood	•	•	•	•	•

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Populus grandidentata	big-tooth aspen	•				
Potentilla norvegica	rough cinquefoil		•			
Potentilla simplex	old-field cinquefoil	•		•		•
Prunella vulgaris	self-heal		•	•	•	
Prunus serotina	wild black cherry	•	•			
Prunus virginiana	choke cherry	•				
Pteridium aquilinum	bracken fern	•				
Pycnanthemum virginianum	common mountain mint		•			
Quercus alba	white oak	•	•	•	•	•
Quercus bicolor	swamp white oak	•	•	•		
Quercus macrocarpa	bur oak		•	•	•	•
Quercus palustris	pin oak	•				
Quercus rubra	red oak	•	•			
Quercus shumardii (SC)	shumard oak	•		•	•	•
Quercus velutina	black oak	•				
Ranunculus abortivus	small-flowered buttercup	•				
Ranunculus hispidus	swamp buttercup		•			
Ranunculus pensylvanicus	bristly crowfoot	•	•			
Ranunculus recurvatus	hooked crowfoot		•			
Ranunculus sceleratus	cursed crowfoot		•			
Rhamnus cathartica	common buckthorn		•	•	•	•
Rhus typhina	staghorn sumac		•			
Ribes americanum	wild black currant		•			
Ribes cynosbati	prickly or wild gooseberry	•				
Rosa multiflora	multiflora rose	•	•	•	•	
Rubus allegheniensis	common blackberry	•	•			
Rubus occidentalis	black raspberry		•			
Rumex obtusifolius	bitter dock		•		•	
Rumex orbiculatus	great water dock		•			

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Rumex verticillatus	water dock			•		
Sanicula marilandica	black snakeroot		•	•		•
Sassafras albidum	sassafras	•				
Scirpus atrovirens	bulrush		•		•	
Scirpus pendulus	bulrush			•	•	•
Scrophularia marilandica	late figwort		•			
Scutellaria lateriflora	mad-dog skullcap	•	•	•		
Setaria pumila	yellow foxtail		•			
Sisyrinchium angustifolium	stout blue-eyed-grass		•			
Smilax hispida	bristly greenbrier	•				
Solanum dulcamara	bittersweet nightshade	•	•			
Solidago altissima	tall goldenrod		•			•
Solidago canadensis	canada goldenrod		•			
Solidago rugosa	rough-leaved goldenrod	•				
Sphenopholis intermedia	slender wedgegrass		•		•	•
Spiranthes ovalis (T)	oval ladies-tresses		•			
Stachys hispida	hedge-nettle		•			
Symphoricarpos orbiculatus	coralberry				•	
Symphyotrichum cordifolium	heart-leaved aster		•			
Symphyotrichum lanceolatum	panicled aster		•			
Symphyotrichum lateriflorum	calico aster	•	•			
Symphyotrichum novae-angliae	new england aster		•			
Symphyotrichum ontarionis	lake ontario aster			•	•	•
Symphyotrichum pilosum	hairy aster		•			
Taraxacum officinale	common dandelion		•	•	•	
Teucrium canadense	wood-sage		•			

Scientific Name	Common Name	Oakwoods Metropark-Salamander Woods	Humbug Marsh	Grosse Ile South	Grosse Ile Parkway	Grosse Ile North
Thelypteris noveboracensis	new york fern	•				
Tilia americana	basswood	•		•	•	•
Torilis japonica	hedge-parsley		•			
Toxicodendron radicans	poison-ivy	•	•	•	•	•
Trifolium hybridum	alsike clover		•			
Trifolium repens	white clover		•			
Trillium grandiflorum	common trillium	•				
Typha xglauca	hybrid cat-tail		•			
Typha angustifolia	narrow-leaved cat-tail		•			
Typha latifolia	broad-leaved cat-tail		•			
Ulmus americana	american elm	•	•	•	•	•
Ulmus rubra	slippery elm		•			
Urtica dioica	stinging nettle		•			
Verbascum thapsus	common mullein		•			
Verbena hastata	blue vervain		•			
Verbena urticifolia	white vervain			•		
Vernonia missurica	missouri ironweed		•			
Veronica serpyllifolia	thyme-leaved speedwell		•			
Viburnum acerifolium	maple-leaved viburnum	•				
Viburnum lentago	nannyberry		•		•	
Viburnum opulus	european highbush-cranberry	•			•	•
Vinca minor	periwinkle				•	•
Viola sororia	common blue violet	•	•			
Vitis aestivalis	summer grape	•				
Vitis riparia	river-bank grape	•	•	•	•	•
Zanthoxylum americanum	prickly-ash	•	•	•		•