Gustav and Elizabeth Johnson Land Preserve:

Vegetation and Plant Species Inventory

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The field work and writing of this report was conducted in June and July 2014. In order to produce the report quickly, there are likely to be minor errors in facts, wording, figures, spelling, and inconsistencies in plant names. The layout and graphics are not ideal. My apologies. Comments are welcome.

It has been my pleasure to assist with the study of the Gustav and Elizabeth Johnson Land Preserve.

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Summary

The Gustav and Elizabeth Johnson Land Preserve totals over 90 acres of diverse vegetation including mature hardwood forest with small, temporary wetlands, ponds, undeveloped lakeshore, and former pasture-land with conifer groves, shrub thickets, and grassy openings. The diverse habitats harbor over 200 plant species at the site including an especially good array of forest wildflowers, ferns, grasses and sedges that are native to our Northern Mesic Hardwood Forest in Wisconsin. The site slopes gently southward toward Deer Lake and within the mature forest there is a natural draw with shallow wetlands perched along its route. A variety of plant species depend on these ephemeral wetlands. The site has a narrow corridor extending south to the lakeshore where there is a natural beach ridge with a small lagoon-pond behind it.

The most important native plant communities are the hardwood forest and the small lake beach/lake terrace communities. In Wisconsin, the upland forest community is called Mesic Northern Hardwoods. The indications of high quality are diverse tree species (red oak, red maple, basswood, sugar maple, white oak, and white pine), above-average native plant species diversity, shallow wet depression micro-habitats, lack of severe, unnatural openings, lack of deep tracks from old trails or logging roads, and lack of serious problems with invasive plants. Disturbance indicators include recent, selective logging, lack of diverse subcanopy trees and shrubs, and lack of large, decaying tree trunks on the ground. One State-listed, rare plant was found in the hardwood forest: American ginseng (Special Concern category in Wisconsin).

Overall, this forest ranks above-average for quality and ranks even higher for context. The context is the local, ecological setting. The large area of native forest has a narrow strip extending to the shoreline at Deer Lake where additional native plant communities are found. The forest is adjacent to two existing Deer Lake Conservancy tracts.

The lakeshore, beach ridge, and inter-beach wetlands are in good natural condition. While small in acreage, their ecological value is high: many plants and animals depend on this increasingly rare habitat. Also, there is a corridor of native vegetation upslope to the larger, forested portion of the site. No rare plants were found at this time in the beach-ridge habitats. Buckthorn is fairly common, robust, and has a negative impact on native shrubs and herbs yet the diversity of native plants is still good.

Management of the property as a natural area can be of benefit in many ways: 1) providing habitat for diverse native plants and wildlife, 2) as an area for quiet recreation, and 3) for protecting water quality. This is a unique and exemplary area near Deer Lake for hiking, enjoying the natural environment, bird watching, and for social gathering, history and storytelling.

Part I.

Ecological Setting

Geographic Setting

The site is located on the north shore of Deer Lake in Polk County, Wisconsin, about 5 miles east of St. Croix Falls.

Geology and Soils

Near the end of the last advance of glacial ice some 15,000 years ago (the Superior Lobe of the Laurentian Ice Sheet), numerous tunnel valleys formed at the ice margin **(Figure 1)**. Sub-glacial water under great pressure excavated the tunnels. Glacial debris carried by melt-water filled the valleys. Deer Lake is situated in one of these classic tunnel valleys. This glacial feature and its associated deposits are important in understanding the flow of subsurface groundwater in the vicinity of Deer Lake. The soil type on the large farms on flat land from the north side of this property to Centuria are silt-loams derived from glacial outwash and are primarily in the Antigo-Rosholt group **(Figure 2)**. Similar soil occurs at this site, particularly where the area of mature forest occurs (compare SaC in **Figure 3** with **Figure 5**: Northern Hardwood Forest). The east half of the site has Alban fine sandy loam soil, and interestingly, a different land use history. The soil maps do not give enough information to map subsurface hydrology.

Pre-Settlement Vegetation

The original, pre-settlement vegetation of Polk County was mostly forest in the north, central and southeast parts of the county. Forest communities were better developed where natural fire-breaks lessened fire frequency. Fire was frequent in the extreme northwest corner of Polk County on droughty, sandy soil, and in parts of southern Polk County where native prairie, brushland, prairie openings, oak savanna and oak woodland were well-established. Where fires were sporadic or patchy near lakes or on hilly terrain, there probably was a patchwork of forest and brushland in various stages of re-growth following fire. When the first Government surveyors mapped the townships and section lines in the mid 1800s, there were several categories for brushy land or early successional forest following fire: aspen-birch-pine, oak openings, or brush. **Figure 4** shows a compilation of the surveyors' notes which is our best estimate of native vegetation cover before extensive logging and farming.

Deer Lake is situated between areas of historically "sugar maple-basswood-red oak forest" and "white oak-black oak" (in this case, the surveyors were referring to northern pin oak, not the black oak of southern Wisconsin barrens). Note that "maple-birch-pine" forests were common across eastern Polk County. White pine was very likely common by Deer Lake based on the nature of the soil and microclimate.

Part II.

Present-Day Vegetation at the Site

Goal

The goal of the botanical field work was to map all vegetation cover types, describe the vegetation types, especially the high-quality areas, locate shallow wetlands that do not show up well on aerial photos, find rare or unusual plant species, and to locate invasive plants and assess their threats.

Methods

Three sites visits were made in 2014: June 22 with Jim Miller (hike potential trail routes) and two full-days of mapping and inventory, June 24 and July 9. At the site, locations were recorded with a GPS unit and later downloaded and overlayed on high-resolution, leaf-off, aerial photography (Wisc. Regional Orthophotography Consortium, 18", spring 2010). During my inventory, I made several traverses across the property after which the locations for 3 vegetation plots were established. Data were collected in a standard format used by MN and WI DNR Natural Heritage Programs (plots are called releve's). The plots were in the high-quality upland forest. Pictures were taken to document: 1) plant communities, 2) characteristic and unusual features, and 3) rare or unusual plant species. Features were later mapped with geographic information system (GIS) software. The maps in this report are slightly tilted because the aerial imagery is centered on the State of Wisconsin and, being in the northwest part of the State, the curvature is noticeable. This can be rectified but time did not permit me to do so.

Land-Use History

The two most influential non-natural, historic alterations to the native vegetation that are evident at present are past logging and past grazing. Other activities that have altered the natural ecological functioning of native plant communities include clearings for temporary logging trails, utility corridors? (underground electric?), excavation of three wetlands and associated channels, conifer plantings on former pasture-land, serious invasion of non-native shrubs on former pasture-land, and other, less important impacts on the extent, quality, and context of the remaining native vegetation.

Logging has had on-going effects in Polk County forests for more than 150 years. At this site only the most recent logging is evident (about 15-20 years ago). Numerous stumps are evenly distributed throughout the cut area. The stumps are almost all oak and mostly greater than 50cm diameter at cut height.

Farming and pasturing in Polk County has caused more permanent loss of native habitat than logging. The eastern 40% of the site is partly wooded pasture and partly non-native, pasture grasses with areas of dense, non-native shrub cover.

Note: I must clarify that I do not know the farming or land-use history of the site so I am using the words "grazing" and "former pasture-land" to refer to all the areas that

were cleared of native vegetation. Some areas might have been hay fields, cultivated land, had buildings, or used for other purposes.

Current Vegetation Cover

The results of field inventory are summarized by vegetation type and categories of native plant community quality. This a modified version of a standard method used in WI and MN (for example, the MN-DNR Minnesota Land Cover Classification System used by MN Metropolitan Council, county planning boards, and watershed districts). The categories described here are more specific owing to the detail in which this property can be mapped. **Figure 5** displays maps of the vegetation units at the site. Scientific names of plant species mentioned here are given in the plant lists at the end of this report.

Vegetation types 1-4 listed in **Table 1** contain mostly native plant communities. Field work focused on these areas and they are discussed at greater length in this report. Vegetation types 5-8 listed below are not native plant communities. The established non-native vegetation, being largely perennial, has some ecosystem benefits but it provides very little habitat for native plants and harbors large populations of invasive plants.

Table 1

List of Vegetation Descriptors for This Site

VEGETATION TYPE

1. **Northern Mesic Hardwood Forest**
2. **Shallow Wet Depressions** – inclusions in forest
3. **Open Water**
4. **Lake Beach - Ridge and Swale**
5. **Semi-natural Forest**
6. **Conifer plantings**
7. **Shrub Thicket**
8. **Grassland**

VEGETATION QUALITY

Native Plant Community (not planted; has diverse of native plant and animal species; complex ecological interactions among organisms and their environment not greatly impeded by human activities)

Semi-Natural Vegetation (planted or not; native or not; permanent plant cover that serves some ecosystem functions)

Non-Natural Vegetation – usually non-permanent plants such as row crops or timber plantations; mowed lawns

Non-Vegetated Land – impervious (eg., paved roads, buildings) or porous surfaces (eg., gravel pits, dirt trails) are common examples

Native Plant Communities

1. Northern Mesic Hardwood Forest

Vegetation Description

This is a native plant community type that occurs widely in northern Wisconsin and Minnesota. "Mesic" means medium moisture in contrast to "xeric" or dry forests and "hydric" or wet forests. Three vegetation plots (marked by GPS points) were established to record details of forest composition and structure. The plots are 20 x 20m in size. Information that is recorded includes tree height, diameter, percent cover of trees in each height stratum, a complete species list with abundance codes, and photos. The following discussion is a synthesis of this forest type at the site.

The hardwood forest at this site has a tall, mostly continuous canopy (15-20+m) of mature and sub-mature, forest-grown trees, primarily red maple, basswood, red oak and sugar maple. The amount and quality of red oak varies as red oak and white oak were recently (15-20 years ago?) selectively cut. Remaining oaks that are over 30cm dbh tend to be along the roads. Where the canopy was opened, red maple assumed dominance in the gaps and red maple and sugar maple are primarily tall, sub-canopy to emerging canopy trees. The combined maples typically contribute between 50 to 80% of the canopy cover. White oak, green ash, and white pine are present in lesser numbers.

Typical tree diameters at breast height (dbh) within the area shown in **Figure 5** are given below. In summaries, diameters fall into size brackets of 5cm increments (5-10, 10-15, and so forth) although individual trees in plots are measured to the cm.

Red maple (abundant):	18 to 42cm dbh
Sugar maple (common to abundant):	15 to 28cm dbh
Red oak (common):	18 to 38cm dbh
Basswood (common) :	17 to 36cm dbh
White oak (occasional, often edges by roads):	20 to 48cm dbh
White pine (occasional, often by roads or wetlands):	38 to 61cm dbh
Green ash (occasional):	16 to 38cm dbh
Red elm (infrequent in canopy/subcanopy):	16 to 21cm dbh

Below 10m, the forest is very open to ground level with little woody vegetation except along edges, by wetland openings, and along old trails.

5 to 10m: 2- 10% cover of slender (<12cm dbh) red maple, sugar maple, basswood, green ash, or red elm.

0.5 to 5m: 1 to 5% cover of maples, ironwood, prickly ash, or red elm (more small trees and shrubs in canopy gaps, by roads and trails, or by shallow wetlands)

0 to 0.5m: dominated by small, sugar maple seedlings. Green ash seedlings in patches near parent trees. A good variety of woody plant seedlings are present (>10 species in a 20 x20m area) but they cannot thrive because of the shade and root competition from the maples.

The herbaceous ground layer (woodland wildflowers, sedges, and grasses) in mid-summer has a generally sparse appearance. Percent cover varies from 5% to 50%.

Much of the "green" at ground level are the abundant maple seedlings. The diversity of herbaceous plants is often quite good although individual plants are small and not numerous. The strip of forest along the east margin of the property has very low herb diversity (small maple seedlings are abundant as is typical).

The most common ground layer herbs (non-woody plants) in mid-summer are lady fern, Pennsylvania sedge (*Carex pensylvanica*), *Carex pedunculata*, and enchanter's nightshade. Maidenhair fern is conspicuous and patchy. In lesser numbers but regularly encountered are spinulose shield fern, bedstraw (*Galium triflorum*), pointy-leaved tick-trefoil, jack-in-the-pulpit, blue cohosh, early meadow rue, and curly-styled star sedge (*Carex rosea*). There are no plants distinctly indicative of this community type or its quality-ranking. It is the assemblage of species and their abundance and distribution at the site that is assessed and compared to known, remaining forests of the highest natural quality in the same ecological region. The fact that over 80 plant species at this site have their primary habitat association within this unit is a good indicator of above-average quality. One rare plant was found: American ginseng. Only two small stems were seen, undoubtedly arising from the same rhizome. They will not flower this year.

The ground is uniformly covered by a thin layer of decaying leaves. The leaves are often completely absent where water from culverts and channels have removed them as well as the humus layer. The humus layer is thin throughout the forest and mineral soil is often visible at worm-cast patches. Non-native earthworms are depleting the humus. Lack of humus is likely a limiting factor in the germination, growth and vitality of forest herbs along with shade and root competition from maples.

The mesic forest that occurs on the slope down to Deer Lake is different in character than the description above. The soil is sandy in places and before settlement, it probably supported a white pine-hardwood forest. Even at present, this little fragment harbors some native plants that are commonly found on forested slopes or with white pine and are not seen elsewhere at the site: Sprengel's sedge and mountain rice-grass (*Piptatherum racemosum*). Non-natural features include a small patch of planted red pine, day lilies, burdock, and sunny edges next to neighboring beach homes.

<u>Disturbance Features</u>

The most prominent disturbance feature is the uniform and continuous distribution of cut stumps except in the strip of forest along the east side of the property. The stumps are mostly, if not all, oak. Logging trails are mostly healing although they are more evident where they followed older, existing trails. The changes to the forest caused by logging, besides the obvious reduction in oak canopy, is the loss of old trees that can naturally senesce. Old trees provide critical habitat for insects, birds, flying squirrels, bats and other animals that rely on cavities, nooks, peeling bark, etc. for nesting, roosting and feeding. In addition, old down trunks and wood are critical for forest soil maintenance. The woody debris in this forest is very limited and it is easy for water to wash the fragile humus downslope. Decaying wood is a haven for fungi and insects. A well-developed fungal community (in association with decaying wood) helps the forest soil absorb water and slow run-off.

Non-native earthworms are abundant in this forest soil as indicated by worm casts seen throughout. They are probably most responsible for the depleting the excessively thin humus layer (in addition to low amount of decaying wood and the nature of the soil and runoff).

Invasive plants are present but do not seem to be serious problem a this time in the shady areas of the forest. The non-native shrub, common buckthorn, is the most important plant to routinely watch and control. The non-native honeysuckle shrubs are only occasional in and around the forest and pose little threat to shaded areas. The native shrub, prickly ash, is present in places along old trails and is a nuisance but not a serious threat as long as there is canopy cover to shade the patches.

2. Shallow Wet Depressions.

The shallow wet depressions that occur in the native mesic hardwood forest contribute greatly to the local ecosystem diversity. They are generally too small to be mapped yet they are an important part of the quality and diversity of the forest. They were inundated numerous times during the spring and early summer this year, 2014. By the time of this inventory in late June-early July, the depressions had mostly drained and only sparse vegetation had resprouted from rhizomes or and plants germinating from seed were small. The discussion here will be brief but not because they are of little importance. Shallow wetlands do a great deal of work of slowing surface and sub-surface water movement. They provide habitat for native plants that specialize in tolerating temporary flooding, especially a variety of native sedges. These depressions do not appear to hold water long enough for frog breeding but they provide habitat for invertebrates under the moist leaves who in turn provide food for other animals. These wetlands and the gentle draws in which they occur appear to be of greater benefit in slowing water movement than the artificial ponds on the site.

Each wet depression seems to have its own character so they are not easy to characterize. Some are dominated by ferns: lady fern, interrupted fern, or sensitive fern, or have exquisite displays of maidenhair fern on the upland margin. Among the various depressions, three different species of sedges with attractive, inflated "seed pods" (perigynia) can be found: *Carex intumescens, C. lupulina,* and *C. tuckermanii*. At this site, 26 species of native plants had the shallow wet depressions as their primary habitat type. No rare plants were found in the depressions during this inventory.

The upland rim around the depressions has a different woody assemblage than in the shade of the forest. Native shrubs and small trees include ironwood, blue beech, chokecherry, downy arrow, prickly ash, and nannyberry. Trees at the margin commonly include red maple, green ash, white pine, box elder, and red elm.

There have been some unknown disturbances to one of these wetland areas based on the weedy nature of ground layer plants (mostly natives, dominated wood nettle). Perhaps this area was used as a log-landing or for equipment during logging.

There is a serious threat to the wetland margins and to the upland forest: common buckthorn. Scattered large individuals occur at the margin of every depression and they are producing fruit. Presumably, they thrive on the sunlight in these openings.

The sunlight at wetland margins also provides native shrubs with critical habitat and buckthorn crowds the limited space. The number of buckthorn plants is not large and they can be controlled.

3. Open Water

The wetlands that hold water are of two types: natural (two small examples) and artificial (three excavated ponds). The two natural wetlands are entirely different from one another. The wetland in the northwest corner of the property along 140th Avenue, is altered by the road (an unnatural steep side) but apparently natural otherwise. On its south side, the slope is fairly low-angle and this rim zone is a critical micro-habitat for native wetland plants and moisture-loving forest herbs. The open water in this pond was not covered by duckweed or algae (in contrast to the artificial ponds) in early July 2014 indicating that nutrient inputs are not excessively high.

The other natural open water area is the "lagoon" pond adjacent to Deer Lake. That will be discussed in the next section.

The three largest ponds at the site were all excavated in the past. There are associated non-natural channels, some more obvious than others. For example, at the east end of the long pond, the channel goes under the paved road and continues eastward through dense brush. The same channel or another channel continues eastward under the gravel driveway on the east side of the property. The two ponds nearest 140th Avenue receive water that flows from culverts at the road.

All three of the non-natural ponds were nearly covered or entirely covered by duckweed by July 2014 (the small species of *Lemna*, duckweed, are very difficult to identify. *L. turionifera* is probably our common, "lesser duckweed" which for years has been mistakenly called *L. minor* according to the U-MN Herbarium curator). Abundant aquatic plant growth suggests a high level of nutrient input. The margins of these wetlands lack natural, low-angle slopes and thus there is almost no microhabitat for plants such wetland sedges that can slow water movement and take up excess nutrients. In places, reed canary grass (invasive non-native) is the only wetland plant, especially at the margin of the long pond.

The ponds also have thriving individuals of buckthorn scattered along their margins limiting space for native shrubs and tree reproduction.

4. Lake Beach

The lake beach community is small but native. The sand that is pushed up by ice has created a beach ridge about 2m wide and behind the ridge (away from Deer Lake) is a small, muck-filled pond and a small, open water pond or "lagoon". There is a scruffy, disturbed aspect near the lake: shrubs are dense, trees are tilted, vines make passage difficult, and weedy patches are common on the beach ridge and at the toe of the forested slope. This is extremely common on natural lakeshores with ridges and swales and on river banks and their floodplain levees. Trees rooted in sand near the water

table are often unstable. Storms, winter ice, and animal activity injure branches and cause disturbances to the soil. Bare soil is quickly colonized by opportunists. In this setting, scruffy is typical.

A variety of interesting native plants were found in the lake beach community and no where else on the property. In the lagoon are sedges, a side-flowering rush (*Juncus effusus*), and the beautiful wild calla. On the beach ridge are bur oak, a large, old tree willow, northern pin oak, and paper birch. In the muck are fowl manna grass, lake sedge, speckled alder and at the margin, grape vines and hops vines clamber over nannyberry, prickly ash, buckthorn and high-bush cranberry.

Weedy plants include the non-natives, bittersweet nightshade (*Solanum dulcamara*), slender bluegrass (*Poa compressa*), as well as the native plant, poison ivy.

A serious threat to this area is buckthorn. Scattered large shrubs with fruit are common and crowding native shrubs and other plants.

Non-Native Plant Communities

Discussion of these areas is brief because they share the same underlying land-use history: past grazing or other farm-related activities that removed native vegetation. The fields became vegetation with plants that are quick to colonize. Dense shrub thickets hide a large portion of the ground and allow no trace of this history to be revealed. Here is where the family stories need to be told. What did the land look like in the past? Who lived and worked here?

5. Hardwood Forest – Semi-natural (former pasture)

This area at first impression has some magnificent old trees. Some sugar maples are over 80cm dbh. The trees were all open-grown, the lower limbs now shaded, dying, or fallen. The assemblage of native forest plants, however, is missing. The ground beneath was pastured or mowed long ago; the native forest plants were mostly displaced. In recent years, some native plants have returned and it is possible to restore this area. The difficulty is that the surrounding areas all have abundant invasive shrubs so any changes to the canopy (such as when the old trees eventually fall apart) is an invitation for invasives.

6. Planted Conifers – Semi-natural (former pasture)

A variety of conifers have been planted throughout units 5, 6, 7, and 8: white pine, red pine, white spruce, Norway spruce, and a few balsam fir mixed in with white spruce near 140th Avenue. Only white pine is native to this area although red pine could have occurred locally here at Deer Lake and on other areas of sandy soil in the vicinity. Almost all the red pine seen today in Polk County was planted and does not occur with a natural assemblage of native plants. At this site, very few species of native plants grow below the conifers; of those that do, some are numerous: lady fern, hog peanut, sweet-scented bedstraw, and red-berried elder. Common non-natives are burdock and bittersweet nightshade.

Some of the conifers have successfully colonized the grassland although the sod or shrub cover is generally too dense for seedlings to establish.

7. Shrub Thickets - Semi-natural (former pasture)

The dense shrub thickets are dominated by non-native honeysuckle with buckthorn scattered throughout. A few other woody trees and shrubs are present: trembling aspen, staghorn sumac, smooth sumac, prickly ash and the invasive plant, Amur maple. None are as successful as honeysuckle in this setting.

8. Grassland – Semi-natural (former pasture)

The grassland areas are dominated by smooth brome (the largest grassland area) or Canada goldenrod (among the shrub thickets on the eastern side of the property). While it is common to call grasslands "prairie" in our region, the plant assemblage here is non-native pasture grasses (smooth brome and red top, mostly). No native prairie plants were found. The dense cover of grass poses no threats. It is not clear whether the dense grasses serve to slow the invasion of non-native honeysuckle.

Part III.

Plants of Gustav and Elizabeth Johnson Preserve

Over 200 plant species were recorded while walking throughout the site and, no doubt, some were missed. The **plant lists** given at the end of this report are organized by plant family. Family names will be unfamiliar to many readers but the advantage is that similar plants are grouped together such as those in the mint family, grass family or buttercup family. Common names are not consistent and are difficult to index.

The representation of native plants is high: 164 of 206 species (42 species are not native). 84 species were found primarily in the northern hardwood forest, 38 additional species were found primarily at the forest edge, including some weedy plants that were growing in old trails. Only 18 species find the grassland as their primary habitat.

Figure 6 shows selected plants of interest. Several common plants are noted along Hungerford Road because it is easy to see some fine examples of the native forest trees including white oak, bur oak and white pine, some planted trees such as white spruce and black walnut, and many woodland wildflowers and ferns.

Part IV.

Conservation Ranking

As a result of the vegetation and plant inventory, the highest priority area for conservation is clearly the northern hardwood forest outlined in red in **Figure 7**. The hardwood forest along the east side of the property has good tree diversity but is somewhat lacking in herb diversity and is given a medium-high rank for conservation. Its value is higher if a larger area of forest to the east is combined in a conservation plan. There is little conservation value in terms of native vegetation in the areas outlined in yellow in **Figure 7** but these areas serve other ecological functions as mentioned earlier. The north-south paved drive (black line) along with its mowed margins has little value for conservation although it provides access to the memorial rock and has other values.

Part V.

Management Considerations for Native Vegetation

At the time of this report, the future of this site is uncertain, therefore only a brief outline of vegetation management considerations are given here. These are the actions that can benefit the integrity and sustained good quality of the native vegetation. Other specialists will suggest actions that benefit wildlife/birdlife, water quality, recreation, etc. Actions can have positive and negative consequences so an eye must be kept to all goals, short term and long term.

1. Plan a Hiking Trail across the site.

People who enjoy the area are more likely to help take care of the area. **Figure 8** shows a proposed hiking trail route that highlights the topography of the site, skirts some natural shallow depressions and the ponds, and has a branch that extends south to Deer Lake. The trail goes by the east end of the long pond and by the rock with the memorial plaque "Gustav and Elizabeth Johnson Preserve".

2. Invasive Plant Monitoring and Control.
Figure 9 shows invasive plants at targeted locations and in general areas for buckthorn and honeysuckle control. There will always be new invaders. The best management is regular observation.

Highest Priority: Wild parsnip requires skin protection before touching the plant.

Highest Priority: Wild chervil is a relatively new invasive along the roadsides in Polk County. There are native plants in the Carrot Family that look very much like wild chervil such as water hemlock. Make a specimen to show volunteer helpers. Collect this weed from a known location and press it flat between newspaper and dry it. It can be laminated or simply put it between clear sheets of recycled plastic. The location of wild chervil in **Figure 9** is not exact – it is along that portion of 140th Avenue.

Highest Priority: Garlic Mustard. The garlic mustard went to seed from its one 10x10m patch. It is likely that spring water washed the seed further south. Be extremely watchful of this area, and other areas, for garlic mustard. It is capable of greatly reducing the quality of the forest ground layer very quickly.

High Priority: Buckthorn. Because of the amount of this shrub, control effort should be prioritized and examples are given below. **Note:** Herbicide treatment of cut stumps is generally recommended but extreme caution must be used near wetlands. It is essential to use the correct formula near wetlands and the herbicide must be applied exactly on the cut area without excess. Neighboring plants must not be contaminated.

> **Highest Priority for buckthorn control**:
> High Priority Conservation Areas: Hardwood Forest and Lake Beach Communities along roads, margins, openings. Conduct routine treatment of plants that will

produce fruits and hand pulling of seedlings if it is possibly to completely remove the roots without causing damage to the soil or other plants. Buckthorn will invade rapidly if given sunlight and soil disturbance. This is currently available at the margins of the shallow wet depressions, along old trails and clearing, and along the margins of all the roads and driveways. If canopy gaps occur following a windstorm, for example, be watchful for existing, small buckthorn plants to grow rapidly.

Medium Priority for buckthorn control:
Along Proposed Hiking Trail and around attractive view points.
Low Priority for buckthorn control:
The least amount of effort on a routine basis should be given to the areas having the most abundant buckthorn and honeysuckle, namely, the former pasture areas. If some portion of this area warrants removal of invasive shrubs, it is critical to have a replacement plan, that is, plan which desirable plants are available to occupy the removal areas. Plant competition is critical for keeping the undesirables from re-invading. This is the a common failure of control efforts. Suggested native shrubs for sunny areas are gray dogwood, nannyberry (especially in low, moist areas), and sumac (smooth or staghorn). In addition, native tree plantings or protection (cages) for existing tree seedlings and saplings can help to provide shade in the long term and is a valuable tool for control in some places.

Notes:
Be aware of look-alikes. The best time for buckthorn identification is late fall when buckthorn is still holding its leaves after most other leaves have dropped.

Herbicides can be used in a very specific manner. Many sources of information do not stress enough the critical need to avoid contamination of the soil, other plants, yourself, and the environment. It is critical that adjacent plants remain healthy because plant competition is one of the most effective ways to keep buckthorn limited in its germination or growth. Buckthorn cannot be eradicated. It can be controlled with good observation and planning.

High Priority: Non-native Shrub Honeysuckles (*Lonicera* species)
The same recommendations given above for buckthorn apply to honeysuckle. Fortunately, there are no native honeysuckles or similar-looking shrubs that could be confused with this invasive shrub at this location. In northern WI and MN, for example, there are native honeysuckle shrubs and the native shrub, snowberry, is a look-alike. Snowberry is common in white pine-hardwood forests (and other forest types) in northern Wisconsin and Minnesota.

Medium-Low Priority: day lilies. Upslope from the lake beach area is a patch of day lilies that can be invasive and completely crowd out all other plants. Since space is precious in this location, pull or cut the plants annually, always leaving sprouts of any other species to compete with the lilies.

3. Working With Water Flowage

It is familiar to many of you reading this report that it is of great importance to the health of the Deer Lake ecosystem and all who use and enjoy the water and shoreline to learn where the water and excess nutrients come from. It is not always obvious and good observations and good data can help. For example, understanding the glacial landforms helps to understand likely routes of subsurface water movement (see **Figure 1**).

On this property, surface water movement is easily seen. **Figure 10** shows some of the routes of surface water movement. It is not complete and more details could be drawn. From a plant community point of view, there are threats to the integrity of the high-quality hardwood forest from culverts and associated sheet flow and gullying. The sediment debris and removal of humus creates ideal seed beds for invasive plants from the roadside, such as garlic mustard.

Further observation and discussion is warranted.

4. Other Management Considerations

Deer browse: in many forests in our region, there is a great impact by deer on the abundance of many native wildflowers and shrubs. Incomplete information is available to discuss the topic further.

Disturbed Land: this site does not have areas of exposed soil (except at culverts and gullies), trash, or indications of contaminants. By the lakeshore, there are old metal drums probably once used as floats. There is also old styrofoam and trash but those are very minor.

Proposed Trail: the route of the proposed trail does not appear to conflict with any known sensitive features.

Forest management in the northern hardwood forest: A let-lie policy is recommended. Trees and branches that fall should be left in place to help re-build the forest soil. Firewood cutting is not recommended for the same reason. It might be desirable to remove some red maple and sugar maple trees next to selected red oak and white oak trees in order reduce competition and to give the oaks a better chance to reach old age. Further discussion of forest management depends on the goals for this site.

Former pasture-lands with shrub thickets, grassland, and deciduous trees. These areas all have invasive shrubs in abundance in or at their margins (least in the forested area). Shading and competition by trees can help limit buckthorn and honeysuckle. Selective shrub removal around targeted, desirable, saplings and adult trees can be initiated as an experiment and modified as needed.

Former pasture-lands with planted conifers. The conifers pose no threat and are helpful in limiting high-density invasive shrub populations. As the trees mature and

senesce, it is recommended to have a plan to encourage native tree replacement and invasive plant control.

Part VI.

Suggestions for Further Study

Obtain historical aerial photos of the site.
Create a summary of the timber harvest data.
Record family history and activities related to land, water and vegetation of the site.

Part VII.

General References (* indicates references used to make maps)

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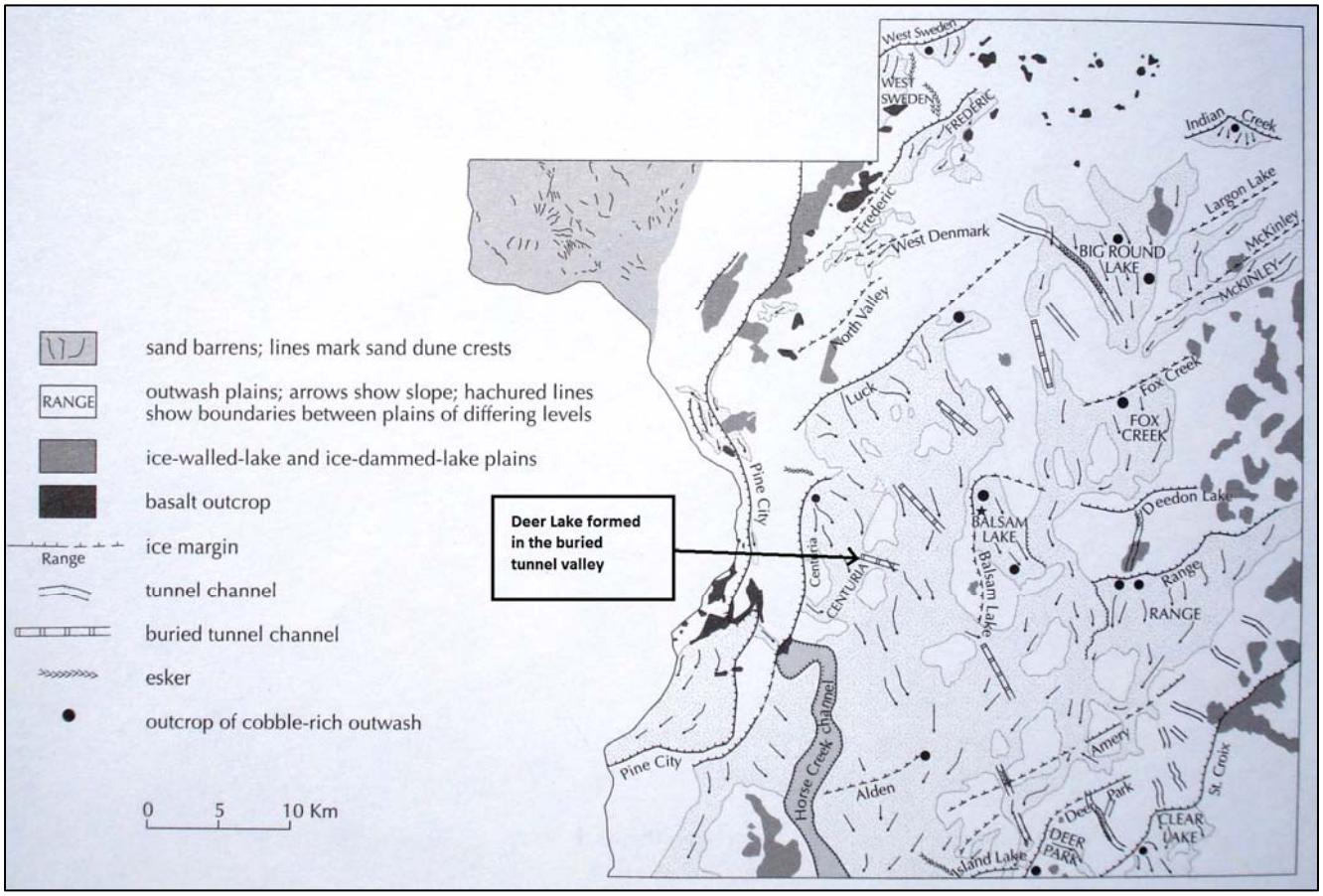
Ten Figures follow this text.

Two versions of the plant list are at the end of the report.

Two maps that were not included with the text are attached:

Topography of Deer Lake area
Shaded Relief of Deer Lake area

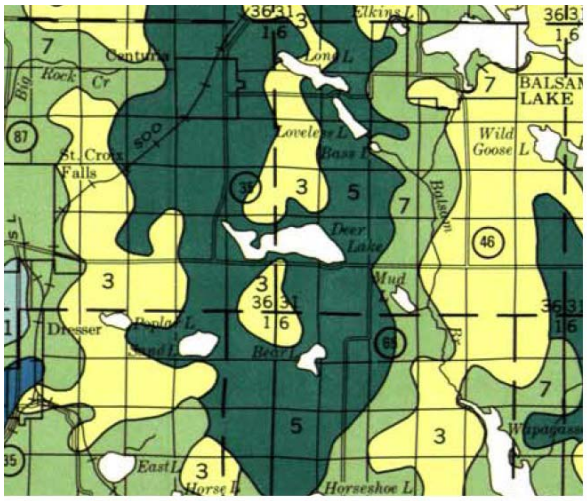
Figure 1 Glacial Feature in Polk County, WI



From: Johnson, Mark D. 2000. Pleistocene Geology of Polk County, Wisconsin. Wisconsin Geological and Natural History Survey. Bulletin 92.

Figure 2 - General Soil Types in the Vicinty of Deer Lake

Exerpts from Polk County Soil Survey



3. Amery-Santiago-Magnor

Nearly level to very hilly, well drained and somewhat poorly drained loamy and silty soils on till plains

This map unit is on glacial moraines that have short, uneven slopes, short drainageways, and depressions and pothole lakes (fig. 2). It makes up about 37 percent of the county. It is about 45 percent Amery soils, 15 percent Santiago soils, 5 percent Magnor soils, and 35 percent soils of minor extent. Amery and Santiago soils are in similar positions on the landscape. Magnor soils are lower on the landscape or in the less sloping areas.

Santiago soils are well drained. Permeability is moderate or moderately slow, and available water capacity is moderate. Typically, the surface layer is very dark brown silt loam about 3 inches thick. The subsurface layer is brown silt loam about 9 inches thick. The next 6 inches is a mixture of the subsoil and the subsurface layer. The subsoil is about 20 inches thick. It is yellowish brown silt loam in the upper part and brown loam and sandy loam in the lower part. The underlying material to a depth of about 60 inches is reddish brown sandy loam.

8. Alban-Campia-Comstock

Nearly level to moderately steep, well drained and somewhat poorly drained loamy and silty soils on glacial lake plains

This map unit is in broad old glacial lakebeds and in some steeper areas along drainageways and in depressions. It makes up about 3 percent of the county. It is about 35 percent Alban soils, 15 percent Campia soils, 12 percent Comstock soils, and 38 percent soils of minor extent.

Alban soils are well drained. Permeability is moderate, and available water capacity is high. Typically, the surface layer is very dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is brown sandy loam about 12 inches thick. The next 24 inches is a mixture of the subsoil and the subsurface layer. The subsoil is dark brown fine sandy loam about 3 inches thick. The underlying material to a depth of about 60 inches is brown fine sandy loam and strong brown fine sand and sand.

Most areas are used for cultivated crops. Maintaining tilth and fertility is the main concern in managing the major soils for cultivated crops. Erosion is a hazard in the more sloping areas, and excessive wetness is a problem on the Comstock soils. The potential is good for cultivated crops and woodland. The potential for residential development is only fair because in some areas the slope and the excessive wetness are moderate or severe limitations for septic tank absorption fields.

5. Antigo-Rosholt

Nearly level to sloping, well drained silty and loamy soils on outwash plains

This map unit is on broad outwash plains and in some more sloping areas along drainageways and in depressions (fig. 3). It makes up about 12 percent of the county. It is about 70 percent Antigo soils, 20 percent Rosholt soils, and 10 percent soils of minor extent.

Antigo soils are moderately permeable in the upper part and very rapidly permeable in the underlying material. Available water capacity is moderate. Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The next 6 inches is a mixture of the subsoil and the subsurface layer. The subsoil is about 14 inches thick. It is dark yellowish brown silt loam in the upper part and dark brown loam in the lower part. The underlying material to a depth of about 60 inches is dark brown and reddish brown, stratified coarse sand and sand and gravel.

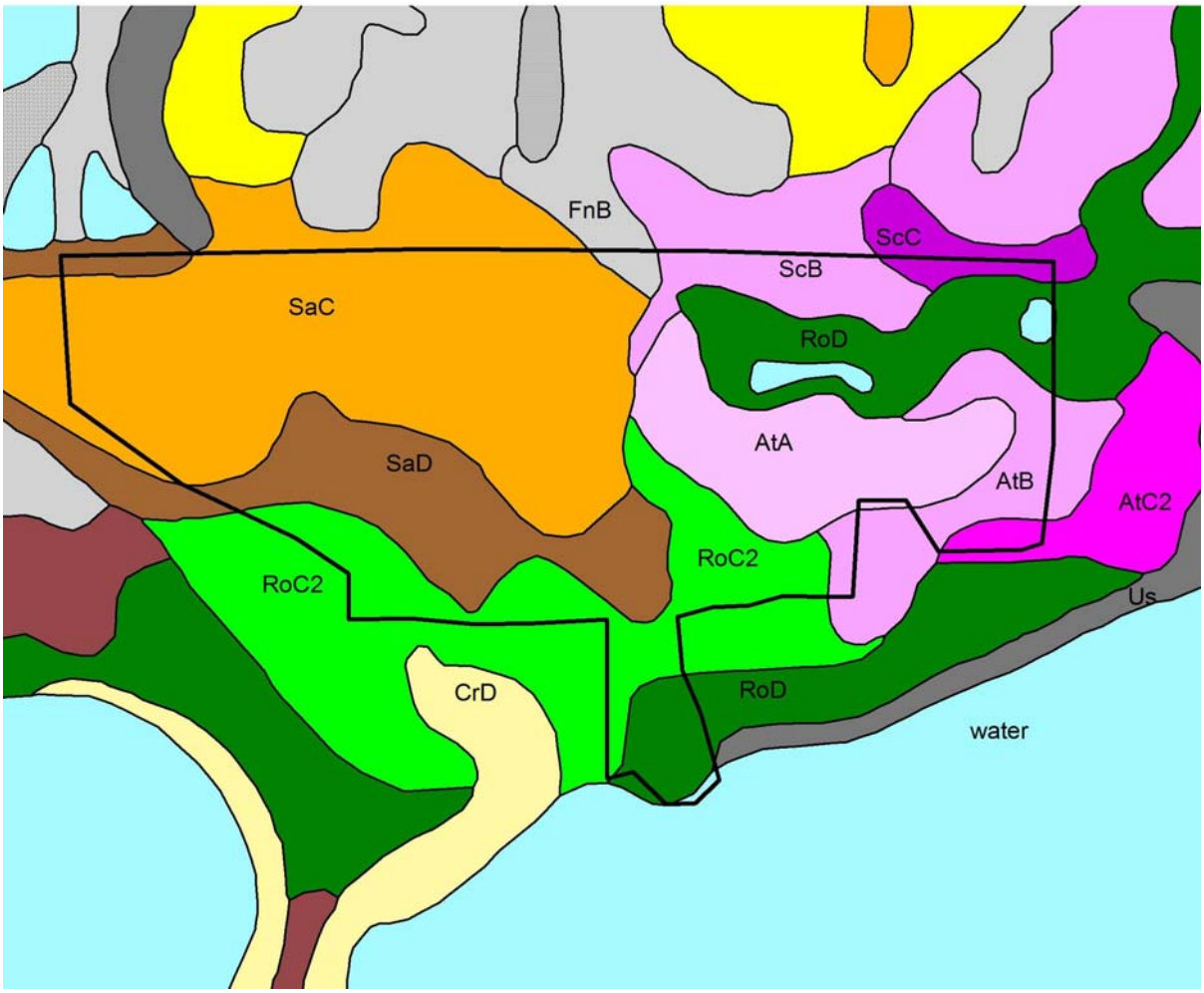
Rosholt soils are moderately permeable in the upper part and very rapidly permeable in the underlying material. Available water capacity is moderate. Typically, the surface layer is dark grayish brown loam about 7 inches thick. The subsurface layer is brown loam about 7 inches thick. The next 12 inches is a mixture of the subsoil and the subsurface layer. The subsoil is about 11 inches thick. It is dark brown sandy loam in the upper part and dark brown loamy coarse sand in the lower part. The underlying material to a depth of about 60 inches is brown, dark brown, and strong brown, stratified coarse sand and fine gravel.

The minor soils in this map unit are the moderately well drained Brill soils and the somewhat poorly drained Poskin soils in concave or depressional areas.

Most areas are used for cultivated crops. Maintaining tilth and controlling erosion in the sloping areas are the main concerns in managing the major soils for cultivated crops. These soils have good potential for cultivated crops, woodland, and residential development.

Figure 3
Detail of Soil Units by Deer Lake

Polk County Soil Survey – adapted by B. Delaney, July 2014



Soil Survey Legend

AtA – Alban fine sandy loam, 0-2% slopes
AtB – Alban fine sandy loam, 0-2% slopes
AtC – Alban fine sandy loam, 0-2% slopes

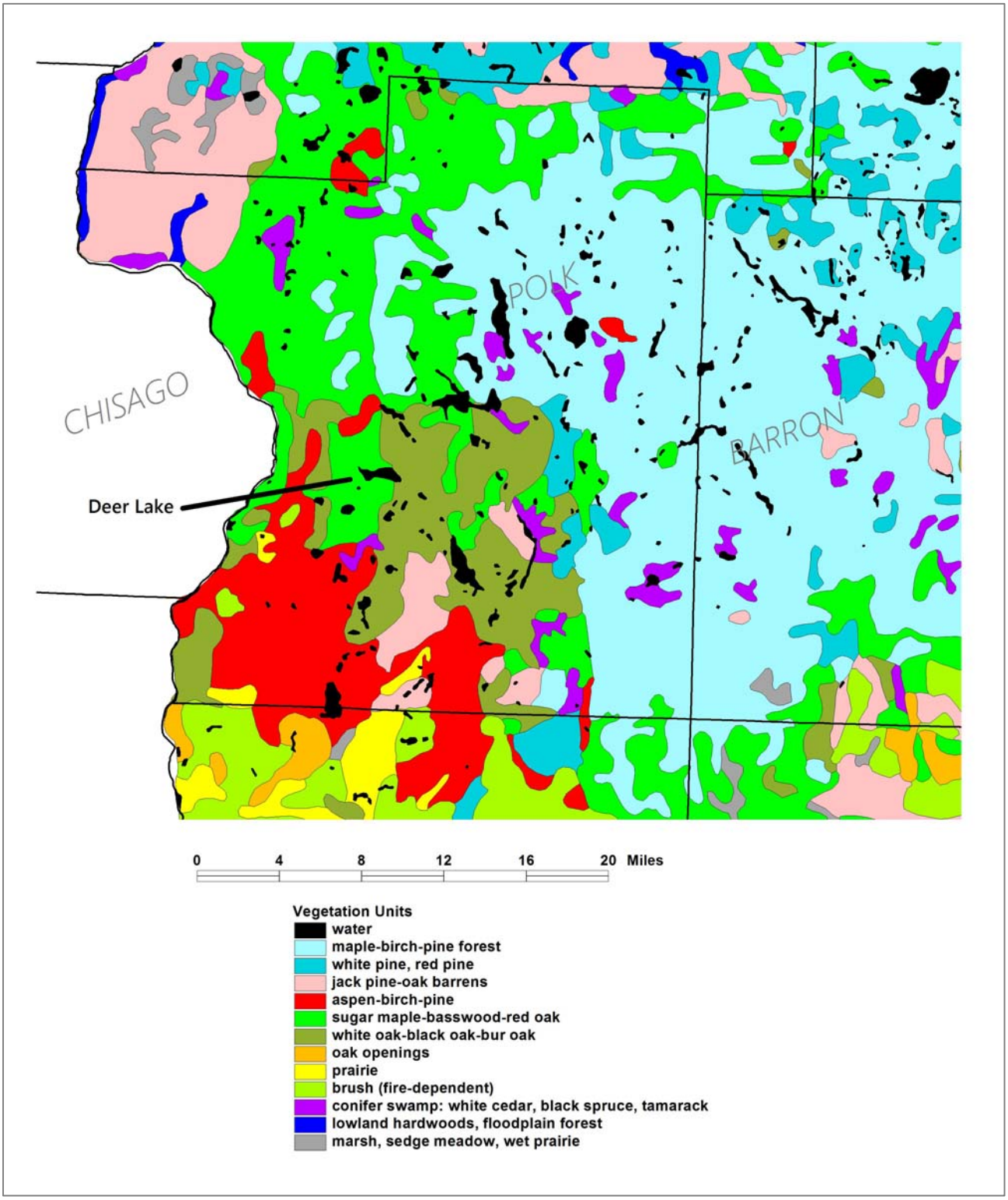
CrD – Cromwell sandy loam, 0-3% slopes

FnB – Freeon silt loam, 2-6% slopes

RoC2 – Rosholt loam, 6-12% slopes
RoD – Rosholt loam, 12-20% slopes
SaC – Santiago silt loam, 6-12% slopes
SaD – Santiago silt loam, 12-20% slopes
ScB – Santiago-Antigo silt loam, 2-6% slopes
ScC – Santiago-Antigo silt loam, 6-12% slopes
Us – Udorthents (sandy)

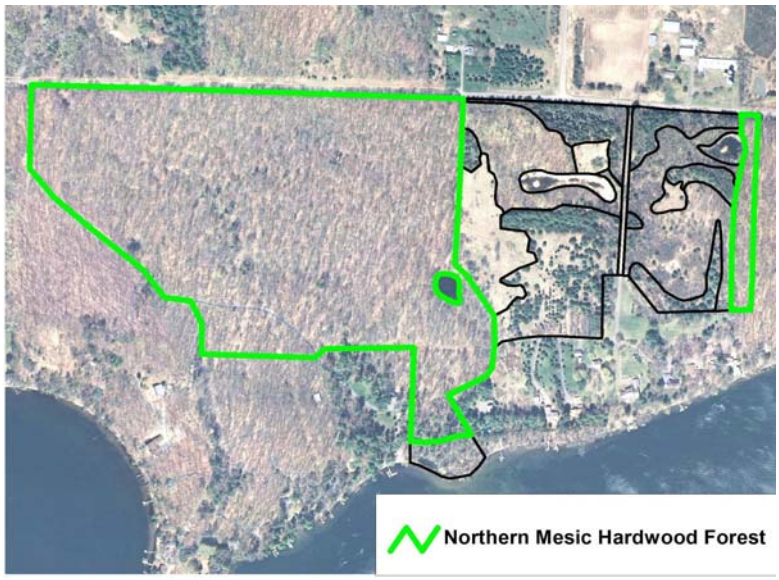
Figure 4

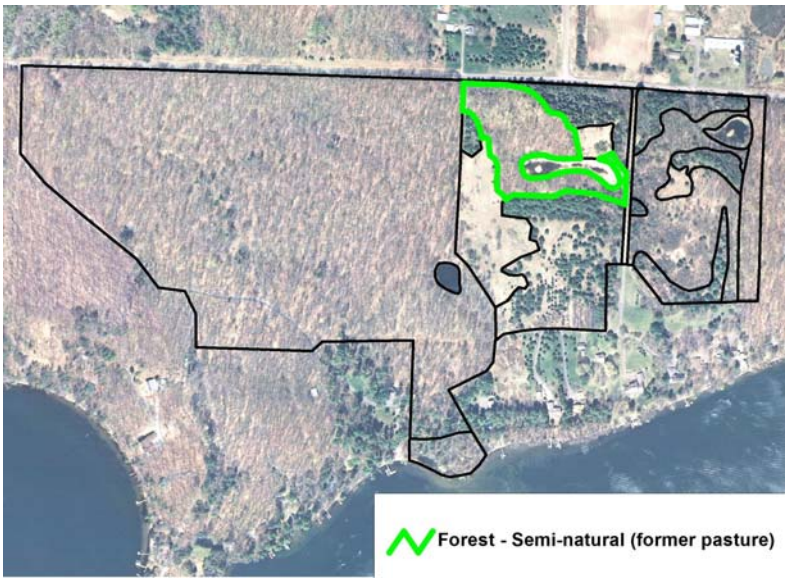
Vegetation of Polk County, Wisconsin in the 1800s Before Logging and Farming



Adapted by B. Delaney, July 2014
from Robert W. Finley 1976: Original Vegetation Cover of Wisconsin. University of Wisconsin.

Figure 5 Vegetation Types





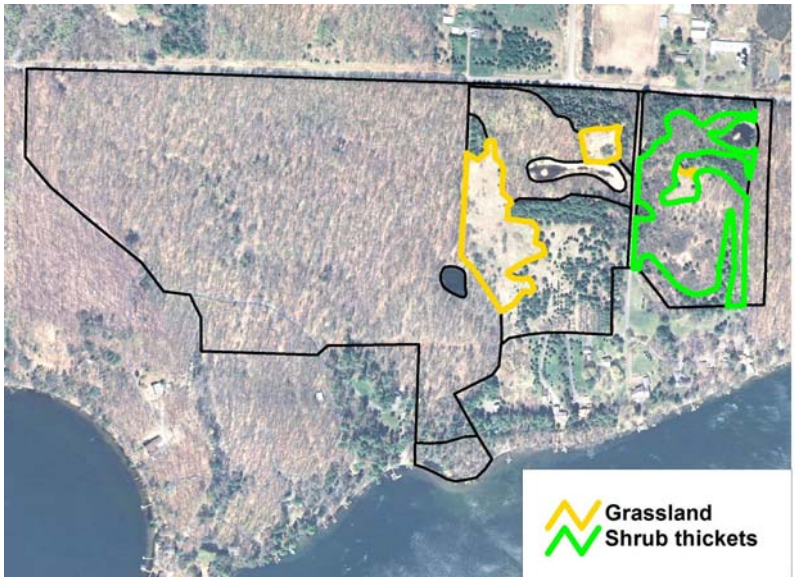
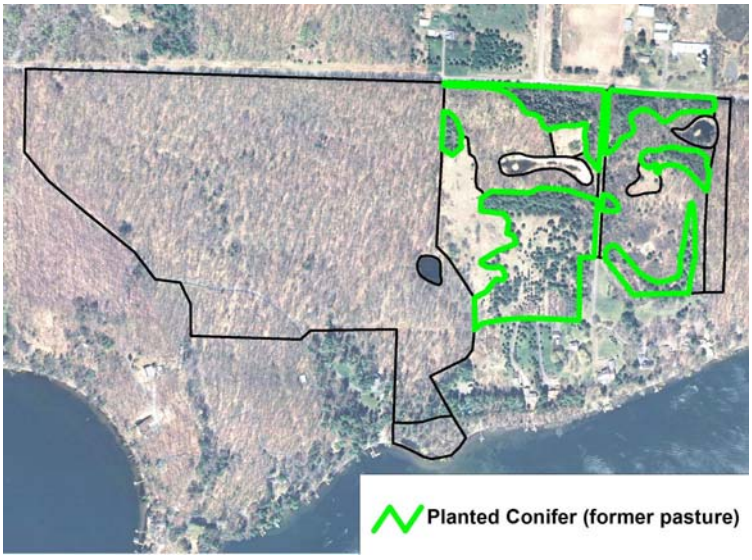
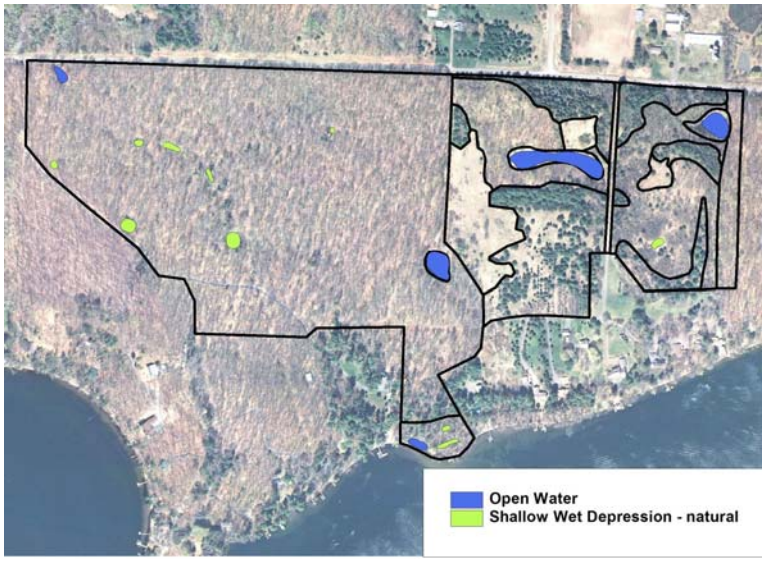


Figure 5 continued Vegetation Types





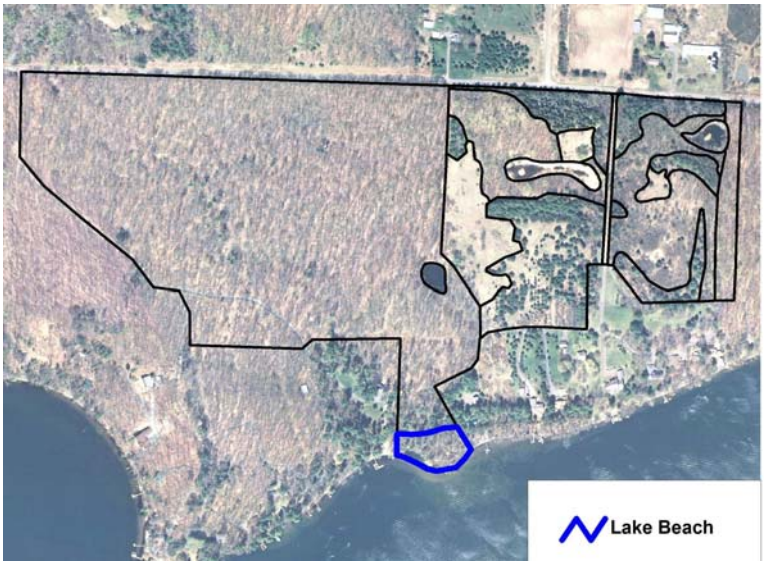
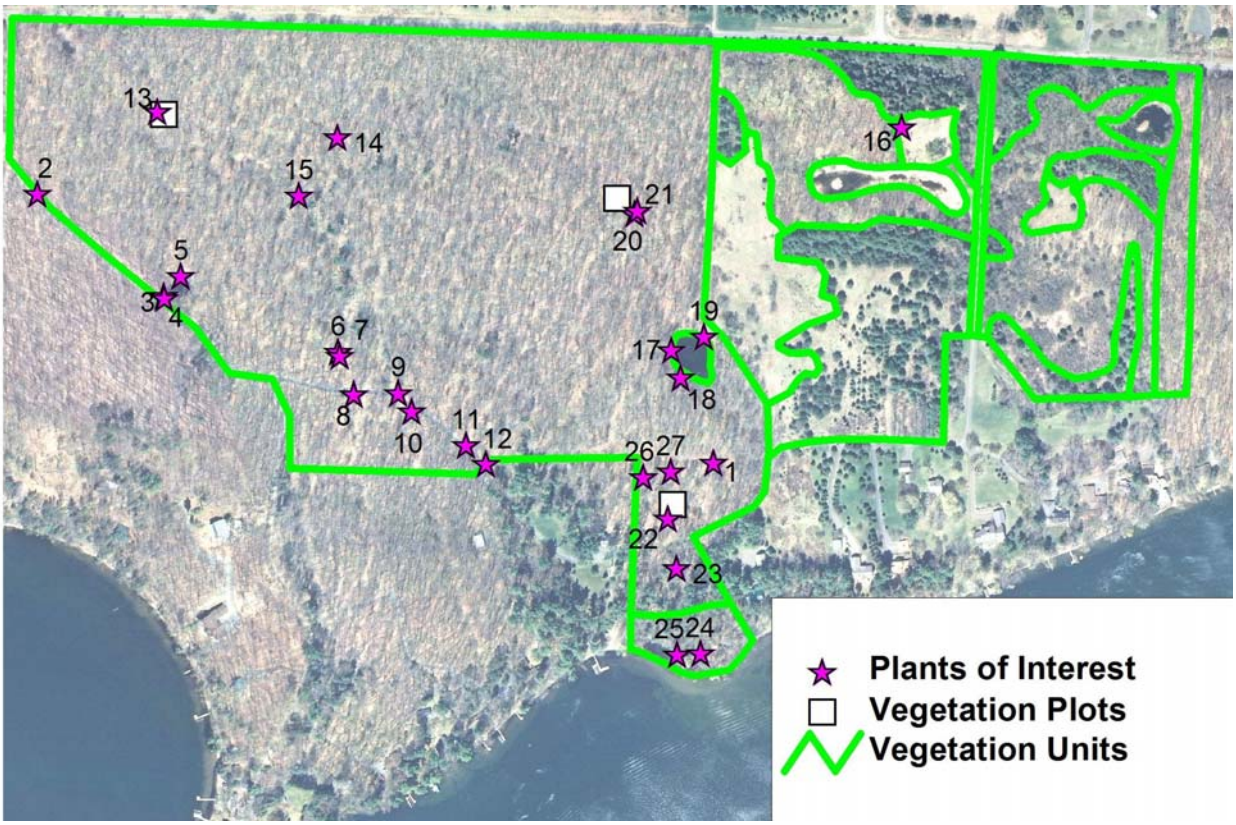


Figure 6 Plants of Interest



ID	Name	Comments
1	poke milkweed	robust in opening; also a few in the woods but more difficult to find
2	bur oak	old tree with burl
3	white spruce	planted white spruce, now old; compare with Norway spruce
4	white pine	large, old white pines
5	shinleaf	Pyrola ellliptica; assoc with white pine-hardwood forests
6	large-flowered trillium	Mostly vegetative within the forest but a few with fruits near the road
7	starflower	a few plants under white pines here; widely scattered, few in numbers
8	witch-hazel	Hamamelis virginiana; planted here; native in E Wisc and eastward
9	hickory seedlings	probably bitternut hickory; seedlings by road; find the adults!
10	blue-beech	or musclewood: Carpinus carolinana; nice examples south side of road
11	black walnut	Juglans nigra; planted years ago; native in S Wisc & southward
12	black walnut	Juglans nigra; planted years ago; native in S Wisc & southward
13	crested shield fern	an uncommon of the fern at this site
14	bottle-brush grass	At edge of old Baker Trail. A beautiful woodland grass.
15	Carex crinita	Interesting, tall, native, wetland sedge at the north margin of depression.
16	interesting garden shrubs	Garden shrubs (not native) at the edge of grassy hillside overlooking pond.
17	Carex tuckermanii	Least common of the 3 attractive sedges with "inflated" seed capsules.
18	maidenhair fern	It is especially beautiful on the north-facing slope of this pond.
19	black walnut	Black walnut can be seen on the N-NE side of the pond (by old road).
20	American ginseng	American ginseng. This is a WI State-listed plant of Special Concern.
21	white baneberry	This plant is rare just to the west in MN. Edge of its range here in WI.
22	black snakeroot	Not seen in elsewhere at site but keep looking.
23	Sprengel's sedge	Likes slopes and here it is! Not seen elsewhere in forest.
24	Fowl manna grass	This species likes mucky soil; important for wildlife.
25	wild calla	A beautiful white “flag” emerging from the lagoon pond
26	blue-bead lily	Clintonia. Associated w/ northern conifer-hardwood forests
27	northern drooping sedge	Associated w/ northern conifer-hardwood forests

Figure 7

Conservation Ranking of Vegetation Units

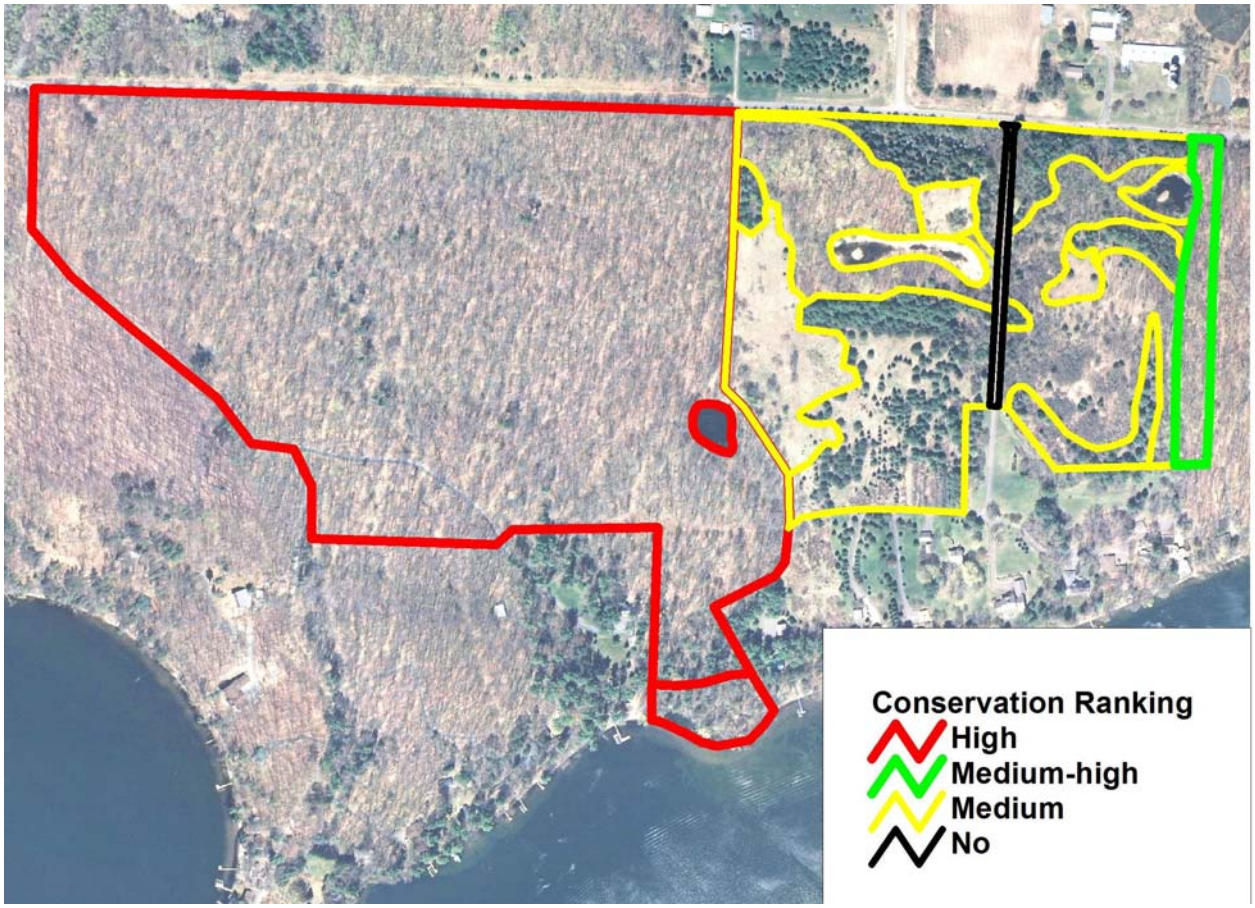


Figure 8

Proposed Trail

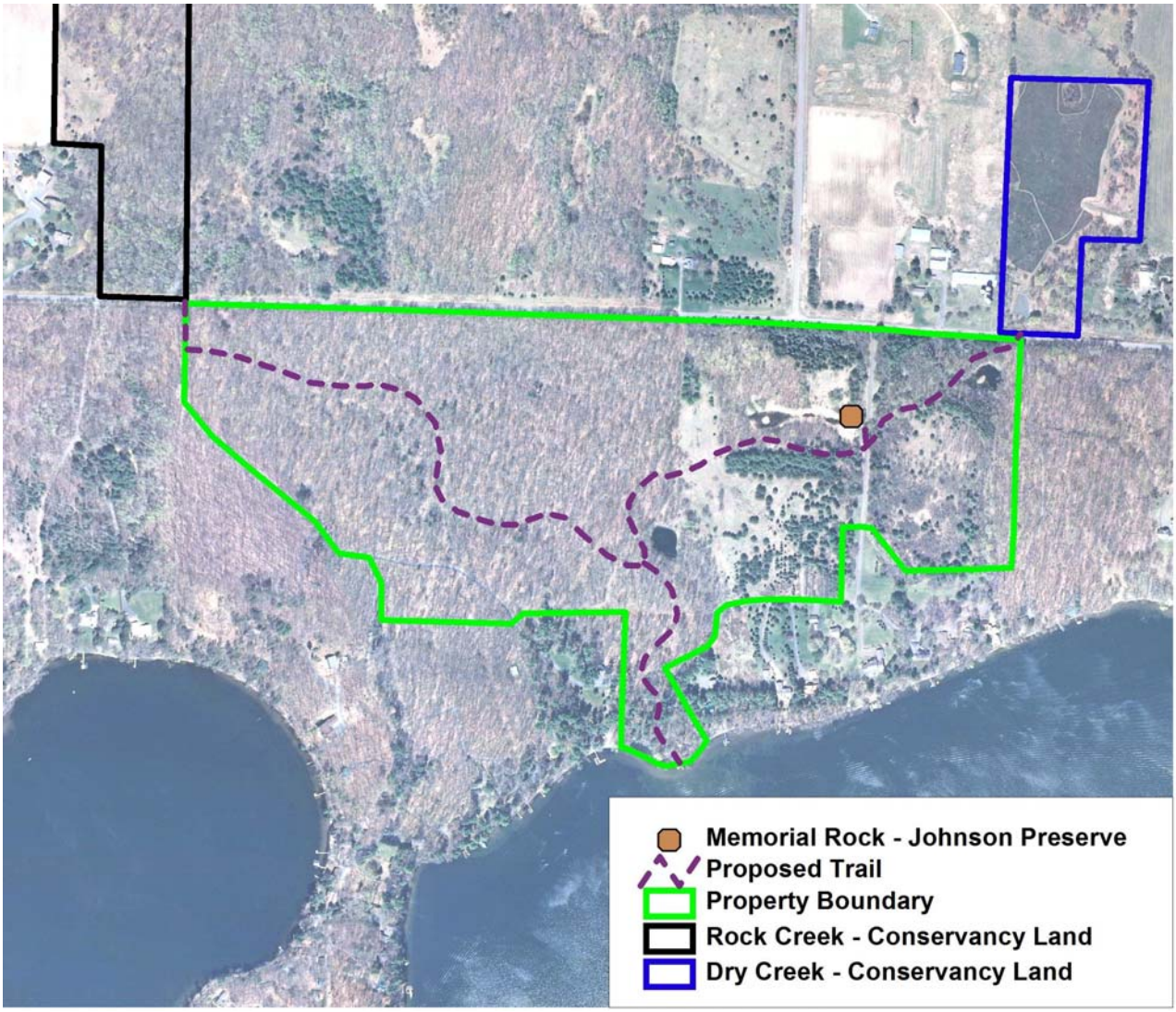


Figure 9

Invasive Plant Locations

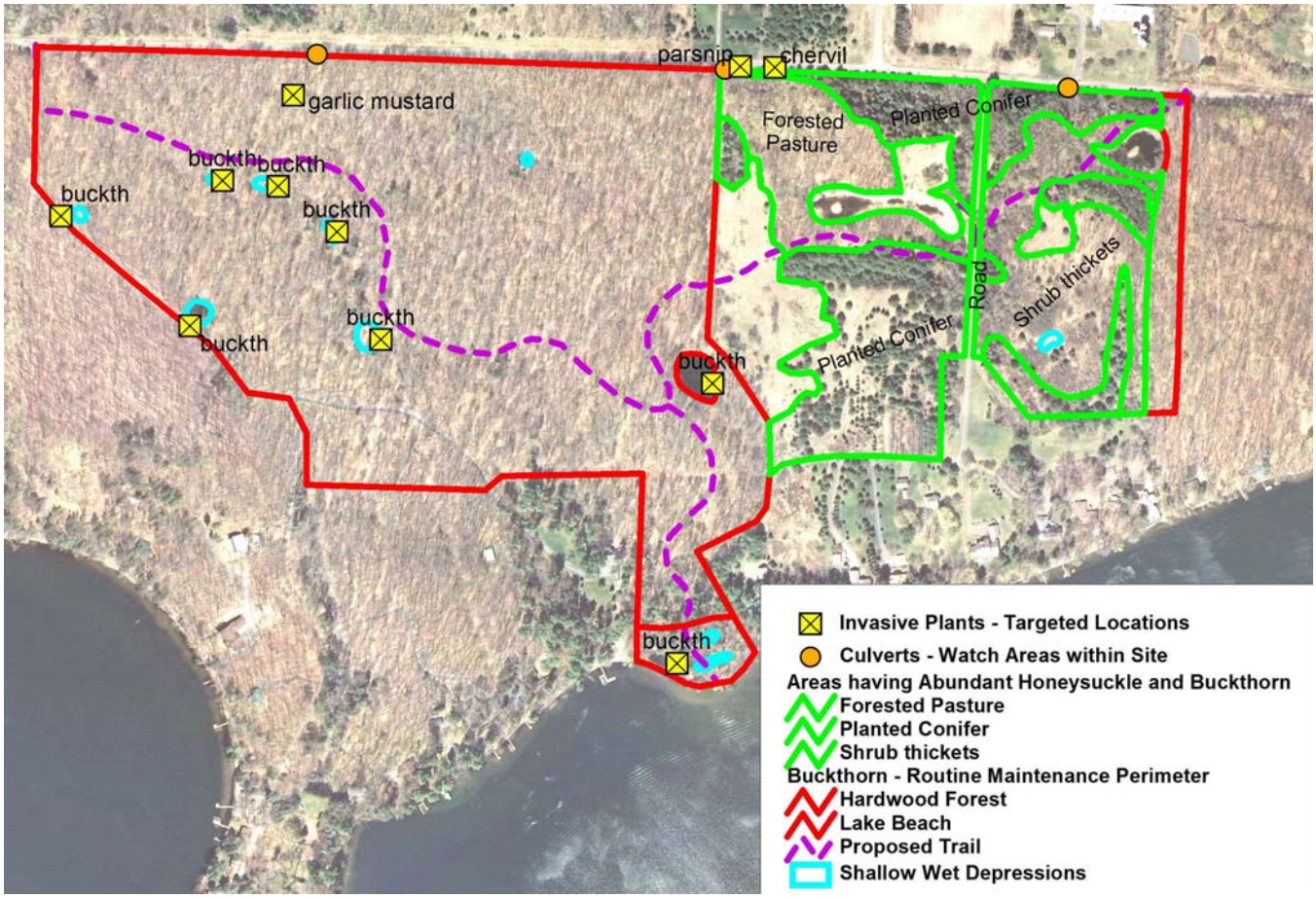
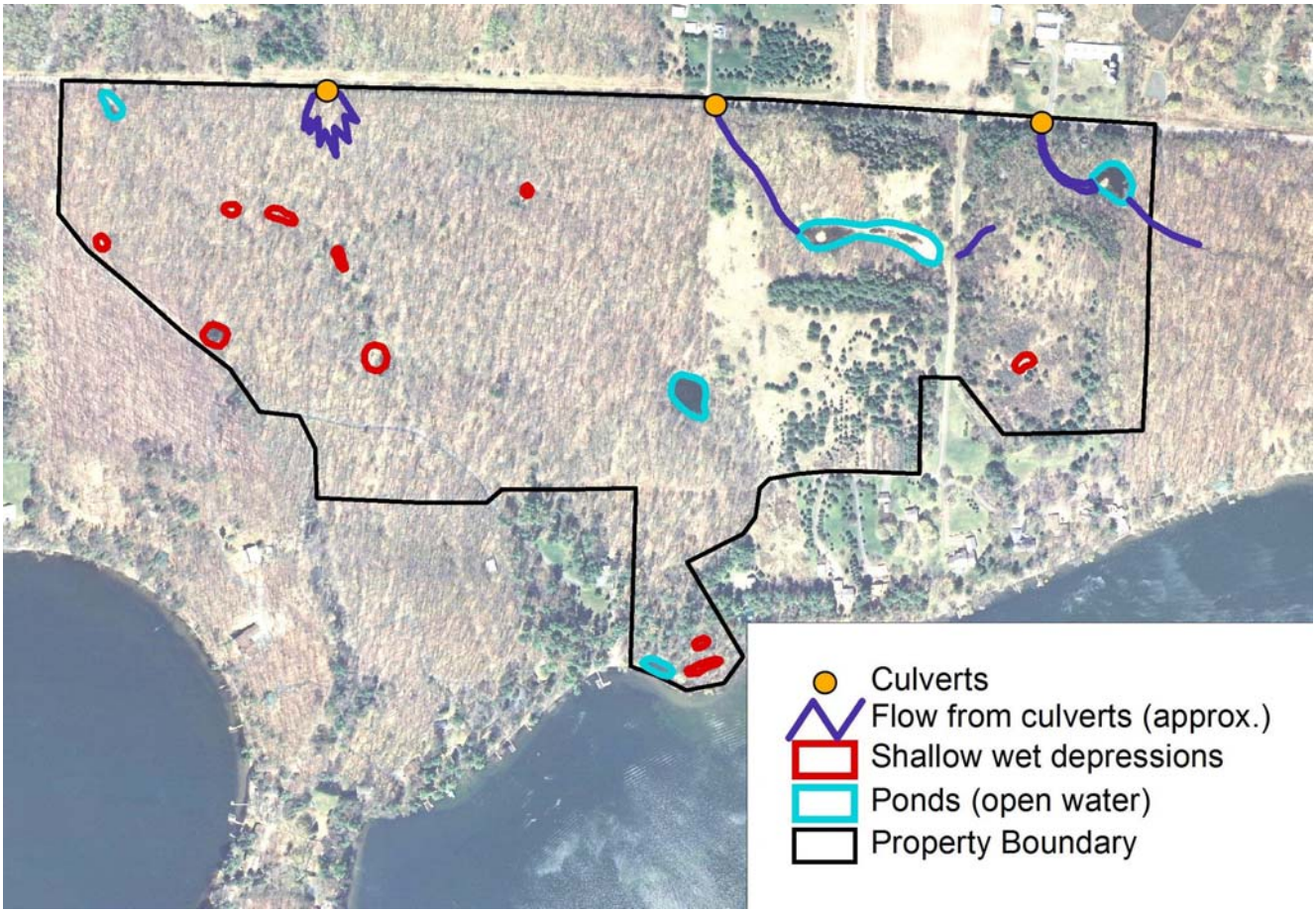


Figure 10

Wetlands and Associated Surface Flow of Water



Flora of the Gustav and Elizabeth Johnson Preserve

Plant Family (alphabetical by genus and species below)

Gymnosperms

Cypress Family *Cupressaceae*

Juniperus virginiana Red cedar

Pine Family *Pinaceae*

Abies balsamea Balsam fir

Picea ? Spruce

Picea abies Norway spruce

Picea glauca White spruce

Pinus resinosa Red pine, Norway pine

Pinus strobus White pine

Pinus sylvestris Scotch pine

Fern Allies and Ferns

Adder's tongue Family *Ophioglossaceae*

Botrychium virginianum Rattlesnake-fern

Dennstaedtia Family *Dennstaedtiaceae*

Pteridium aquilinum var. latiusculum Bracken fern

Horsetail Family *Equisetaceae*

Equisetum arvense Field horsetail

Maidenhair Fern Family *Pteridaceae*

Adiantum pedatum Maidenhair fern

Marsh Fern Family *Thelypteridaceae*

Thelypteris palustris var. pubescens Northern marsh fern

Royal Fern Family *Osmundaceae*

Osmunda claytoniana Interrupted fern

Wood Fern Family *Dryopteridaceae*

Athyrium filix-femina var. angustum Lady fern

Dryopteris carthusiana Spinulose shield fern

Dryopteris cristata Crested fern

Matteuccia struthiopteris var. Ostrich fern

Onoclea sensibilis Sensitive fern

Plant Family (alphabetical by genus and species below)

Angiosperms - Dicots

Aster Family *Asteraceae*

Ageratina altissima White snakeroot

Ambrosia artemisiifolia Common ragweed

Arctium minus Common burdock

Aster (cordate-leaved, serrate) (cordate-leaved aster)
[see Symphyotrichum]

Aster lanceolatus ? Panicled aster
[see Symphyotrichum]

Aster lateriflorus Side-flowering aster
[see Symphyotrichum]

Aster macrophyllus Big-leaved aster
[see Eurybia]

Bidens ? Beggar-Ticks, Bur-Marigold

Bidens cernua ? Nodding beggar-ticks

Chrysanthemum leucanthemum Ox-eye daisy

Cirsium arvense Canada thistle

Erigeron philadelphicus var. ? Philadelphia fleabane

Erigeron strigosus Daisy fleabane

Eupatorium rugosum White snakeroot
[see Agerotina altissima]

Eurybia macrophylla Big-leaf aster

Helianthus Sunflower

Helianthus hirsutus ? hairy sunflower

Hieracium aurantiacum Orange hawkweed

Lactuca biennis Two-flowered Cynthia

Lactuca canadensis ? Canada wild lettuce

Solidago canadensis Canada goldenrod

Solidago flexicaulis Zig-zag goldenrod

Solidago gigantea Giant goldenrod

Symphyotrichum (cordate-leaved, cordate-leaved aster grou

Symphyotrichum lanceolatum ? Panicled aster

Symphyotrichum lateriflorus Panicled aster

Tanacetum vulgare Dandelion

Plant Family (alphabetical by genus and species below)

Taraxacum officinale Common dandelion

Barberry Family *Berberidaceae*

Berberis thunbergii Japanese barberry

Caulophyllum thalictroides Blue Cohosh

Beech Family *Fagaceae*

Quercus alba White oak

Quercus ellipsoidalis Northern pin oak

Quercus macrocarpa Bur oak

Quercus rubra Northern red oak

Birch Family *Betulaceae*

Alnus incana ssp. rugosa Speckled alder

Betula papyrifera Paper birch

Carpinus caroliniana ssp. virginiana Blue beech, Musclewoo

Ostrya virginiana Ironwood

Borage Family *Boraginaceae*

Hackelia Stickseed; Beggar's Lice

Buckthorn Family *Rhamnaceae*

Rhamnus cathartica Common buckthorn

Buttercup Family *Ranunculaceae*

Actaea ? Baneberry

Actaea pachypoda White baneberry

Actaea rubra Red baneberry

Anemone quinquefolia var. wood anemone

Anemonella thalictroides Rue-anemone
[see Thalictrum thalictroides]

Ranunculus abortivus Kidney-leaf buttercup

Ranunculus recurvatus Hooked crowfoot

Thalictrum dioicum early meadow-rue

Thalictrum thalictroides rue anemone

Carrot Family *Apiaceae*

Anthriscus sylvestris Wild chervil

Osmorhiza ? Sweet cicely

Osmorhiza claytonii Sweet cicely

Plant Family (alphabetical by genus and species below)

Pastinaca sativa Wild parsnip

Sanicula marilandica ? Black snakeroot

Dogbane Family *Apocynaceae*

Apocynum androsaemifolium Spreading dogbane

Dogwood Family *Cornaceae*

Cornus alternifolia Pagoda dogwood

Elm Family *Ulmaceae*

Celtis occidentalis Hackberry

Ulmus ? Elm

Ulmus americana American elm

Ulmus rubra Red elm, slippery elm

Evening-primrose Family *Onagraceae*

Circaea lutetiana ssp. canadensis Enchanter's nightshade

Figwort Family *Scrophulariaceae*

Verbascum thapsus common mullein

Geranium Family *Geraniaceae*

Geranium maculatum Wild geranium

Ginseng Family *Araliaceae*

Aralia racemosa American spikenard

Panax quinquefolium American ginseng

Grape Family *Vitaceae*

Parthenocissus inserta Virginia creeper
[see Parthenocissus vitacea]

Parthenocissus vitacea Virginia creeper

Vitis riparia Wild grape

Hemp Family *Cannabaceae*

Humulus lupulus common hops

Holly Family *Aquifoliaceae*

Ilex verticillata Winterberry

Honeysuckle Family *Caprifoliaceae*

Lonicera (Shrub) Honeysuckle (shrub)

Lonicera bella pretty honeysuckle

Plant Family (alphabetical by genus and species below)

Lonicera morrowii Morrow's honeysuckle

Lonicera tatarica Tartarian Honeysuckle

Sambucus canadensis Common elderberry

Sambucus pubens Red-berried elder
[see S. racemosa]

Sambucus racemosa var. pubens red-berried elder

Viburnum lentago Nannyberry

Viburnum opulus var. americanum ? High-bush cranberry

Viburnum rafinesquianum Downy arrowwood

Viburnum trilobum High-bush cranberry
[see V. opulus var. americanum]

Linden Family *Tiliaceae*

Tilia americana Basswood

Madder Family *Rubiaceae*

Galium asprellum Rough bedstraw

Galium concinnum Shining bedstraw

Galium triflorum var. triflorum Three-flowered bedstraw

Maple Family *Aceraceae*

Acer ginnala Amur maple

Acer negundo Box elder

Acer rubrum Red maple

Acer saccharinum Silver maple

Acer saccharum Sugar maple

Milkweed Family *Asclepiadaceae*

Asclepias exaltata Poke milkweed

Asclepias syriaca Common milkweed

Mint Family *Lamiaceae*

Galeopsis tetrahit ? Hemp-nettle

Glechoma hederacea Creeping charlie

Leonurus cardiaca Motherwort

Lycopus americanus Cut-leaved bugleweed

Origanum vulgare ? Wild marjoram

Scutellaria lateriflora Mad-dog skullcap

Plant Family (alphabetical by genus and species below)

Mustard Family *Brassicaceae*

Alliaria petiolata Garlic-mustard

Barbarea vulgaris ? yellow rocket

Myrsine Family *Myrsinaceaae*

Lysimachia ciliata Fringed loosestrife

Trientalis borealis Starflower
[or see Lysimachia borealis in Myrsinaeae]

Nettle Family *Urticaceae*

Laportea canadensis Wood nettle

Pilea ? Clearweed

Urtica dioica ssp. gracilis Stinging nettle

Nightshade Family *Solanaceae*

Solanum dulcamara Bittersweet nightshade

Olive Family *Oleaceae*

Fraxinus ? Ash

Fraxinus americana White ash

Fraxinus nigra Black ash

Fraxinus pennsylvanica Green ash

Pea or Bean Family *Fabaceae*

Amphicarpaea bracteata Hog-peanut

Desmodium glutinosum Pointed-leaved tick-trefoil

Pink Family *Caryophyllaceae*

Stellaria ? Chickweed; Starwort

Stellaria media ? Common chickweed

Plantain Family *Plantaginaceae*

Plantago major Common plantain

Primrose Family *Primulaceae*

Trientalis borealis Starflower
[see Myrsinaceae]

Rose Family *Rosaceae*

Geum canadense White avens

Potentilla simplex Old-field cinquefoil

Prunus serotina Black cherry

Plant Family (alphabetical by genus and species below)

Prunus virginiana Choke cherry

Rubus (Blackberry-low) ? Blackberry - complex (low)

Rubus (Blackberry) ? Blackberry - complex

Rubus allegheniensis Common blackberry

Rubus occidentalis Black raspberry

Rubus strigosus Red raspberry
[see R. idaeus]

Sorbus ? Mountain-ash

Saxifrage Family *Grossulariaceae*

Ribes cynosbati Prickly gooseberry

Shinleaf Family *Pyrolaceae*

Pyrola elliptica Common pyrola

Smartweed Family *Polygonaceae*

Rumex britannica ? Great water dock

Rumex orbiculatus ? Great water dock
[see Rumex britannica]

Staff-tree Family *Celastraceae*

Celastrus scandens Climbing bittersweet

Sumac or Cashew Family *Anacardiaceae*

Rhus glabra Smooth sumac

Rhus hirta Staghorn sumac

Rhus typhina Staghorn sumac
[see R. hirta]

Toxicodendron rydbergii Western poison ivy

Touch-me-not Family *Balsaminaceae*

Impatiens capensis Jewelweed, Touch-me-not

Vervain Family *Verbenaceae*

Phryma leptostachya lopseed

Violet Family *Violaceae*

Viola ? Violet

Viola pubescens yellow violet

Walnut Family *Juglandaceae*

Carya cordiformis ? Bitternut hickory

Plant Family (alphabetical by genus and species below)

Juglans nigra Black walnut

Willow Family *Salicaceae*

Populus tremuloides Trembling aspen

Salix amygdaloides ? Peach-leaved willow

Witch-hazel Family *Hamamelidaceae*

Hamamelis virginiana Witch-hazel

Wood-sorrel Family *Oxalidaceae*

Oxalis (stricta or dillenii) ? Yellow wood-sorrel

ANGIOSPERMS - MONOCOTS

Arum Family *Araceae*

Arisaema triphyllum Jack-in-the-pulpit

Calla palustris Wild calla

Catbrier Family *Smilacaceae*

Smilax ? Carrion flower; catbriar

Smilax tamnoides greenbrier

Duckweed Family *Lemnaceae*

Lemna ? Duckweed

Grass Family *Poaceae*

Agrostis stolonifera Redtop

Brachyelytrum erectum Bearded short-husk

Bromus inermis Smooth brome

Bromus pubescens Hairy brome

Elymus hystrix Bottlebrush grass

Elymus virginicus ? Virginia wild-rye

Festuca obtusa Nodding fescue
[see F. subverticillata]

Festuca subverticillata nodding fescue

Glyceria striata Fowl manna grass

Leersia oryzoides ? Rice cut grass

Leersia virginica ? White grass

Milium effusum var. cisatlanticum Woodland millet-grass

Oryzopsis asperifolia Mountain rice-grass

Plant Family (alphabetical by genus and species below)

Oryzopsis racemosa Black-fruited rice-grass
[see Piptatherum]

Phalaris arundinacea Reed canary grass

Phleum pratense Timothy

Piptatherum racemosum black-fruited rice grass

Poa compressa Canada bluegrass

Poa pratensis Kentucky bluegrass

Schizachne purpurascens False melic grass

Iris Family *Iridaceae*

Iris versicolor ? Blue flag

Lily Family *Liliaceae*

Asparagus officinalis Asparagus

Clintonia borealis Blue-bead lily

Hemerocallis fulva ? Day lily

Maianthemum canadense Canada mayflower

Maianthemum racemosum Starry false Solomon's-seal

Polygonatum pubescens Hairy Solomon's-seal

Smilacina racemosa False Solomon's-seal
[see Maianthemum]

Smilax Greenbrier; Catbrier
[see Smilacaceae]

Smilax hispida Green-briar
[see Smilacaceae; S. tamnoides]

Trillium grandiflorum ? Large-flowered trillium

Uvularia sessilifolia Pale bellwort

Sedge Family *Cyperaceae*

Carex (ovales) ? Oval sedges (complex)

Carex arctata Drooping woodland sedge

Carex blanda Common wood sedge

Carex comosa ? Bottlebrush sedge

Carex crinita ? Caterpillar sedge

Carex deweyana Dewey's sedge

Carex gracillima Graceful sedge

Carex intumescens var. fernaldii Inflated sedge

Plant Family (alphabetical by genus and species below)

Carex lacustris Lake sedge

Carex lupulina Hop sedge

Carex pedunculata Long-stalked sedge

Carex pensylvanica Pennsylvania sedge

Carex radiata eastern star sedge

Carex retrorsa ? Retrorse sedge

Carex rosea Sedge, straight-styled wood

Carex scoparia ? Pointed broom sedge

Carex sparganioides ? Bur-reed sedge

Carex sprengelii Sprengel's sedge

Carex tenera ? marsh straw sedge

Carex tuckermanii Tuckerman's sedge

Scirpus cyperinus ? Woolgrass

Yam Family *Dioscoreaceae*

Dioscorea villosa Wild yam

Plants of the Gustav and Elizabeth Johnson Land Preserve

a = annual **b** = biennial **p** = perennial **w** = woody **v** = vine
N=Not native to this area

Habitat Codes:
fm (mesic forest) fe (forest edge)
pp (planted conifers) wet (wetlands)
lk (lake beach, lagoon) gr (grassland)
rd (along road or trail) dl (disturbed land)

Abundance at Site (in approp. habitat):
a = abundant
c = common
o = occasional
u = uncommon
r = rare l = local

Gymnosperms

Cupressaceae				**Cypress Family**	
	w		fe	u	*Juniperus virginiana L.*	Red cedar
Pinaceae					**Pine Family**	
	w	N	pp	l	*Abies balsamea (L.) Mill.*	Balsam fir
	w	N	pp	o	*Picea*	Spruce
					ID? ID difficult on some trees with no low branches. Either Norway or white spruce and both are here.	
	w	N	pp	o	*Picea abies (L.) Karst.*	Norway spruce
	w	N	pp	l,c	*Picea glauca (Moench) Voss*	White spruce
	w	N	pp	l, c	*Pinus resinosa Ait.*	Red pine, Norway pine
	w		fm	o	*Pinus strobus L.*	White pine
	w	N	pp	u	*Pinus sylvestris L.*	Scotch pine

Fern Allies and Ferns

Dennstaedtiaceae				**Dennstaedtia Family**	
	p		fe	o	*Pteridium aquilinum var. latiusculum*	Bracken fern
Dryopteridaceae				**Wood Fern Family**	
	p		fm	a	*Athyrium filix-femina var. angustum*	Lady fern
	p		fm	c	*Dryopteris carthusiana (Vill.) H. P. Fuchs*	Spinulose shield fern
	p		fm	r	*Dryopteris cristata (L.) Gray*	Crested fern
	p		fe	o	*Matteuccia struthiopteris var. pensylvanica*	Ostrich fern
	p		fe	c	*Onoclea sensibilis*	Sensitive fern
Equisetaceae					**Horsetail Family**	
	p		lk	u	*Equisetum arvense L.*	Field horsetail
Ophioglossaceae					**Adder's tongue Family**	
	p		fm	r	*Botrychium virginianum (L.) Sw.*	Rattlesnake-fern
Osmundaceae					**Royal Fern Family**	
	p		wet	u	*Osmunda claytoniana L.*	Interrupted fern
Pteridaceae					**Maidenhair Fern Family**	
	p		fm	c	*Adiantum pedatum L.*	Maidenhair fern
Thelypteridaceae					**Marsh Fern Family**	
	p		lk	r	*Thelypteris palustris Schott var. pubescens*	Northern marsh fern

Aceraceae					**Maple Family**	
	w	N	gr	o	*Acer ginnala Maxim.*	Amur maple
	w		wet	o	*Acer negundo L.*	Box elder
	w		fm	a	*Acer rubrum L.*	Red maple
	w		lk	r	*Acer saccharinum L.*	Silver maple
	w		fm	a	*Acer saccharum Marsh.*	Sugar maple
Anacardiaceae					**Sumac or Cashew Family**	
	w		fe	u	*Rhus glabra L.*	Smooth sumac
	w		gr	u	*Rhus hirta (L.) Sudw.*	Staghorn sumac
	w		gr	u	*Rhus typhina L.* [see R. hirta]	Staghorn sumac
	w		rd	o	*Toxicodendron rydbergii (Small ex Rydb.)*	Western poison ivy
Apiaceae					**Carrot Family**	
	bp	N	rd	l	*Anthriscus sylvestris (L.) Hoffm.* This is the new invasive. There are native look-alikes; please do not eradicate natives.	Wild chervil
	o		fm	u	*Osmorhiza* ID? probably O. claytonii; possibly O. longistylis	Sweet cicely
	p		fm	u	*Osmorhiza claytonii (Michx.) Clarke*	Sweet cicely
	p	N	rd	l	*Pastinaca sativa L.* Invasive. Spreading northward. Stop it now.	Wild parsnip
	p		fm	u	*Sanicula marilandica L.* ID? based on leaf; not flowering.	Black snakeroot
Apocynaceae					**Dogbane Family**	
	p		rd	o	*Apocynum androsaemifolium L.*	Spreading dogbane
Aquifoliaceae					**Holly Family**	
	w		wd	o	*Ilex verticillata (L.) Gray*	Winterberry
Araliaceae					**Ginseng Family**	
	p		fm	u	*Aralia racemosa L.*	American spikenard
	p		fm	r	*Panax quinquefolium L.* pictures	American ginseng
Asclepiadaceae					**Milkweed Family**	
	p		fe	o	*Asclepias exaltata L.*	Poke milkweed
	p		gr	o	*Asclepias syriaca L.*	Common milkweed
Asteraceae					**Aster Family**	
	p		fe	u	*Ageratina altissima (L.) King & H.E. Robins*	White snakeroot
	a		dl	o	*Ambrosia artemisiifolia L.*	Common ragweed
	b	N	rd	c	*Arctium minus (Hill) Bernh.*	Common burdock
	p		fm	-	*Aster (cordate-leaved, serrate)* [see Symphyotrichum]	(cordate-leaved aster)
	p		lk	-	*Aster lanceolatus Willd.* [see Symphyotrichum]	Panicled aster

p		fe	-	*Aster lateriflorus (L.) Britt.*	Side-flowering aster
				[see Symphyotrichum]	
p		rd	-	*Aster macrophyllus L.*	Big-leaved aster
				[see Eurybia]	
a		wet	o	*Bidens*	Beggar-Ticks, Bur-Marigold
				ID? Seedling. Leaves deeply 3-divided.	
a		wet	o	*Bidens cernua L.*	Nodding beggar-ticks
				ID? Seedling. Leaves not divided.	
p	N	gr	l	*Chrysanthemum leucanthemum L.*	Ox-eye daisy
p	N	gr	c	*Cirsium arvense (L.) Scop.*	Canada thistle
b		fe	u	*Erigeron philadelphicus L. var. philadelphicus*	Philadelphia fleabane
				ID? Clasping-leaved species	
b		gr	o	*Erigeron strigosus Muhl.*	Daisy fleabane
p		fm	-	*Eupatorium rugosum Houtt.*	White snakeroot
				[see Agerotina altissima]	
p		fm	o	*Eurybia macrophylla (L.) Cass.*	Big-leaf aster
p		gr	-	*Helianthus*	Sunflower
p		fe	l	*Helianthus hirsutus Raf.*	hairy sunflower
				ID? Not flowering yet. Might be H. strumosus. Base of blade not as truncate as in hirsutus; not as taperd as in strumosus. Petiole distinct, 5mm+	
p	N	gr	o	*Hieracium aurantiacum L.*	Orange hawkweed
b		fe	u	*Lactuca biennis (Moench) Fern.*	Two-flowered Cynthia
b		lk	u	*Lactuca canadensis L.*	Canada wild lettuce
				ID? near lakeshore in shade.	
p		gr	a	*Solidago canadensis L.*	Canada goldenrod
				ID: interpreted as S. canadensis in the broad sense	
p		fm	u	*Solidago flexicaulis L.*	Zig-zag goldenrod
p		fe	o	*Solidago gigantea Ait.*	Giant goldenrod
p		fe	u	*Symphyotrichum (cordate-leaved, serrate)*	cordate-leaved aster group
				ID: one of the arrow-leaved asters. Not flowering when seen.	
p		lk	u	*Symphyotrichum lanceolatum (Willd.) G.L.*	Panicled aster
				ID? Immature	
p		fe	o	*Symphyotrichum lateriflorum (L.) A. Löve & D.*	Panicled aster
p	N	gr	l, o	*Tanacetum vulgare L.*	Dandelion
p	N	lk	u	*Taraxacum officinale F. H. Wiggers*	Common dandelion
Balsaminaceae				**Touch-me-not Family**	
a		wet	c	*Impatiens capensis Meerb.*	Jewelweed, Touch-me-not
Berberidaceae				**Barberry Family**	
w	N	fm	u	*Berberis thunbergii DC.*	Japanese barberry
p		fm	o	*Caulophyllum thalictroides (L.) Michx.*	Blue Cohosh
Betulaceae				**Birch Family**	
w		lk	l	*Alnus incana (L.) Moench ssp. rugosa (Du Roi)*	Speckled alder
w		rd	u	*Betula papyrifera Marsh.*	Paper birch
w		fm	u	*Carpinus caroliniana Walt. ssp. virginiana*	Blue beech, Musclewood
w		fm	o	*Ostrya virginiana (Mill.) K. Koch*	Ironwood

Boraginaceae				**Borage Family**	
	b		fe	o	*Hackelia* ID: either nodding or Virginia stickseed.	Stickseed; Beggar's Lice
Brassicaceae					**Mustard Family**	
	p	N	fe	l	*Alliaria petiolata (Bieb.) Cavara & Grande*	Garlic-mustard
	b	n	gr	u	*Barbarea vulgaris R. Br.* ID? withered; seed pods like yellow rocket	yellow rocket
Cannabaceae					**Hemp Family**	
	?		lk	l	*Humulus lupulus L.*	common hops
Caprifoliaceae					**Honeysuckle Family**	
	w	N	rd	a	*Lonicera (Shrub)* All of the invasive, non-native honeysuckle shrubs (listed below) can be lumped into one group for simplicity. They are very similar in habit and	Honeysuckle (shrub)
	w	N	rd	-	*Lonicera bella Zabel*	pretty honeysuckle
	w	N	rd	-	*Lonicera morrowii Gray*	Morrow's honeysuckle
	w	N	rd	-	*Lonicera tatarica L.*	Tartarian Honeysuckle
	w		rd	u	*Sambucus canadensis L.*	Common elderberry
	w		pp	-	*Sambucus pubens Michx.* [see S. racemosa]	Red-berried elder
	w		pp	u	*Sambucus racemosa L.*	red-berried elder
	w		lk	u	*Viburnum lentago L.*	Nannyberry
	w		lk	l	*Viburnum opulus L. var. americanum Aiton* ID? Plants crowded, browsed, but habitat is perfect; need better specimens to rule out the European invasive called Guelder rose.	High-bush cranberry
	w		fe	o	*Viburnum rafinesquianum Schultes*	Downy arrowwood
	w			-	*Viburnum trilobum Marsh.* [see V. opulus var. americanum]	High-bush cranberry
Caryophyllaceae					**Pink Family**	
	a	N	lk	u	*Stellaria* ID? wide-leaved, hairy stem, clambering	Chickweed; Starwort
	a	N	wet	u	*Stellaria media (L.) Vill.* ID? wide-leaved, smooth-stemmed, clambering	Common chickweed
Celastraceae					**Staff-tree Family**	
	w		fm	u	*Celastrus scandens L.*	Climbing bittersweet
Cornaceae					**Dogwood Family**	
	w		fe	o	*Cornus alternifolia L. f.*	Pagoda dogwood
Fabaceae					**Pea or Bean Family**	
	a		fm	c	*Amphicarpaea bracteata (L.) Fern.*	Hog-peanut
	p		fm	c	*Desmodium glutinosum (Muhl. ex Willd.) Wood*	Pointed-leaved tick-trefoil
Fagaceae					**Beech Family**	
	w		fm	o	*Quercus alba L.*	White oak
	w		lk	r	*Quercus ellipsoidalis E. J. Hill*	Northern pin oak
	w		fe	u	*Quercus macrocarpa Michx.*	Bur oak

	w		fm	c	*Quercus rubra L.* — Northern red oak
Geraniaceae					**Geranium Family**
	p		fm	o	*Geranium maculatum L.* — Wild geranium
Grossulariaceae					**Saxifrage Family**
	w		fe	u	*Ribes cynosbati L.* — Prickly gooseberry
Hamamelidaceae					**Witch-hazel Family**
	w	N	fe	r	*Hamamelis virginiana L.* — Witch-hazel
Juglandaceae					**Walnut Family**
	w		fe	u	*Carya cordiformis (Wang.) K. Koch* — Bitternut hickory ID? Seedlings only and near other planted trees (black walnut and witch-hazel); can't rule out a planted hickory with similar leaflets.
	w	N	fe	l	*Juglans nigra L.* — Black walnut
Lamiaceae					**Mint Family**
	a	N	wet	c	*Galeopsis tetrahit L.* — Hemp-nettle ID? Not yet flowering.
	p	N	lk	o	*Glechoma hederacea L.* — Creeping charlie
	p	N	lk	u	*Leonurus cardiaca L.* — Motherwort
	p		lk	r	*Lycopus americanus Muhl.* — Cut-leaved bugleweed
	p	n			*Origanum vulgare L.* — Wild marjoram ID? escaped garden plant
	p		wet	u	*Scutellaria lateriflora L.* — Mad-dog skullcap
Myrsinaceaae					**Myrsine Family**
	p		wet	o	*Lysimachia ciliata L.* — Fringed loosestrife
	p		fm	o	*Trientalis borealis Raf.* — Starflower [or see Lysimachia borealis in Myrsinaeae]
Oleaceae					**Olive Family**
	w		fm	-	*Fraxinus* — Ash ID? seedlings difficult to ID to species.
	w		fm	c	*Fraxinus americana L.* — White ash
	w		fm	u	*Fraxinus nigra Marsh.* — Black ash
	w		fm	o	*Fraxinus pennsylvanica Marsh.* — Green ash
Onagraceae					**Evening-primrose Family**
	p		fm	c	*Circaea lutetiana L. ssp. canadensis (L.) Asch.* — Enchanter's nightshade
Oxalidaceae					**Wood-sorrel Family**
	p		rd	o	*Oxalis (stricta or dillenii)* — Yellow wood-sorrel ID: common yellow-flowered wood sorrels are lumped into this group
Plantaginaceae					**Plantain Family**
	p	N	rd	u	*Plantago major L.* — Common plantain
Polygonaceae					**Smartweed Family**
	?		lk	r	*Rumex britannica L.* — Great water dock ID? Immature. Growing in lagoon pool at Lake edge.

p			r	*Rumex orbiculatus A. Gray* [see Rumex britannica]	Great water dock
Primulaceae				**Primrose Family**	
p		fm	c	*Trientalis borealis Raf.* [see Myrsinaceae]	Starflower
Pyrolaceae				**Shinleaf Family**	
p		fm	r	*Pyrola elliptica Nutt.*	Common pyrola
Ranunculaceae				**Buttercup Family**	
p		fm	-	*Actaea* ID? vegetative shoots difficult to ID to species; both red baneberry and white baneberry are here.	Baneberry
p		fm	r	*Actaea pachypoda Ell.*	White baneberry
p		fm	o	*Actaea rubra (Ait.) Willd.*	Red baneberry
p		fm	o	*Anemone quinquefolia var. quinquefolia*	wood anemone
p		fm	-	*Anemonella thalictroides (L.) Spach* [see Thalictrum thalictroides]	Rue-anemone
p		fm	u	*Ranunculus abortivus L.*	Kidney-leaf buttercup
b		wet	u	*Ranunculus recurvatus Poir.*	Hooked crowfoot
p		fm	c	*Thalictrum dioicum L.*	early meadow-rue
p		fm	o	*Thalictrum thalictroides (L.) A.J. Eames & B.*	rue anemone
Rhamnaceae				**Buckthorn Family**	
w	N	fm	a	*Rhamnus cathartica L.*	Common buckthorn
Rosaceae				**Rose Family**	
?		wet	u	*Geum canadense Jacq.*	White avens
p		wet	u	*Potentilla simplex Michx.*	Old-field cinquefoil
w		fm	u	*Prunus serotina Ehrh.*	Black cherry
w		fe	u	*Prunus virginiana L.*	Choke cherry
w		fe	u	*Rubus (Blackberry-low)* ID: "low-blackberries" or dewberries are better lumped in a group	Blackberry - complex (low)
w		fe	o	*Rubus (Blackberry)* ID: tall blackberries have wicked thorns; mostly like R. Alleg; can't rule out other species	Blackberry - complex
w		fe	c	*Rubus allegheniensis Porter*	Common blackberry
w		fe	u	*Rubus occidentalis L.*	Black raspberry
w		wet	u	*Rubus strigosus Michx.* [see R. idaeus]	Red raspberry
w		lk	r	*Sorbus* ID? seedling only.	Mountain-ash
Rubiaceae				**Madder Family**	
p		wet	u	*Galium asprellum Michx.*	Rough bedstraw
p		fm	u	*Galium concinnum T. & G.*	Shining bedstraw
p		fm	c	*Galium triflorum Michx. var. triflorum*	Three-flowered bedstraw
Salicaceae				**Willow Family**	
w		fe	u	*Populus tremuloides Michx.*	Trembling aspen

	w		lk	r	*Salix amygdaloides Anderss.* — Peach-leaved willow ID? A large, tree willow; inaccessible
Scrophulariaceae					**Figwort Family**
	b	N	gr	u	*Verbascum thapsus L.* — common mullein
Solanaceae					**Nightshade Family**
	p	N	fe	c	*Solanum dulcamara L.* — Bittersweet nightshade
Tiliaceae					**Linden Family**
	w		fm	a	*Tilia americana L.* — Basswood
Ulmaceae					**Elm Family**
	w		fm	o	*Celtis occidentalis L.* — Hackberry
	w		fm	o	*Ulmus* — Elm ID? seedlings, small trees with no low branches are difficult to ID.
	w		fm	o	*Ulmus americana L.* — American elm
	w		fm	o	*Ulmus rubra Muhl.* — Red elm, slippery elm
Urticaceae					**Nettle Family**
	p		wet	o,	*Laportea canadensis (L.) Wedd.* — Wood nettle
	a		wet	o	*Pilea* — Clearweed ID? One of two very similar Pilea species.
	p		wet	u	*Urtica dioica L. ssp. gracilis (Ait.) Selander* — Stinging nettle
Verbenaceae					**Vervain Family**
	p		lk	u	*Phryma leptostachya L.* — lopseed
Violaceae					**Violet Family**
	p		fm	u	*Viola* — Violet ID? maybe V. sororia, common blue violet
	p		fm	c	*Viola pubescens Ait.* — yellow violet
Vitaceae					**Grape Family**
	wv			-	*Parthenocissus inserta (Kerner) Fritsch* — Virginia creeper [see Parthenocissus vitacea]
	vw		fm	a	*Parthenocissus vitacea (Knerr) Hitchc.* — Virginia creeper
	wv		fe	o	*Vitis riparia Michx.* — Wild grape

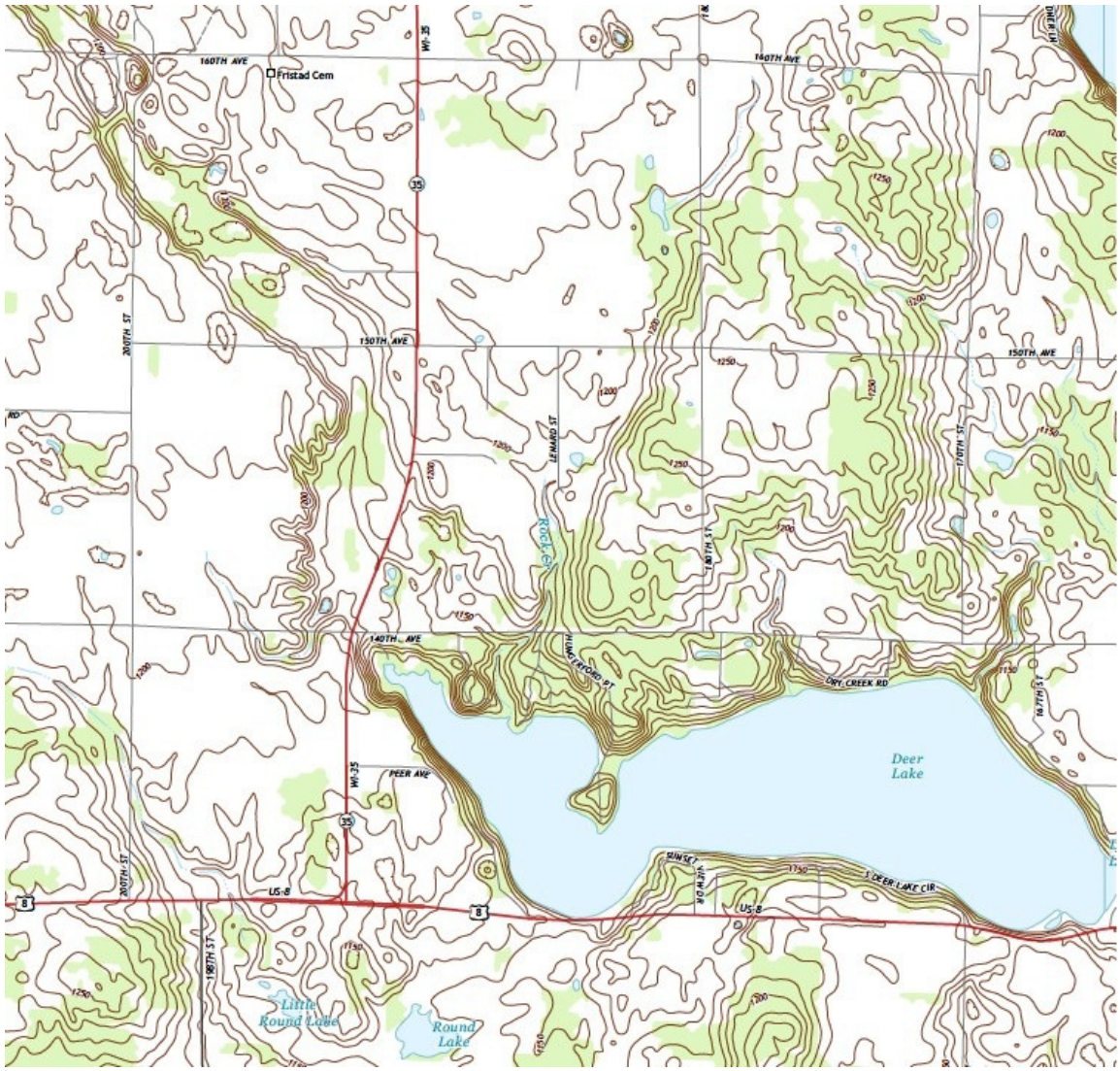
Angiosperms - Monocots

Araceae					**Arum Family**
	p		fm	o	*Arisaema triphyllum (L.) Schott* — Jack-in-the-pulpit
	p		lk	l	*Calla palustris L.* — Wild calla
Cyperaceae					**Sedge Family**
	p		wet	u	*Carex (ovales)* — Oval sedges (complex) ID? ovales-group, not C. scoparia
	p		fm	u	*Carex arctata Boott* — Drooping woodland sedge
	p		fm	u	*Carex blanda Dewey* — Common wood sedge
	p		lk	r	*Carex comosa Boott* — Bottlebrush sedge ID? Immature dense spike, pediceled.

p		wet	u	*Carex crinita Lam.* ID? clearly crintia-ilke; either crinita or gynandra.	Caterpillar sedge
p		fm	o	*Carex deweyana Schwein.*	Dewey's sedge
p		fm	c	*Carex gracillima Schwein.*	Graceful sedge
p		fm	c	*Carex intumescens Rudge var. fernaldii Bailey*	Inflated sedge
p		lk	u	*Carex lacustris Willd.* ID? No spike but habit, size, stem-base like C. lacustris	Lake sedge
p		wet	u	*Carex lupulina Willd.*	Hop sedge
p		fm	c	*Carex pedunculata Muhl. ex Willd.*	Long-stalked sedge
p		fm	c	*Carex pensylvanica Lam.*	Pennsylvania sedge
p		fm	c	*Carex radiata (Wahlenb.) Small*	eastern star sedge
p		wet	r	*Carex retrorsa Schwein.* ID? Immature. Dense spikes, not pediceled or drooping as in C. comosa.	Retrorse sedge
p		fm	c	*Carex rosea Schkuhr ex Willd.*	Sedge, straight-styled wood
p		wet	u	*Carex scoparia Schkuhr ex Willd.* ID? Clearly scoparia-like with rel. long tapered spikes clustered (but not tight) at end of culm.	Pointed broom sedge
p		fe	u	*Carex sparganioides Muhl. ex Willd.* ID? This is the difficult C. sparganioides group. Large, robust plants with long arching culms, on old logging road with Rubus.	Bur-reed sedge
p		fe	u	*Carex sprengelii Spreng.*	Sprengel's sedge
p		fe	u	*Carex tenera Dewey* ID? Immature. Typical of tenera; slender, leafy culm, lvs narrow and soft, spikes not congested.	marsh straw sedge
p		wet	u	*Carex tuckermanii Dewey*	Tuckerman's sedge
p		wet	u	*Scirpus cyperinus (L.) Kunth* ID? vegetative clump at wetland edge with typical S.c. leaf texture and shape.	Woolgrass
Dioscoreaceae				**Yam Family**	
p		fm	o	*Dioscorea villosa L.*	Wild yam
Iridaceae				**Iris Family**	
p		lk	u	*Iris versicolor L.* ID? inaccessible; likely versicolor but need to confirm	Blue flag
Lemnaceae				**Duckweed Family**	
p		lk	a	*Lemna* ID? Probably Lemna turionifera which is common to abundant in our area; formerly all lumped into Lemna minor, lesser duckweed.	Duckweed
Liliaceae				**Lily Family**	
p	N	gr	u	*Asparagus officinalis L.*	Asparagus
p		fe	l	*Clintonia borealis (Ait.) Raf.* ID is fine. Odd to find it in a single patch. Appears as if introduced. By old Baker Road.	Blue-bead lily
p	N	fe	l	*Hemerocallis fulva (L.) L.* ID: not flowering; probably H. fulva.	Day lily

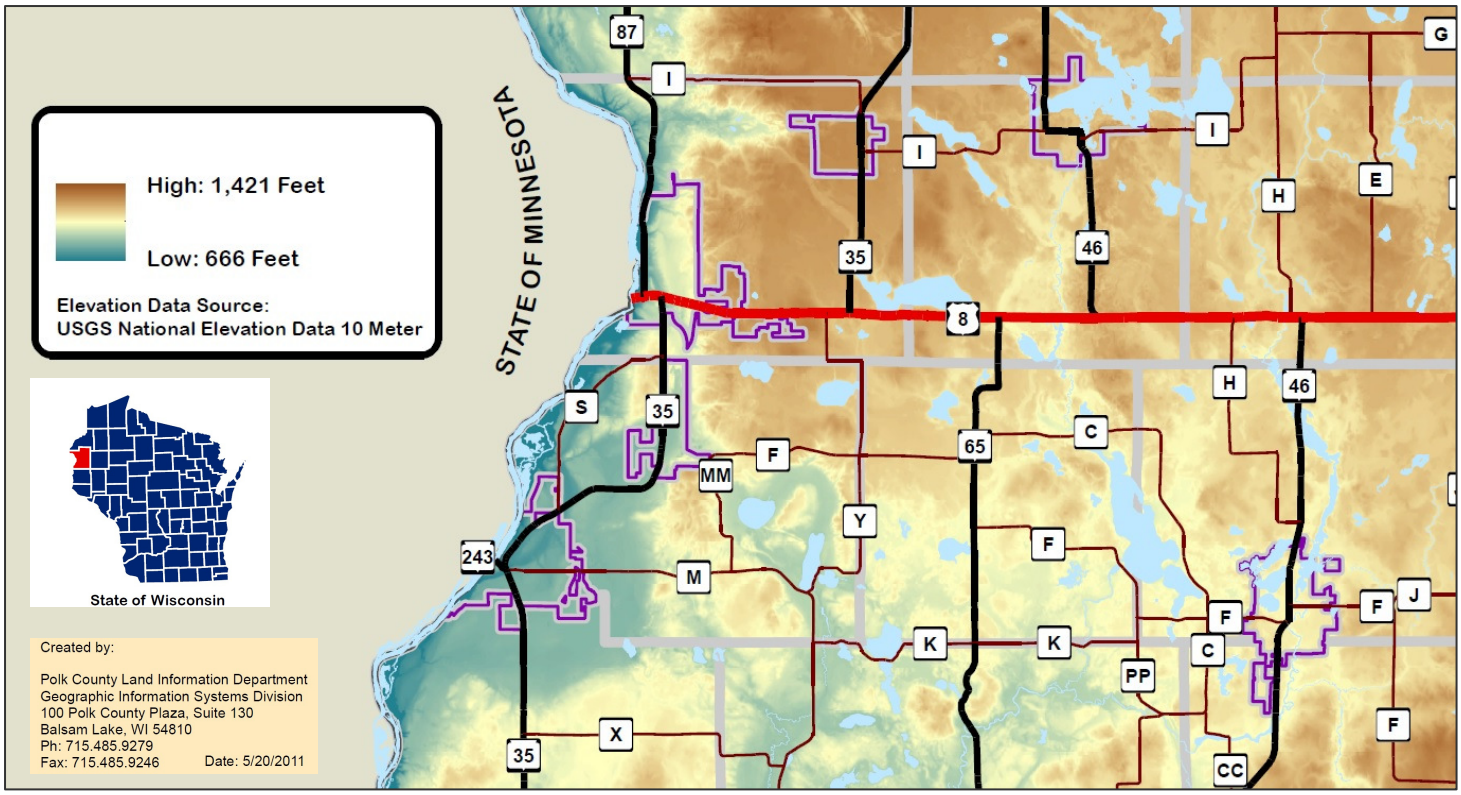
p		fm	o	*Maianthemum canadense Desf.*		Canada mayflower
p		fm	o	*Maianthemum racemosum (L.) Link ssp.*		Starry false Solomon's-seal
p		fm	u	*Polygonatum pubescens (Willd.) Pursh*		Hairy Solomon's-seal
p		fm	-	*Smilacina racemosa (L.) Desf.*		False Solomon's-seal
				[see Maianthemum]		
p		fm	-	*Smilax*		Greenbrier; Catbrier
				[see Smilacaceae]		
wv		fm	-	*Smilax hispida Torr.*		Green-briar
				[see Smilacaceae; S. tamnoides]		
p		fm	o	*Trillium grandiflorum (Michx.) Salisb.*		Large-flowered trillium
				ID? Vegetative shoots assumed to be all T. grandiflora. One indiv in fruit was grandiflora.		
p		fm	o	*Uvularia sessilifolia L.*		Pale bellwort
Poaceae				**Grass Family**		
p	N	gr	a	*Agrostis stolonifera L.*		Redtop
p		fm	o	*Brachyelytrum erectum (Schreb.) Beauv.*		Bearded short-husk
p	N	gr	a	*Bromus inermis Leyss.*		Smooth brome
p		fm	o	*Bromus pubescens Muhl. ex Willd.*		Hairy brome
p		fe	u	*Elymus hystrix L.*		Bottlebrush grass
p		lk	u	*Elymus virginicus L.*		Virginia wild-rye
				ID: Immature. Clearly Elymus; probably virginicus; maybe villosus.		
p		fm	-	*Festuca obtusa Biehler*		Nodding fescue
				[see F. subverticillata]		
p		fm	c	*Festuca subverticillata (Pers.) E.B.Alexeev*		nodding fescue
p		wet	o	*Glyceria striata (Lam.) Hitchc.*		Fowl manna grass
p		lk	u	*Leersia oryzoides (L.) Swartz*		Rice cut grass
				ID? not flowering yet. Taller than probable L. virginica.		
p		fe	u	*Leersia virginica Willd.*		White grass
				ID? not flowering yet. Edge of logging road in forest; typical habitat.		
p		fm	u	*Milium effusum L. var. cisatlanticum Fern.*		Woodland millet-grass
p		fm	c	*Oryzopsis asperifolia Michx.*		Mountain rice-grass
p			u	*Oryzopsis racemosa (Smith) Ricker*		Black-fruited rice-grass
				[see Piptatherum]		
p	N	wet	o	*Phalaris arundinacea L.*		Reed canary grass
p	N	gr	o	*Phleum pratense L.*		Timothy
		fm	u	*Piptatherum racemosum (Sm.) Barkworth*		black-fruited rice grass
p	N	lk	u	*Poa compressa L.*		Canada bluegrass
?	N	gr	o	*Poa pratensis L.*		Kentucky bluegrass
p		fm	u	*Schizachne purpurascens (Torr.) Swallen*		False melic grass
Smilacaceae				**Catbrier Family**		
v		fm	u	*Smilax*		Carrion flower; catbriar
				ID? appears to be one of the herbaceous, non-prickly carrion flowers		
v		fm	o	*Smilax tamnoides L.*		greenbrier
				ID: this is the prickly species: greenbriar (syn: S. hispida)		

Topography of the Deer Lake – 10-foot Contour Intervals



Shaded Relief Map of the Deer Lake Vicinity

Deer Lake took its shape 10,000 to 15,000 years ago as stagnant glacial ice was melted out of a buried tunnel valley leaving behind what is now a lake.



Lines
red: Highway 8
dark lines: State and County roads
purple: municipalities
light gray: township boundaries

Portion of Polk County map by B. Delaney, July 2014.

The entire Polk County Shaded Relief map is available from the Polk County Land Information Department at their website. It is modfied here to highlight the west-central portion of Polk County