

**Witherell Woods
Palmer Park
City of Detroit Parks Department
Ecological Management Plan**



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Ann Arbor, MI
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Overall Observations and Site Description

Witherell Woods, located within Palmer Park, is 70-acres of mesic (moist)- and dry-mesic forest, emergent marsh, vernal pools, and southern swamp. Most of the forest is dominated by an amazing canopy of oaks, hickory, and beech, reflecting the persistence of this site in a similar state going back hundreds of years. The understory and ground layer suggest a less-pristine recent past; one in which deer and invasive plant species have reduced the diversity of herbaceous and shrub species compared with what the trees likely previously sheltered.

The extensive trail network leads park users through the mixture of habitats, providing easy access throughout the site for passive recreation activities that include jogging, walking, biking, birding and plant identification. Adjacent golf and disc golf courses, and tennis and handball courts bring active users to and (in the case of the disc golf course) within the forest.

Plant surveys were conducted in May, June, and August 2023 in an effort to identify as many species as possible. During the visits, we noted 158 total species, of which 109 were native. All plants were entered into a database system developed by the Michigan Department of Natural Resources (DNR) called the Floristic Quality Index (FQI). This Floristic Quality Assessment process assigns a “coefficient of conservatism” to each native species reflecting that plant’s probability of occurring in a relatively unaltered setting. Species occurring in a wide array of settings receive low coefficients of conservatism, while those that are restricted to few habitats that are minimally disturbed receive high values. Based on the values of all plants on that site, an FQI is established.

The MDNR notes that

Most of the remaining undeveloped land registers floristic quality indices (FQI) of less than 20 and has minimal significance from a natural quality perspective. Areas with a FQI higher than 35 possess sufficient conservatism and richness that they are floristically important from a statewide perspective. Areas registering in the 50s and higher are extremely rare and represent a significant component of Michigan’s native biodiversity and natural landscapes. (Herman et al)

The [FQI](#) for Witherell Woods was calculated at 32.7 including all non-native species and 39.7 when considering only native species. These numbers are very consistent with survey results that took place in 2004 by Weatherbee’s Botanical Surveys. At that time, 109 out of 140 identified species were native. As noted above, the same number of natives were found along with 18 additional non-native species this time.

The FQI is also just one indicator of a site’s quality. It is based purely on the presence or absence of plants. As such, there are several important factors that are not considered in the FQI but that are key elements for determining a site’s overall quality. These include such things as the quantity of rare plants or invasive species present or the overall “restorability” of a site. For example, the FQI does not reflect the difference in a site with a few scattered garlic mustard plants versus a site in which half the area is dominated by garlic mustard. Likewise, the FQI does not differentiate if there is one white lady’s slipper versus one hundred. Nonetheless, the

FQI is a good starting point from which to assess the value of a natural area, especially in terms of diversity and the presence of rare species.

Other factors include:

- **Rarity of plant communities** is based on the Michigan Natural Feature Inventory's (MNFI's) statewide ranking of these communities on a statewide basis and their compilation of the global rankings.
- **Degree of invasion** reflects the extent to which a site has been colonized by weeds pernicious enough to alter site function or to disrupt the ability of native species to maintain their niches within the site.
- **Restorability** refers to the degree to which a site can return to approximate historical conditions such as expressing a high degree of plant and animal diversity and a successful level of ecosystem function. A site may be thoroughly invaded by some species but may still be easily restored because that invasive or community type is easily managed. Conversely, a site may be mildly invaded and yet be more difficult to manage because that invasive plant or community type is very difficult to manage.

More recent disturbances are reflected in treed-over dump piles along the northern strip of woods and stands of black locust and pines on the west edge, which suggest historic plantings that have begun to alter the ecology of those and adjacent regions.

Generally speaking, the degree of invasion by weedy plants is moving from the edges in, with the southern and northwestern edges hosting the most dense stands of woody invaders in the park. As with virtually all restoration efforts, management in this park from an ecological perspective, should radiate out from the most pristine areas to those that are more degraded. At this site, that means moving from the inside out.

Overall Goals and Intended Site Uses

With an old growth canopy hosting some of the largest trees in southeast Michigan, an extensive trails system, an active "Friends of" group, study sites established by local universities, a variety of sporting activities surrounding the site, and excellent restoration opportunities in adjacent meadows, Witherell Woods offers many things to a great diversity of park users. This management plan focusses on improving the ecological quality of the woods through efforts that are aimed towards increasing the overall biodiversity within the site as much as possible. Restoration of this area offers an incredible opportunity to educate park users on the benefits of native habitats and their maintenance through natural and human processes, all while increasing the biological diversity housed within.

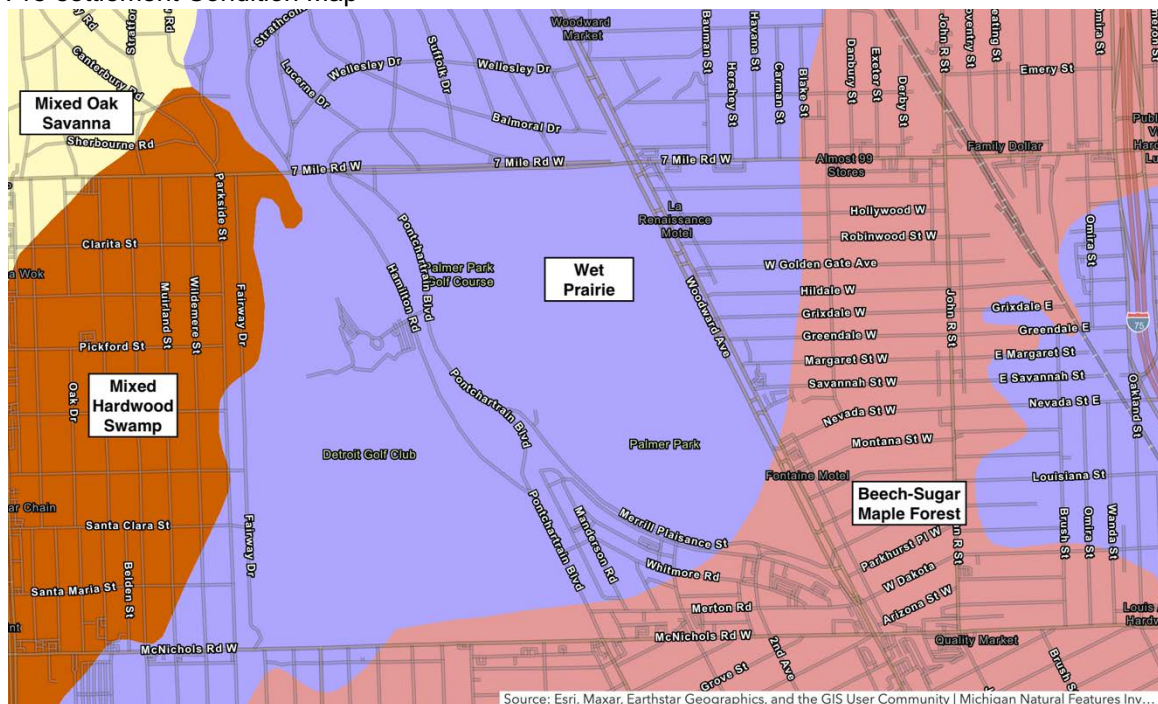
Specifically, the goals for Witherell woods are to preserve and enhance the diversity of the woodland communities already present; to preserve and enhance the wetlands as habitat for a diversity of plants and wildlife; to maintain the woods and wetlands through natural processes and stewardship by people; and to offer educational, hiking, and other recreational opportunities as appropriate for the many park users.

Pre-Settlement Condition

One of the fascinating characteristics of the wood is the significant habitat variation that occurs with only slight changes in the site's topography. 14,000 years ago, Palmer Park was on the bottom of what had been Lake Maumee. Old beach ridges ran along the lake bottom and are still present in the form of the small semi-linear rises which create the topographic relief within the woods today.

As shown in the pre-European settlement map below, Witherell Woods (and indeed, all of Palmer Park) is described as wet prairie, with beech-sugar maple, mixed hardwood swamp, and mixed oak savanna all described nearby. The wet prairie community type is a sun-loving, shade-intolerant habitat.

Pre-settlement Condition Map



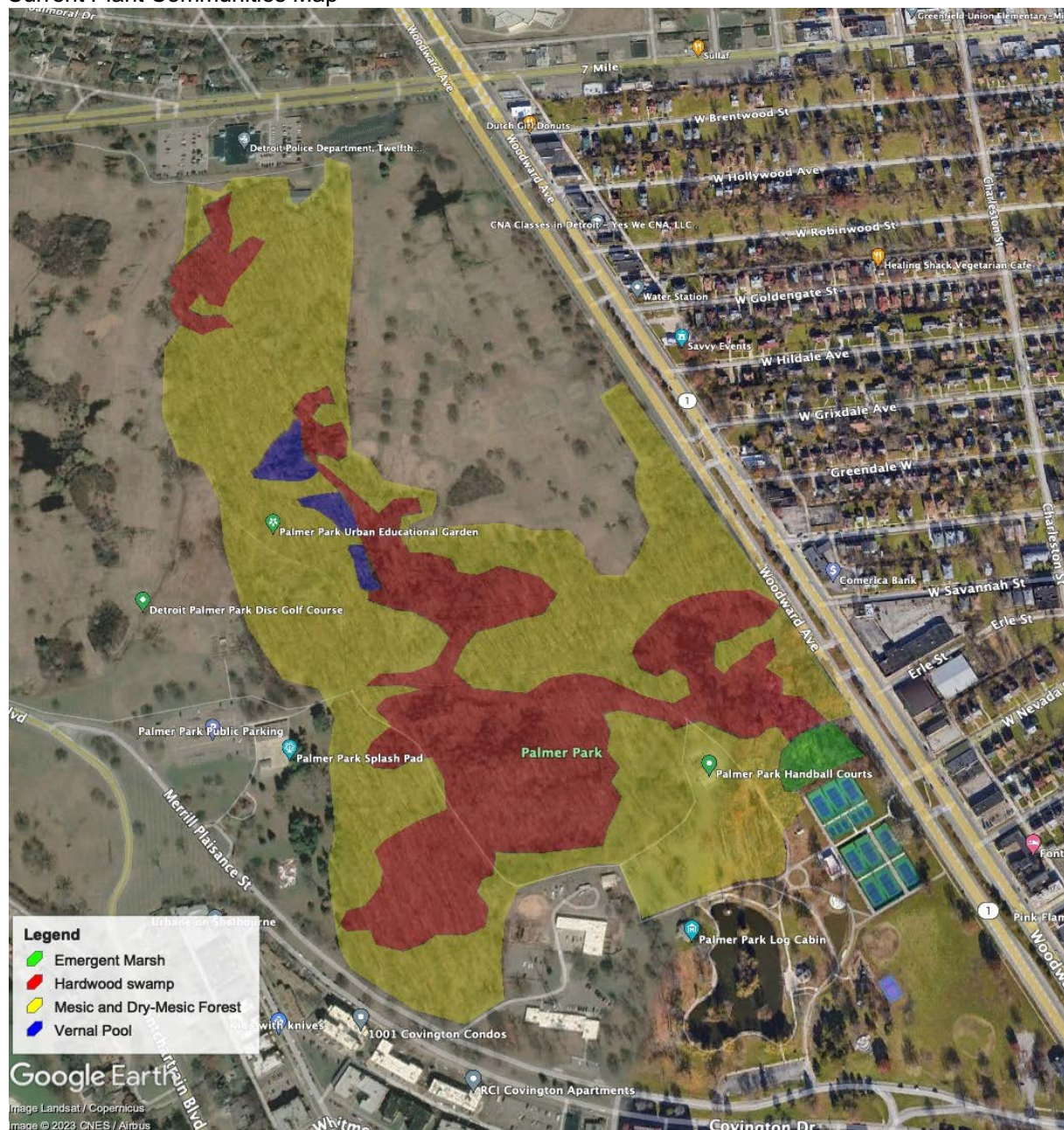
Map 1. Michigan Natural Features Inventory's pre-settlement mapping based on General Land Office survey notes (circa 1817).

As previously noted, the old-growth trees throughout the site suggest a different story than what is described in the historical mapping. Specifically, they indicate that the topographic variations within the park primarily divide the site into mesic- and dry-mesic southern forest and southern hardwood swamp, with a newer emergent marsh forming in the southeast corner of the site.

Current Plant Communities

Present-day communities are described below. Accompanying each is also a link to a more complete general community description by the Michigan Natural Features Inventory.

Current Plant Communities Map



Map 2. Current plant communities. Red polygons demarcate southern hardwood swamp; blue polygons indicate vernal pools, and green polygon shows the emergent marsh. Areas outside of these polygons are a combination of mesic southern forest (generally lower elevation) and dry-mesic southern forest (generally higher elevation).

Mesic southern forest

https://mnfi.anr.msu.edu/abstracts/ecology/Mesic_southern_forest.pdf

Characterized by beech and sugar maple canopies, this community occurs primarily on flat or rolling topography with mostly silty or loamy soils associated with former glacial lakeplains. At this site, this forest-type occupies the “middle ground” topographically between the higher and drier dry-mesic southern forest and the southern hardwood swamps below.



This large American beech tree characterizes the mesic southern forest plant community.

Dry-mesic southern forest

https://mnfi.anr.msu.edu/abstracts/ecology/Dry-Mesic_Southern_Forest.pdf

These forested areas are found on higher ground and are the most intact natural community on this site. This plant community is dominated by oaks or oaks and hickory, and dependent on frequent low-level ground fires to maintain its open condition and understory diversity. Typically found on loamy or sandy loam soils, black and white oaks are most common, with red oak on moister soils. Fire is the most important factor in preserving this community type. These forests were typically much more open prior to the 1800's, but fire suppression has allowed woody plants to encroach.

Fire provides an important service in reducing the presence of shade-tolerant trees and invasive brush that threatens to close in the forests and reduce herbaceous diversity.

Windthrow is a smaller scale disturbance that provides gaps for young oaks to succeed to the canopy and creates areas of increased sunlight for sun-loving forbs and graminoids to temporarily flourish. The herbaceous understory even under the shade of trees can be a rich tapestry of shade-tolerant wildflowers and sedges.



Native wildflowers and shrubs return following fire, while invasive red maples are discouraged, as shown following this woodland burn.

Typical invasive plant threats to biodiversity in this forest type are garlic mustard, Asian bittersweet, common buckthorn, autumn olive, shrub honeysuckles, multiflora rose, and Norway maple. While not numerous in the interior of the woods at present time, many large, mature buckthorns were observed at the woodland edges with carpets of the invaders' seedlings beneath. In addition, Norway maples have invaded the western parcel of woods.

The dry-mesic southern forest is the highest quality community on site. In particular, the western and northern portions of these woods contain the highest priority areas for restoration efforts. These woods are becoming more closed as the understory thickens. Specifically, red maples and black cherry are over-abundant and cast dense shade that inhibits oak recruitment. Invasive common and glossy buckthorn are spreading within the woods, as are privet and honeysuckle, to a lesser extent. Asian bittersweet is scattered throughout the woods. These warrant immediate attention as their tenacious nature and the difficulty of control heightens considerably as times passes.

Vernal ponds

https://mnfi.anr.msu.edu/abstracts/ecology/Vernal_Pool.pdf

Characterized by the presence of water only seasonally, vernal ponds provide critical habitat for amphibians. Fish cannot survive in ponds that lose their standing water

seasonally, and the absence of these predators allows a large diversity of salamanders, frogs and toads to reproduce.

Southern hardwood swamp

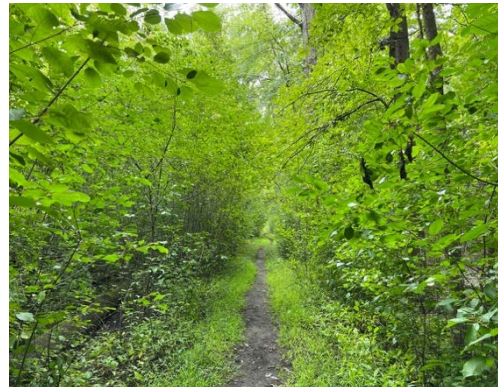
https://mnfi.anr.msu.edu/abstracts/ecology/Southern_hardwood_swamp.pdf

Historically covering less than 4% of the state and found mostly in the southern Lower Peninsula, this community types has increased by half following widespread European settlement. Several reasons account for this increase. Many were not logged, as compared to neighboring upland forests. Drainage of other wetland types and of agricultural areas flooded new zones, causing conversion to hardwood swamp. Most of the areas covered by swamp are not suitable for agriculture or residential development so they were left relatively untouched. Dominant tree species listed by the surveyors were silver maple, sycamore, hackberry and cottonwood.

Fire frequency is typically very low in swamps, making this community type susceptible to invasion by exotic shrubs, primarily glossy buckthorn. The death of ash trees in the last 25 years as a result of the emerald ash borer has created a disturbance that has allowed exotic shrubs to quickly colonize. If fire is successfully introduced to the swamp (more recent droughty autumns and springs has created conditions that would allow to fire to carry in a way that it likely didn't in the past) it will help with controlling the spread of invasive shrubs, in particular glossy buckthorn seedlings.



Many high-quality southern hardwood swamps are scattered throughout the forest.



Other areas of swamp are far more impacted by invasives such as glossy buckthorn (*Rhamnus frangula*).

Emergent marsh

<https://mnfi.anr.msu.edu/communities/description/10654/Emergent%20Marsh/>

Found in the southeast corner of this site (just north of the tennis courts), the marsh is characterized by frequent flooding, high water tables, and emergent vegetation. Fire most likely was a feature of marshes historically, but the major disturbance in this case is frequent flooding. The high water prevents establishment of woody plants and herbaceous species that cannot stand prolonged submergence, while seasonally low water allows for seed germination.

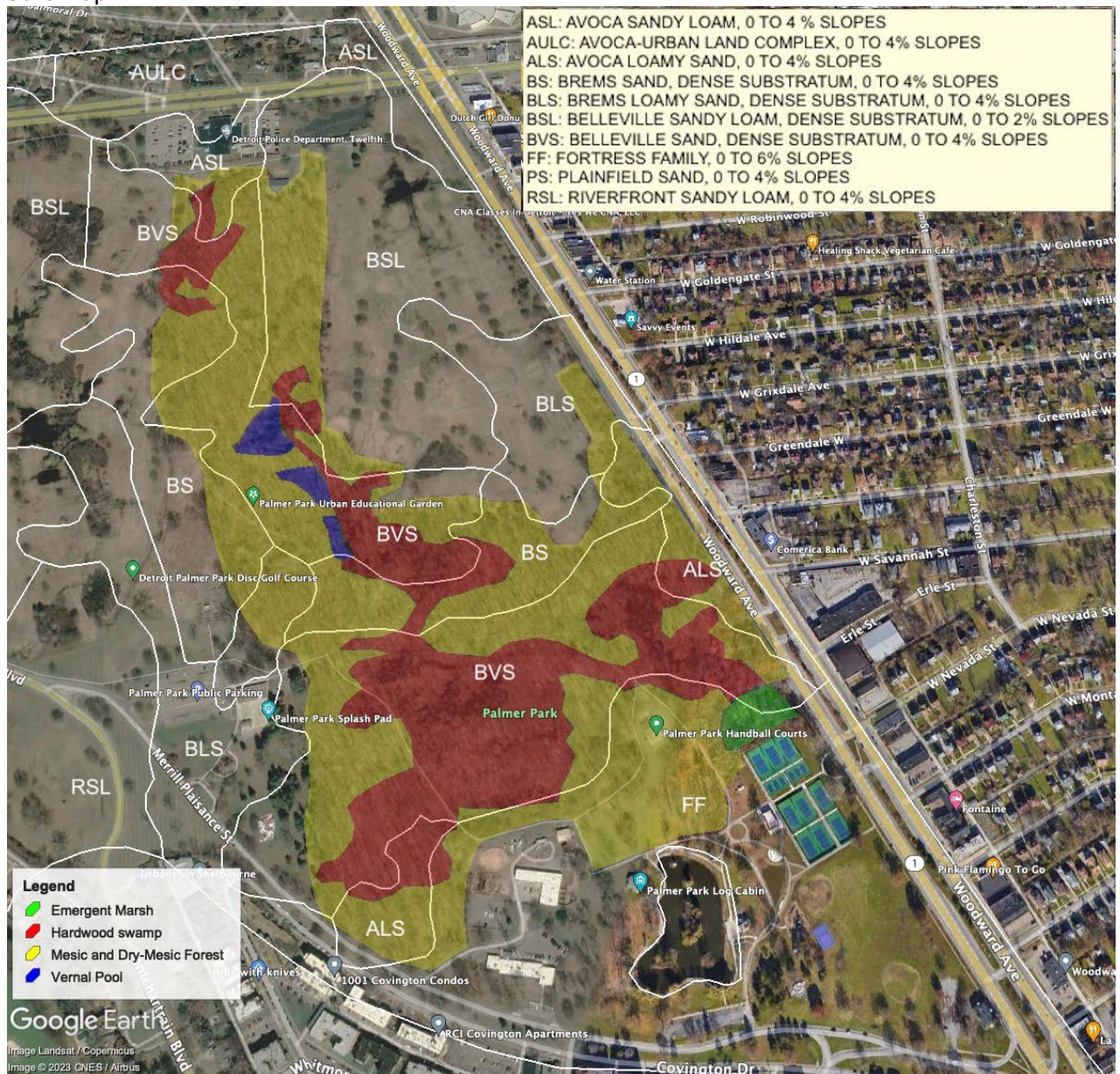


Judging from the canopy of many dead trees towering above, this particular marsh appears to have formed through altered hydrology that encouraged the accumulation of greater water depth than was here historically. Hydrologic changes may have resulted from changes to drainage adjacent to the golf course, the tennis courts, and Woodward Avenue. These changes have not only altered the canopy but the ground layer species as well. From a management standpoint, *Phragmites* and invasive narrow-leaved cattails have gained a toe-hold and should be addressed before they outcompete the native marsh vegetation.

Soils

As can be seen in the United States Department of Agriculture’s (USDA) soils series map that is overlain with the current natural plant communities of Witherell Woods, the wettest portions of the site are virtually all underlain with Belleville Sand (BVS) soils. This soil type is described as consisting “of very deep, poorly drained or very poorly drained soils formed in sandy glaciofluvial and glaciolacustrine deposits underlain by loamy glacial or lacustrine deposits at 50 to 100 cm. Belleville soils are on lake plains, till-floored lake plains, and wave-worked till plains. Slope ranges from 0 to 2 percent” ([soil description link](#)).

Soils Map



Map 3. Belleville Sand underlays virtually all of the emergent marsh community type within the woods. This soil type has the mildest slopes within the soil series.

Surrounding Land Uses

Witherell woods are surrounded by a mixture of mowed and unmowed meadows, golf, and frisbee golf courses. Adjacent unmanaged natural areas can provide safe harbor for invasives that are being managed within the woods, and a constant source of seed and vegetative invasion. Conversely, these meadows can provide the benefit of increased habitat size and diversity and offer the foundation where prairies, oak savannas and barrens could be established over time.

The woods' many users offer a great audience for education relating to native plants and biodiversity, invasive species, site management, and even water quality impacts from impervious surfaces. Such education can provide benefits for the natural areas and greater appreciation by park users. The easy access for large numbers of people nearby can cause stress to the park, but also presents an opportunity for education, volunteerism, and investment in caring for the park.

Large Scale Site Stresses

1. Lack of fire is increasing shade throughout the site. Maples are increasing in the drier, oak-dominated areas, shading out understory wildflowers and preventing young oak establishment. Fire will also greatly inhibit the spread of invasive woody plants within the forest.
2. Invasive plants such as Asian bittersweet, buckthorn (common and glossy), honeysuckle, and Norway maple are undoubtedly increasing throughout the park.
3. Heavy deer presence is almost certainly reducing the ground-layer diversity and young woody plant populations as well as oak growth from the seedling to the sapling stage.
4. While active use of the park is a main goal, the heavy use at this site should be carefully monitored and managed to prevent damage to the very natural areas that draw users here. New trail creation appears to be a concern, especially in the southeast portion of the woods, and should be monitored and discouraged.

Site Concerns and Prioritization

1. Higher and drier oak hickory woods are of the highest quality. Controlling woody invaders, as well as sweeping for garlic mustard and other herbaceous invaders is a priority here.
2. Asian bittersweet is establishing throughout the park and it should be controlled before it gets worse.
3. Mesic forested areas are adjacent to the drier oak-dominated zones and contain many of the same invasives. Management efforts should spill from uphill zones down slope.
4. Pushing management efforts into the vernal pools, swamps, and emergent marshes will further reduce the "refugia" for invasive species to move from these wetter areas into drier portions of the site.
5. *Phragmites* are expanding within the emergent marsh in the southeast. This species' control is relatively easy and will maintain good plant diversity within the marsh.

Management Actions

1. Burn all portions of the woods, targeting dry conditions to give fire the best chance to move across the lower, wetter portions of the site. A burn plan should be developed by the organization implementing the burn and should clearly identify management goals and weather parameters to target to meet those goals.
2. Control woody invaders throughout the woods. Sub-pencil-sized diameter plants will be killed with fire. Larger woody invaders should be targeted with a combination of cut stump

treatments in less invaded zones with more native trees and shrubs to maneuver around, and brush hogging/forestry mowing in densely invaded areas with few natives (such as along the southern edge of the woods along the trails). The Michigan DNR offers specific control techniques for several of these species: <https://mnfi.anr.msu.edu/invasive-species/GlossyBuckthornBCP.pdf>

3. Balance a focus on the higher-quality, less invaded central portions of the woods with stimulating park user interest with control work in high-visibility zones such as along trails and along Woodward Ave.
4. Sweep for garlic mustard and dame's rocket (another highly invasive ground cover species). This can be a great way to involve volunteers in the management process. This and other volunteer activities and locations are shown in Map 6 below.
5. **Control** Asian bittersweet throughout the park.
6. Initially, fire in the wooded areas should be timed to have maximum impact on shrubs and young maple trees. Burning two years in a row is recommended to begin with. While this may knock back spring ephemerals during the season in which the burn takes place, these plants will rebound in following seasons. Fire should be used throughout all the dry-mesic southern forest areas, as well as edges adjacent to these areas where fire will carry. Future rotations of burning every 2 to 4 years should be timed to precede spring ephemerals or occur in autumn after leaf-fall.
7. Enhancing educational opportunities relating to native plant communities and their benefits, the threats of invasive species, and the importance of staying on trails. Map 5 below offers suggested sign content and locations to enhance educational opportunities.
8. Begin restoration in adjacent old field and meadow areas by planting prairie species. The size of the target areas should be dictated by budget, with the understanding that there will be ongoing maintenance/management efforts needed into the future. Control existing vegetation through spraying. Ecologically, working on meadow zones adjacent to the woods will offer the greatest connectivity and wildlife habitat value, though this could and should be balanced with areas that may be higher visibility and therefore create higher public buy-in long-term.
9. Trail management and maintenance. Assess where trails are truly needed/desirable and close those that are duplicative or inappropriate.
10. Manage deer since they appear to be having a significant impact on the ground layer within the woodland areas. Creating "deer exclosures" (fenced zones which keep deer out) along the trails to demonstrate the impacts of deer browse may help to build public support.
11. Control woody invaders surrounding vernal ponds in an effort to improve habitat there.
12. **Control** *Phragmites* and narrow-leaved cattails in the cattail marsh at the southeast corner of the park.
13. **Control** Japanese knotweed at the edge of the woodland patch located between the former homestead and Witherell woods.
14. Control Norway maple, black locust, and tree-of-heaven where it occurs, beginning east of the main N-S trail and working west (i.e., working from the least invaded zones to the most invaded). **Note that killing these large, clonal species involves girdling or basal bark treatments while they are in place and will result in longer term hazard trees that need to be addressed through active forestry efforts.**
15. Discourage leaf-blowing by grounds crew into the woodland edges, as the consistent accumulation of this "extra" leaf litter kills what is growing there and primes that zone for

encroachment by invasives or bramble patches. Encourage chopping/composting of leaves where they fall instead.

16. In surrounding no-mow/meadow zones:
 - a. Designate areas to convert to prairie and spray these sites three to four times during the growing season.
 - b. Seed with a wildflower/grass mix in the late fall (dormant-season seeding) by broadcasting seed across these zones.
 - c. Mow twice during the following season when the growth reaches about 18”.
 - d. Spot-spray during the first growing season, targeting the most pernicious weeds (Canada thistle, crown-vetch, etc).

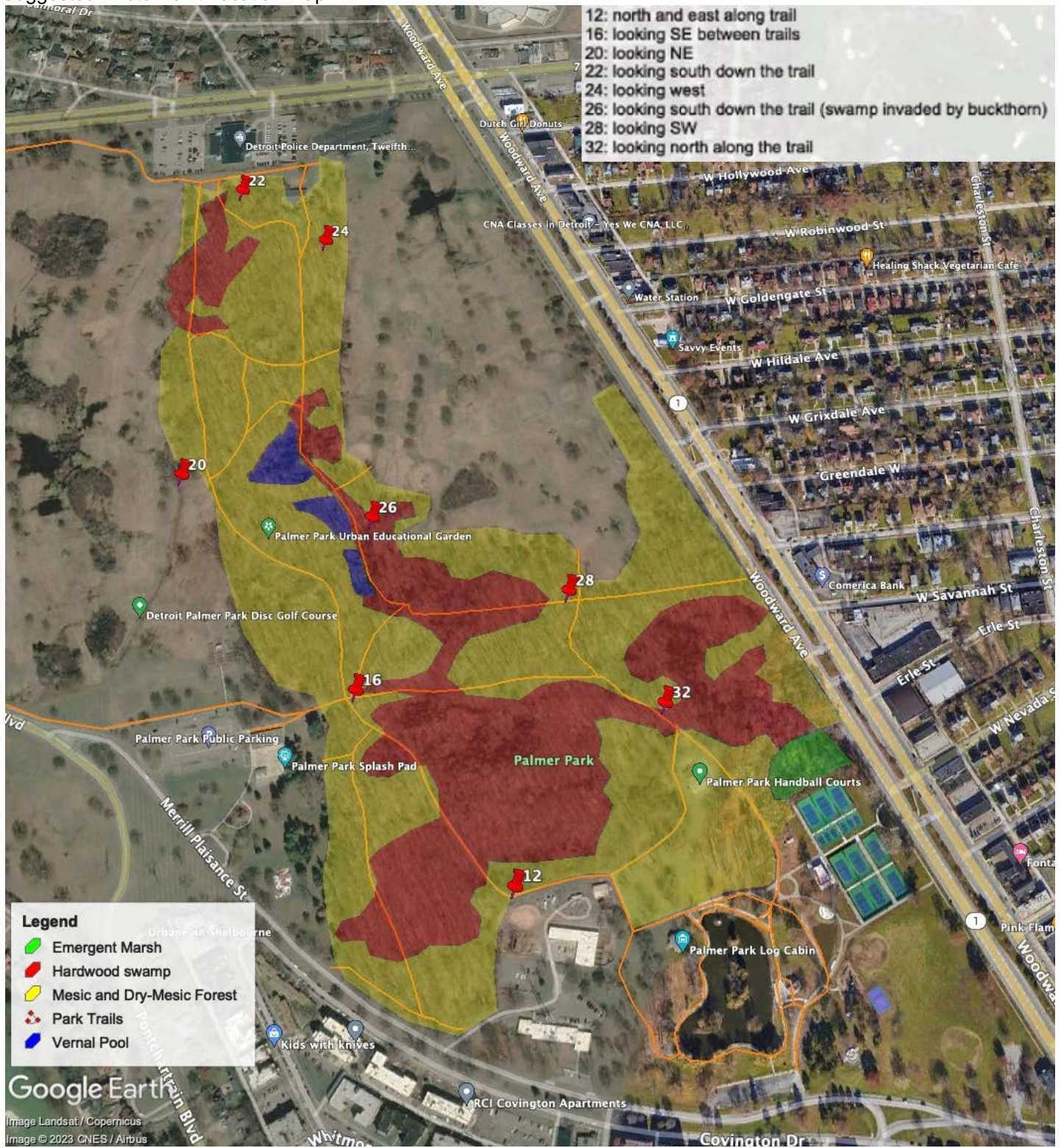
Monitoring Recommendations

1. Establish photo monitoring points at designated locations (recommended spots are shown in Map 4 below) before restoration efforts begin.
2. Establish transects at recommended locations (Map 7) and conduct species inventories on a designated timeline (TBD based on the realistic ability to return regularly to the site for this work—ideally every 1-3 years). We recommend transects be 50-100’ long with species’ presence within 5-10’ of either side of the transect being recorded; however final transect dimensions should be ultimately determined by staff/volunteer resources.
3. Create deer exclosures (deer exclusion fencing and interpretive signage) along the trail to demonstrate deer impacts in protected/unprotected zones along the trail(s).
4. Organize annual “bioblitz” events (single day efforts in which numerous plant and animal experts identify all species within a given timeframe) to create an annual snapshot of what’s present in the surveyed area and see how changes occur over time. See [iNaturalist](#) for a recommended guide for organizing and tracking data.
5. Consider using Cornell Ornithology Lab’s [Merlin app](#) on a set date range/time (seeking to replicate similar conditions) to track changes in bird populations within a designated portion of the woods.
6. Establish long-term photo monitoring of fire effects in woodlands (as shown in photo showing burned/unburned areas).



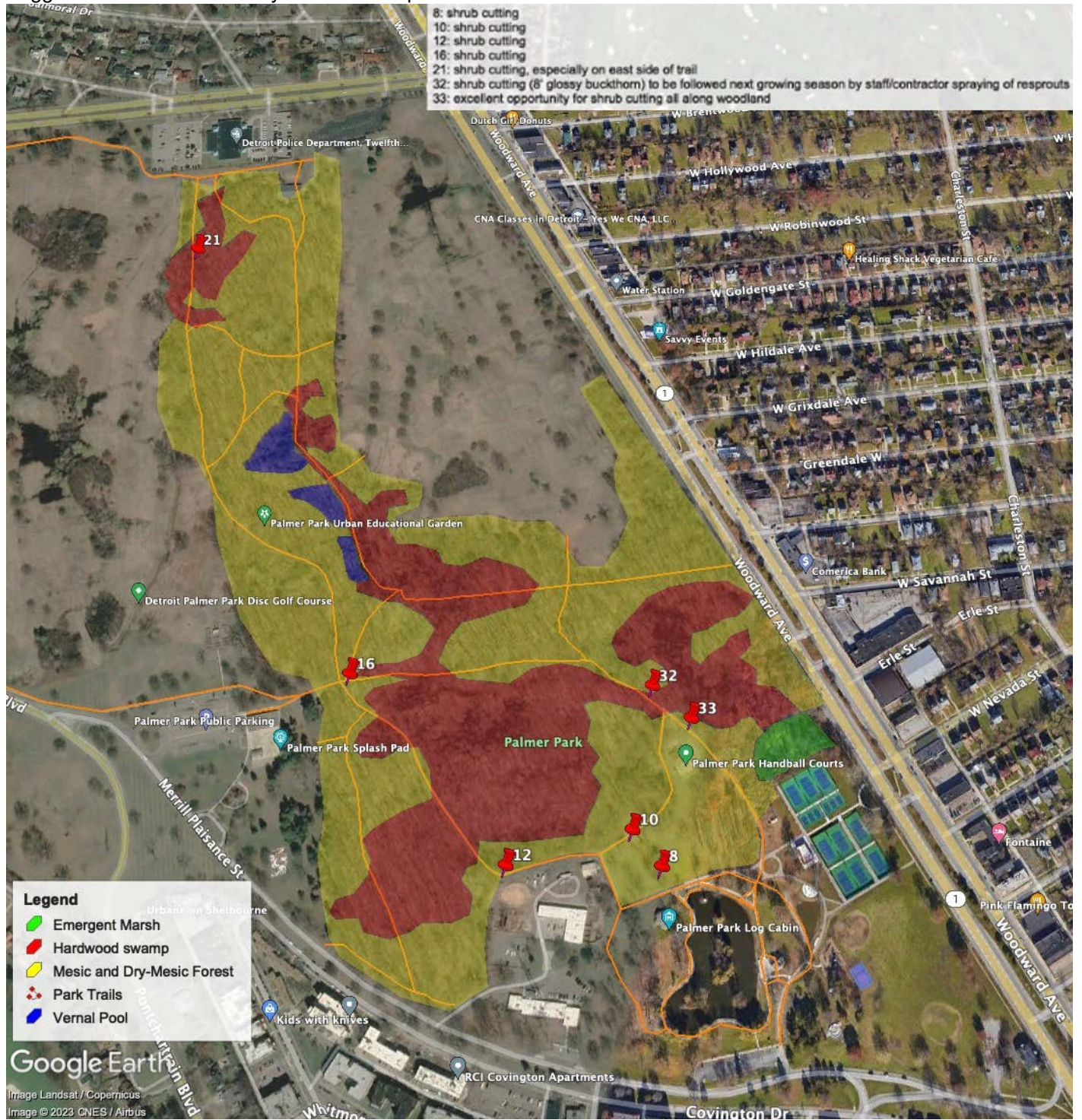
Photo monitoring image illustrates burned zone on the left and unburned on the right.

Suggested Photo Point Location Map



Map 4. Recommended photo point locations for long-term monitoring.

Suggested Volunteer Workday Locations Map



Attachment 1. Plant Inventory and Floristic Quality Assessment

Witherell Woods--Palmer Park
May 23, June 21, August 30, 2023
Palmer Park, Detroit
Detroit, MI

FQA DB Region: Michigan
FQA DB Publication Year: 2014
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.

Surveyers: David Mindell, Trenton VonKlingler, Bev Walters

Conservatism-Based Metrics:

Total Mean C:	2.6
Native Mean C:	3.8
Total FQI:	32.7
Native FQI:	39.7
Adjusted FQI:	31.6
% C value 0:	34.8
% C value 1-3:	24.7
% C value 4-6:	34.2
% C value 7-10:	6.3
Native Tree Mean C:	4.9
Native Shrub Mean C:	3.9
Native Herbaceous Mean C:	3.2

Species Richness:
Total Species: 158

Native Species:	109	69%
Non-native Species:	49	31%
Species Wetness:		
Mean Wetness:	1.3	
Native Mean Wetness:	0.8	
Physiognomy Metrics:		
Tree:	41	25.90%
Shrub:	24	15.20%
Vine:	7	4.40%
Forb:	59	37.30%
Grass:	9	5.70%
Sedge:	14	8.90%
Rush:	2	1.30%
Fern:	2	1.30%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	8	5.10%
Perennial:	144	91.10%
Biennial:	6	3.80%
Native Annual:	5	3.20%
Native Perennial:	103	65.20%
Native Biennial:	1	0.60%

Species:		Native?	C	W	Physiognom	Duration
Scientific Name	Common Name					
<i>Acalypha rhomboidea</i>	three-seeded mercury	native	0	3	forb	annual
<i>Acer negundo</i>	box-elder	native	0	0	tree	perennial

<i>Acer platanoides</i>	norway maple	non-native	0	5	tree	perennial
<i>Acer rubrum</i>	red maple	native	1	0	tree	perennial
<i>Acer saccharinum</i>	silver maple	native	2	-3	tree	perennial
<i>Aesculus glabra</i>	ohio buckeye	native	5	0	tree	perennial
<i>Ageratina altissima</i> ; eupatorium rugosum	white snakeroot	native	4	3	forb	perennial
<i>Agrostis stolonifera</i>	creeping bent	non-native	0	-3	grass	perennial
<i>Ailanthus altissima</i>	tree-of-heaven	non-native	0	5	tree	perennial
<i>Alisma triviale</i> ; a. plantago- aquatica	northern water-plantain	native	1	-5	forb	perennial
<i>Alliaria petiolata</i>	garlic mustard	non-native	0	3	forb	biennial
<i>Ambrosia artemisiifolia</i>	common ragweed	native	0	3	forb	annual
<i>Amelanchier arborea</i>	juneberry	native	4	3	tree	perennial
<i>Apocynum androsaemifolium</i>	spreading dogbane	native	3	5	forb	perennial
<i>Arctium minus</i>	common burdock	non-native	0	3	forb	biennial
<i>Arisaema triphyllum</i>	jack-in-the-pulpit	native	5	0	forb	perennial
<i>Asclepias syriaca</i>	common milkweed	native	1	5	forb	perennial
<i>Berberis thunbergii</i>	japanese barberry	non-native	0	3	shrub	perennial
<i>Bidens cernua</i>	nodding beggar-ticks	native	3	-5	forb	annual
<i>Bidens frondosa</i>	common beggar-ticks	native	1	-3	forb	annual
<i>Bromus inermis</i>	smooth brome	non-native	0	5	grass	perennial
<i>Carex blanda</i>	sedge	native	1	0	sedge	perennial
<i>Carex cristatella</i>	sedge	native	3	-3	sedge	perennial
<i>Carex digitalis</i>	sedge	native	5	5	sedge	perennial
<i>Carex gracilescens</i>	sedge	native	5	3	sedge	perennial
<i>Carex grisea</i> ; c. amphibola	sedge	native	3	0	sedge	perennial
<i>Carex lupulina</i>	sedge	native	4	-5	sedge	perennial
<i>Carex muskingumensis</i>	sedge	native	6	-5	sedge	perennial
<i>Carex pennsylvanica</i>	sedge	native	4	5	sedge	perennial

<i>Carex plantaginea</i>	sedge	native	8	5	sedge	perennial
<i>Carex radiata</i> ; <i>c. rosea</i>	straight-styled wood sedge	native	2	0	sedge	perennial
<i>Carex rosea</i> ; <i>c. convoluta</i>	curly-styled wood sedge	native	2	5	sedge	perennial
<i>Carex stipata</i>	sedge	native	1	-5	sedge	perennial
<i>Carpinus caroliniana</i>	blue-beech	native	6	0	tree	perennial
<i>Carya glabra</i>	pignut hickory	native	5	3	tree	perennial
<i>Carya ovata</i>	shagbark hickory	native	5	3	tree	perennial
<i>Catalpa speciosa</i>	northern catalpa	non-native	0	3	tree	perennial
<i>Celastrus orbiculatus</i>	oriental bittersweet	non-native	0	5	vine	perennial
<i>Celtis occidentalis</i>	hackberry	native	5	0	tree	perennial
<i>Cercis canadensis</i>	redbud	native	8	3	tree	perennial
<i>Chenopodium album</i>	lambs-quarters	non-native	0	3	forb	annual
<i>Circaea canadensis</i> ; <i>c. lutetiana</i>	enchanters-nightshade	native	2	3	forb	perennial
<i>Cirsium arvense</i>	canada thistle	non-native	0	3	forb	perennial
<i>Convallaria majalis</i>	lily-of-the-valley	non-native	0	5	forb	perennial
<i>Cornus florida</i>	flowering dogwood	native	8	3	tree	perennial
<i>Cornus foemina</i>	gray dogwood	native	1	0	shrub	perennial
<i>Crataegus crus-galli</i> ; <i>c. fontanesiana</i>	cockspur thorn	native	5	0	tree	perennial
<i>Dactylis glomerata</i>	orchard grass	non-native	0	3	grass	perennial
<i>Dicentra canadensis</i>	squirrel-corn	native	7	5	forb	perennial
<i>Doellingeria umbellata</i> ; <i>aster u.</i>	flat-topped white aster	native	5	-3	forb	perennial
<i>Elymus hystrix</i> ; <i>hystrix patula</i>	bottlebrush grass	native	5	3	grass	perennial
<i>Epilobium coloratum</i>	cinnamon willow-herb	native	3	-5	forb	perennial
<i>Erigeron annuus</i>	daisy fleabane	native	0	3	forb	biennial
<i>Euonymus europaeus</i>	spindle tree	non-native	0	5	shrub	perennial
<i>Eurybia macrophylla</i> ; <i>aster m.</i>	big-leaved aster	native	4	5	forb	perennial
<i>Fagus grandifolia</i>	american beech	native	6	3	tree	perennial

Frangula alnus; rhamnus frangula	glossy buckthorn	non-native	0	0	shrub	perennial
Fraxinus americana	white ash	native	5	3	tree	perennial
Fraxinus pennsylvanica	red ash	native	2	-3	tree	perennial
Geranium maculatum	wild geranium	native	4	3	forb	perennial
Geum canadense	white avens	native	1	0	forb	perennial
Geum urbanum	avens	non-native	0	5	forb	perennial
Gleditsia triacanthos	honey locust	native	8	0	tree	perennial
Glyceria striata	fowl manna grass	native	4	-5	grass	perennial
Hamamelis virginiana	witch-hazel	native	5	3	shrub	perennial
Hydrophyllum virginianum	virginia waterleaf	native	4	0	forb	perennial
Ilex verticillata	michigan holly	native	5	-3	shrub	perennial
Impatiens capensis	spotted touch-me-not	native	2	-3	forb	annual
Juglans nigra	black walnut	native	5	3	tree	perennial
Juncus dudleyi	dudleys rush	native	1	-3	rush	perennial
Juncus tenuis	path rush	native	1	0	rush	perennial
Ligustrum vulgare	common privet	non-native	0	3	shrub	perennial
Linaria vulgaris	butter-and-eggs	non-native	0	5	forb	perennial
Lindera benzoin	spicebush	native	7	-3	shrub	perennial
Liriodendron tulipifera	tulip tree	native	9	3	tree	perennial
Lonicera maackii	amur honeysuckle	non-native	0	5	shrub	perennial
Lysimachia ciliata	fringed loosestrife	native	4	-3	forb	perennial
Lysimachia nummularia	moneywort	non-native	0	-3	forb	perennial
Maianthemum canadense	canada mayflower	native	4	3	forb	perennial
Maianthemum racemosum; smilacina r.	false spikenard	native	5	3	forb	perennial
Medicago lupulina	black medick	non-native	0	3	forb	annual
Melilotus albus	white sweet-clover	non-native	0	3	forb	biennial
Morus alba	white mulberry	non-native	0	3	tree	perennial
Nepeta cataria	catnip	non-native	0	3	forb	perennial

<i>Nyssa sylvatica</i>	black-gum	native	9	-3	tree	perennial
<i>Onoclea sensibilis</i>	sensitive fern	native	2	-3	fern	perennial
<i>Osmunda regalis</i>	royal fern	native	5	-5	fern	perennial
<i>Ostrya virginiana</i>	ironwood; hop-hornbeam	native	5	3	tree	perennial
<i>Oxalis dillenii</i> ; <i>o. stricta</i>	common yellow wood-sorrel	native	0	3	forb	perennial
<i>Parthenocissus quinquefolia</i>	virginia creeper	native	5	3	vine	perennial
<i>Persicaria hydropiperoides</i> ; <i>polygonum h.</i>	mild water-pepper	native	5	-5	forb	perennial
<i>Persicaria maculosa</i> ; <i>polygonum persicaria</i>	lady's-thumb	non-native	0	0	forb	annual
<i>Persicaria virginiana</i> ; <i>polygonum v.</i>	jumpseed	native	4	0	forb	perennial
<i>Phleum pratense</i>	timothy	non-native	0	3	grass	perennial
<i>Phragmites australis</i> var. <i>australis</i>	reed	non-native	0	-3	grass	perennial
<i>Pinus nigra</i>	austrian pine	non-native	0	5	tree	perennial
<i>Plantago major</i>	common plantain	non-native	0	3	forb	perennial
<i>Platanus occidentalis</i>	sycamore	native	7	-3	tree	perennial
<i>Poa compressa</i>	canada bluegrass	non-native	0	3	grass	perennial
<i>Poa pratensis</i>	kentucky bluegrass	non-native	0	3	grass	perennial
<i>Podophyllum peltatum</i>	may-apple	native	3	3	forb	perennial
<i>Polygonatum biflorum</i>	solomon-seal	native	4	3	forb	perennial
<i>Populus deltoides</i>	cottonwood	native	1	0	tree	perennial
<i>Prenanthes altissima</i>	tall white lettuce	native	5	3	forb	perennial
<i>Prunella vulgaris</i>	self-heal	native	0	0	forb	perennial
<i>Prunus serotina</i>	wild black cherry	native	2	3	tree	perennial
<i>Prunus virginiana</i>	choke cherry	native	2	3	shrub	perennial
<i>Quercus alba</i>	white oak	native	5	3	tree	perennial
<i>Quercus bicolor</i>	swamp white oak	native	8	-3	tree	perennial

<i>Quercus ellipsoidalis</i> ; <i>q. coccinea</i>	hills oak	native	4	5	tree	perennial
<i>Quercus macrocarpa</i>	bur oak	native	5	3	tree	perennial
<i>Quercus rubra</i>	red oak	native	5	3	tree	perennial
<i>Quercus velutina</i>	black oak	native	6	5	tree	perennial
<i>Ranunculus recurvatus</i>	hooked crowfoot	native	5	-3	forb	perennial
<i>Rhamnus cathartica</i>	common buckthorn	non-native	0	0	tree	perennial
<i>Rhodotypos scandens</i>	Jetbead	non-native	0	5	shrub	perennial
<i>Ribes americanum</i>	wild black currant	native	6	-3	shrub	perennial
<i>Robinia pseudoacacia</i>	black locust	non-native	0	3	tree	perennial
<i>Rosa multiflora</i>	multiflora rose	non-native	0	3	shrub	perennial
<i>Rubus allegheniensis</i>	common blackberry	native	1	3	shrub	perennial
<i>Rubus occidentalis</i>	black raspberry	native	1	5	shrub	perennial
<i>Rumex crispus</i>	curly dock	non-native	0	0	forb	perennial
<i>Rumex obtusifolius</i>	bitter dock	non-native	0	0	forb	perennial
<i>Salix alba</i>	white willow	non-native	0	-3	tree	perennial
<i>Sambucus racemosa</i>	red-berried elder	native	3	3	shrub	perennial
<i>Saponaria officinalis</i>	bouncing bet	non-native	0	3	forb	perennial
<i>Sassafras albidum</i>	sassafras	native	5	3	tree	perennial
<i>Scirpus atrocinctus</i> ; <i>s. cyperinus</i>	wool-grass	native	5	-5	sedge	perennial
<i>Scirpus atrovirens</i>	bulrush	native	3	-5	sedge	perennial
<i>Scutellaria lateriflora</i>	mad-dog skullcap	native	5	-5	forb	perennial
<i>Smilax hispida</i> ; <i>s. tamnoides</i>	bristly greenbrier	native	5	0	vine	perennial
<i>Solanum dulcamara</i>	bittersweet nightshade	non-native	0	0	vine	perennial
<i>Solidago altissima</i>	tall goldenrod	native	1	3	forb	perennial
<i>Solidago caesia</i>	bluestem goldenrod	native	6	3	forb	perennial
<i>Solidago canadensis</i>	canada goldenrod	native	1	3	forb	perennial
<i>Symphotrichum urophyllum</i> ; <i>aster sagittifolius</i>	arrow-leaved aster	native	2	5	forb	perennial
<i>Taraxacum officinale</i>	common dandelion	non-native	0	3	forb	perennial

<i>Taxus canadensis</i>	yew	native	5	3	shrub	perennial
<i>Tilia americana</i>	basswood	native	5	3	tree	perennial
<i>Toxicodendron radicans</i>	poison-ivy	native	2	0	vine	perennial
<i>Tragopogon pratensis</i>	common goats beard	non-native	0	5	forb	biennial
<i>Trifolium pratense</i>	red clover	non-native	0	3	forb	perennial
<i>Typha angustifolia</i>	narrow-leaved cat-tail	non-native	0	-5	forb	perennial
<i>Ulmus americana</i>	american elm	native	1	-3	tree	perennial
<i>Ulmus pumila</i>	siberian elm	non-native	0	3	tree	perennial
<i>Urtica dioica</i>	stinging nettle	native	1	0	forb	perennial
<i>Verbascum thapsus</i>	common mullein	non-native	0	5	forb	biennial
<i>Verbena urticifolia</i>	white vervain	native	4	0	forb	perennial
<i>Viburnum acerifolium</i>	maple-leaved viburnum	native	6	5	shrub	perennial
<i>Viburnum lantana</i>	wayfaring tree	non-native	0	5	shrub	perennial
<i>Viburnum lentago</i>	nannyberry	native	4	0	shrub	perennial
<i>Viburnum opulus</i>	cranberry	non-native	0	-3	shrub	perennial
<i>Viburnum rafinesquianum</i>	downy arrow-wood	native	5	5	shrub	perennial
<i>Vinca minor</i>	periwinkle	non-native	0	5	shrub	perennial
<i>Viola sororia</i>	common blue violet	native	1	0	forb	perennial
<i>Vitis aestivalis</i>	summer grape	native	6	3	vine	perennial
<i>Vitis riparia</i>	river-bank grape	native	3	0	vine	perennial
<i>Zanthoxylum americanum</i>	prickly-ash	native	3	3	shrub	perennial