

Management Plan  
Reichert Nature Preserve  
December 2014



LEGACY LAND CONSERVANCY

## **Management Plan for the Reichert Nature Preserve**

**Putnam Township, Livingston County and Dexter Township, Washtenaw County, Michigan**

Prepared by Dana Wright  
Legacy Stewardship and Volunteer Coordinator  
December 2014

This document contains a description of Reichert Nature Preserve, management objectives, and management actions. Management actions are broken down into short term (0-3 years), mid term (3-8 years), as well as immediate and annual needs. Where possible the personnel, time, and cost required for implementing specific management actions are estimated and additional resources and references are suggested. Due to the complexity of this site and the objectives, it is recommended that the Plan be updated in 2-3 years.



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# INTRODUCTION

## Legacy Land Conservancy Preserves

Legacy Land Conservancy (Legacy) seeks to preserve and make available to the public, land that represents a variety of locations, functions and ecosystem types. The specific characteristics of the property and availability of assets and resources, such as funding or community involvement also influence the selection of properties to preserve.

## Classification

The Reichert Nature Preserve is open to the public for quiet recreational use with permission from Legacy. Such uses as educational group exploration, hiking, cross country skiing and bird watching are encouraged. No motorized vehicles or bicycles are allowed on the property when operated by the members of the general public, with the exception of battery or electric power driven devices operated by a person with a mobility disability.

The table below summarizes the selection criteria and the role Reichert Nature Preserve fulfills within the broader framework:

**Preserve: Reichert**

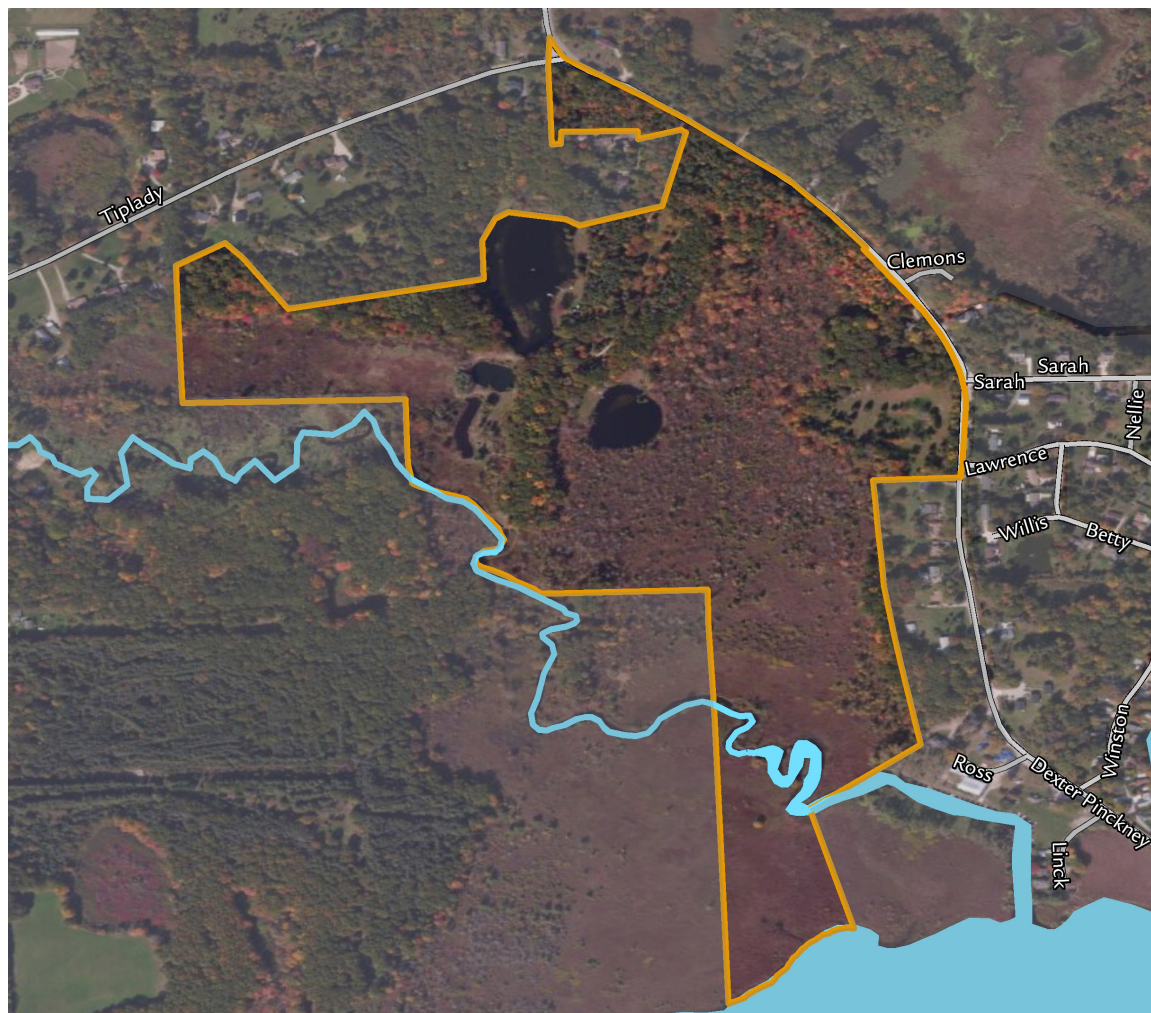
**Location: Livingston and Washtenaw County border**

|                                    |                                              |          |                          |  |                          |  |                                      |  |               |          |                     |
|------------------------------------|----------------------------------------------|----------|--------------------------|--|--------------------------|--|--------------------------------------|--|---------------|----------|---------------------|
| <b>Assets/<br/>Characteristics</b> | High Quality                                 |          | Low Acquisition<br>Costs |  | Low Stewardship<br>Costs |  | Preserve Adopter<br>Potential        |  | Size          |          |                     |
| <b>Function</b>                    | Teaching Tool/<br>Educational<br>Opportunity |          | Research Potential       |  | Urban Preserve           |  | Proximity to other<br>Protected Land |  | Community Use |          |                     |
| <b>Ecosystem</b>                   | Prairie                                      | Woodland | River<br>Corridor        |  | Fen                      |  | Bog                                  |  | Marsh         | Farmland | Organic<br>Farmland |



## General Property Description

This 92-acre preserve bridges the border of Washtenaw and Livingston Counties and was formally deeded to Legacy Land Conservancy by Dr. Rudy Reichert in 2012. The rolling, wooded terrain, kettle lakes, and frontage along Little Portage Lake and the Portage River represent a generous and welcome addition to our public preserves.



**Map 1** Aerial Image of the Reichert Nature Preserve (note: boundaries are approximate) (data source: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community)

## Land Use History

Historically too wet for agriculture and development, this land has been left largely unaltered. In the early to mid 1900's several attempts were made to farm the upland areas with unsatisfactory results due to the sandy, gravelly soils. Since Dr. Reichert's purchase of the land in 1964, impoundments were installed and several ponds were dredged, enlarging them for swimming and other passive recreation. Docks were installed, and a small cabin, several picnic shelters, multiple benches and a bridge were built throughout the property. Trails were created on the upland areas of the land, most of which are accessible using an electric golf cart. Several areas were cleared of trees for other recreation use; a few acres became pasture for the Reichert family horses, and another area became a small golf course. Along with tending a large vegetable garden, the family planted numerous flowers and trees around the benches, docks and cabins.

At the time Legacy acquired the property, the gardens, golf course, pasture and many of the structures were no longer being maintained.

## Acquisition

The property was donated by Dr. Rudolph Reichert to Legacy in December of 2012. Six years earlier Dr. Reichert put the land into conservation easement held by Legacy and Livingston Land Conservancies jointly. At the time of the gift in 2012, the conservation easement was passed to Livingston Land Conservancy. This property is unique among Legacy's preserves for the additional protection of this conservation easement. This easement is an additional consideration in all management practices.

## Surrounding Uses

The preserve is 1.5 miles south of the Village of Pinckney. Most of the surrounding land is rural residential in nature. The 11,000-acre Pinckney State Recreation Area is within two miles.

## Connectivity

The Reichert lands preserve another portion of the complex of hundreds of kettle lakes that form an arc from Adrian and Jackson in the south to Bloomfield Hills in the north. Waterloo, Pinckney, and Brighton State Recreation Areas also lie within this important arc of land. The Reichert Preserve extends the green corridor of Waterloo and Pinckney Recreation Areas toward Brighton Recreation Area.

With Portage Creek running through the property it is connected hydrologically to the lands upstream in Waterloo, and downstream to Little Portage Lake and the Huron River. Efforts to acquire more land adjacent to the preserve and the creek are important in protecting the water quality in the Huron River Watershed.

Adjacent land use is rural residential with large lot sizes and is included in the wetland complex centered in the Reichert Preserve.

## Existing Resources/Assets

The Preserve was gifted to Legacy with the existing caretaker, Nick Rayer, who lives on the property with his wife and has managed it since the original purchase by Dr. Reichert. Nick has been an invaluable resource and continues to mow select areas, maintain the



**Figure 1** Nick Rayer, caretaker, and Dr. Rudolph Reichert

buildings and trails, and take care of dead, dying, and fallen trees throughout the Preserve.

The Preserve's docks, cabins, benches, and other material improvements mark the Reichert family's history on the land and provide places to gather for walks and other educational opportunities.

At the time of the gift of the Preserve, Dr. Reichert also gave Legacy two small adjacent residential building lots to be sold to endow the property for stewardship. Those lots have been sold and a fund created to support management activities on the Reichert Preserve.

## Purpose of the Plan

The purpose of this management plan is to provide a framework to guide management of the Reichert Nature Preserve. The plan provides current and future land managers, stewards, and the community at large with information about the Preserve to aid in ensuring long term protection.

The primary management objective for the Reichert Nature Preserve is to balance management of the special habitats found here with community access and educational opportunities.



**Figure 2** Water lily (*Nymphaea odorata*) is a common native plant which grows in the ponds at the Reichert Nature Preserve.



## SITE DESCRIPTION

### Ecology

The rolling, wooded terrain, kettle lakes, and frontage along Little Portage Lake and Portage Creek represent a diversity of habitats that once were common in this part of the state. The property is part of the kettle-kame complex found in the interlobate region of southeastern Michigan, with dry oak forest on the kames and a vast wetland complex in the depressional areas. A botanical survey of the Preserve was completed by Beverly Walters, Research Museum Collection Manager at The University of Michigan Herbarium, over the summer and fall of 2014. The survey, which included observations of numerous locally rare and state-listed plant species, documented a Floristic Quality Index of 71 for the Preserve. This underscores the botanical importance and diversity of natural communities found on the Preserve.

The Preserve is dominated by wetlands characterized by MNFI (Michigan Natural Features Inventory) as:

**Southern Wet Meadow:** an open, groundwater-influenced, sedge-dominated wetland. Open conditions are maintained by seasonal flooding, beaver-induced flooding, and fire. Sedges in the genus *Carex*, in particular tussock sedge (*Carex stricta*), dominate the



**Figure 3** Butterflies enjoy the riparian buffers at the Preserve populated with native wetland species. Common milkweed (*Asclepias syriaca*) seen here.

community\*. This area has an excellent population of cordgrass (*Spartina pectinata*). There has been only one invasive species seen - a small amount of purple loosestrife on the west side.

**Emergent Marsh:** a shallow-water wetland along the shores of lakes and streams characterized by emergent narrow- and broad-leaved herbs and grass-like plants as well as floating-leaved herbs.

## Ecology continued

Common plants include spike-rushes (*Eleocharis spp.*), pond-lilies (*Nuphar spp.*), pickerel weed (*Pontederia cordata*), arrowheads (*Sagittaria spp.*), bullrushes (*Schoenoplectus spp.*), and cat-tails (*Typha spp.*)\*.

**Southern Shrub Carr:** a moderate to long persistent successional shrub community typically occurring on saturated, organic soil and is characterized by fluctuating water levels and poor drainage conditions. This community is dominated by willows (*Salix spp.*), dogwoods (*Cornus spp.*), winterberry (*Ilex verticillata*), and bog birch (*Betula pumila*) and is successional intermediate toward forested wetlands such as rich tamarack swamp and southern hardwood swamp.

**Rich Tamarack Swamp:** a groundwater-influenced forested wetland dominated by tamarack (*Larix laricina*)\*.

Upland portions of the preserve are mostly **Dry Mesic Oak Forest** in varying degrees of health. This is a fire-dependent, oak-dominated forest type. Frequent fires maintain semi-open conditions, promoting oak regeneration and ground and shrub layer diversity\*. The high quality dry mesic oak forest on the glacial esker supports a number of plants rarely seen in Washtenaw County including yellow pimpernel (*Taenidia integerrima*) and two state listed species: dwarf hackberry (*Celtis tenuifolia*) and red

mulberry (*Morus rubra*).

Additionally, the open oak woods near the caretaker's house supports some locally uncommon native plants typical of oak savannas: false dandelion (*Krigia biflora*) and wood-betony (*Pedicularis canadensis*). West of this area, near the elevated stand, there is a small population of large-leaved shinleaf (*Pyrola elliptica*) which is not encountered often in Washtenaw County.

More detail on community types in Appendix D.

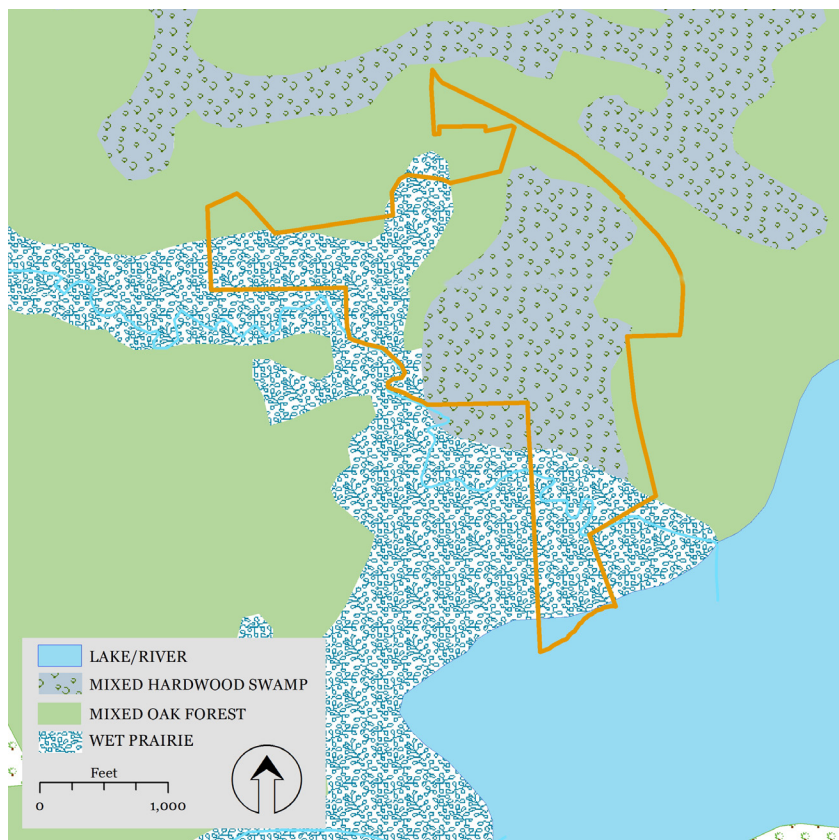
### Detailed botanical inventory in Appendix E

\*Community type descriptions from <http://mnfi.anr.msu.edu/mnfi/communities/index.cfm> and can also be found in detail in Appendix D



## Presettlement Vegetation Types

Pre-settlement vegetation is very similar to present day conditions, excepting areas which were cleared for farming and replanted with pines or kept open. The area is dominated by wet prairie and swamp, with a central, finger-shaped area as well as edge areas of upland of oak forest.



**Map 2** Pre-settlement vegetation type map of the Reichert Preserve and surrounding area (data source: MNFI).

## Topography

The preserve is topographically flat with elevation ranging only from 870-900 feet above sea level.



**Map 3** Topographic map of the Reichert Preserve and surrounding area (data source: USGS).



## Soils

BnC & BrC -Boyer loamy sand, 6-12% slopes — 29% of total

BrB - Boyer loamy sand, 2-6% slopes — .1% of total

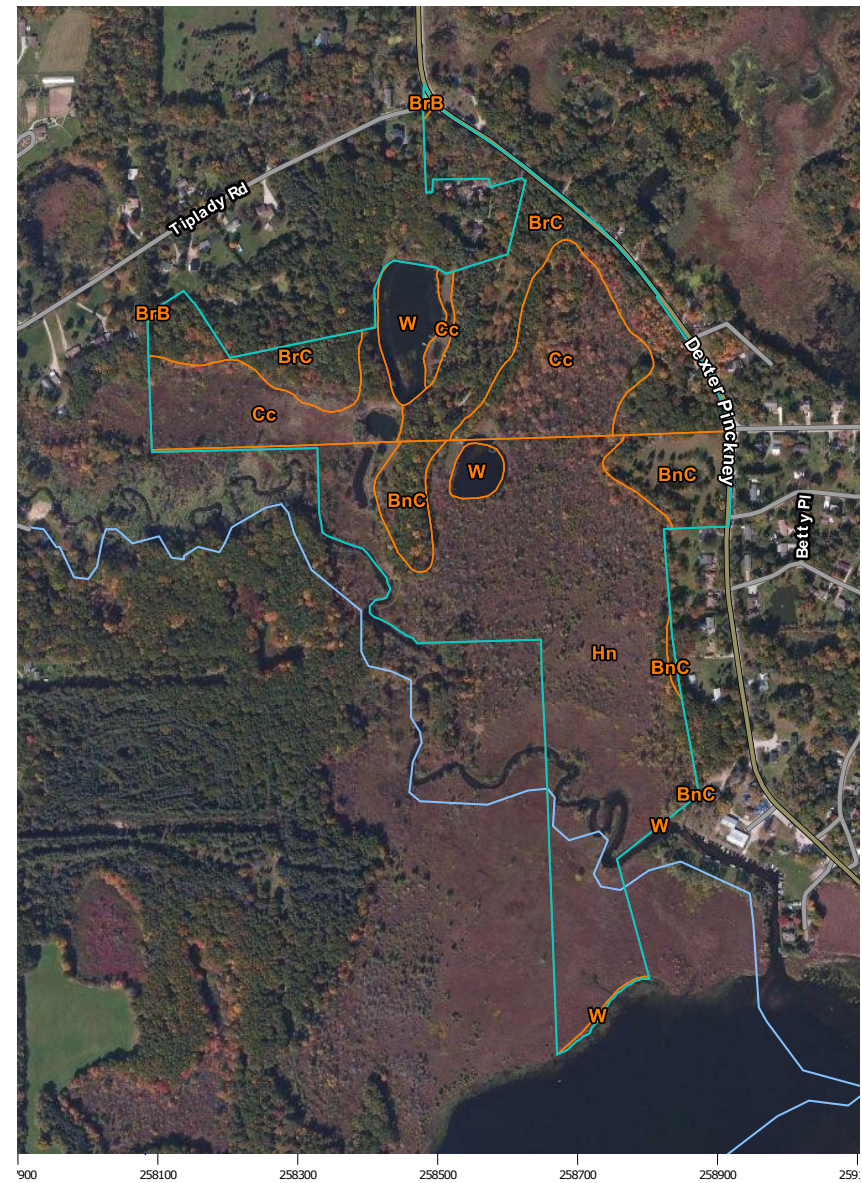
Cc - Carlisle muck — 20% of total

Hn - Houghton muck — 46.2% of total

W - Water —4.7% of total

The Preserve's soils are primarily muck, with loamy sand in the uplands areas. Because the preserve spans two counties, reported data reflects changes in soil types, though it is not likely that soils would change at county boundary.

\*For more information about specific soil types and a more complete report see Appendix C



**Map 4** Soil types present in the Preserve.



## Hydrology

The landforms of the Preserve were shaped by glacial activity. Boyer soils are present in moraines left over from deposits in glacial rivers. The central, finger-shaped upland area was once the bottom of a glacial river. As the glacier melted, soil deposits were left behind. The existing ponds were depressional areas formed by settling and melting of the last glaciers.

In the 1960's three ponds were created by installing impoundments on existing hydrologically connected depressional areas. The areas were dredged to enlarge and deepen them and to remove aquatic vegetation. When the largest pond (Big Lake) was dredged a central



**Figure 4** View of Devil's Lake showing the northern edge of the Tamarack Swamp



**Figure 5** Portage Creek at the Preserve

island was created by piling of the dredged spoils. In the winter, sand was loaded on top of plastic to smother bottom vegetation, creating a sandy bottom for swimming in the largest pond. Devil's Lake, an existing pond, was also dredged to enlarge it by one-third its original size. In 2010 the ponds were re-dredged.

Portage Creek flows along the western edge of the Washtenaw County portion of the property, then through the middle of the southern-most leg, draining into Little Portage Lake. The property boasts approximately 2,200 feet of Portage Creek frontage and 27 acres of Little Portage Lake.

# MANAGEMENT OBJECTIVES

## Overview of Objectives

The primary management goals for Reichert Nature Preserve involve balancing restoration and maintenance of the natural areas with educational goals and public access.

- **Maintain and enhance the value of the Preserve as a natural area for the enjoyment of local residents and visitors to the Pinckney area.**
- **Maintain and improve riparian health along the banks of the creek and ponds.**
- **Maintain pine plantations to ensure invasive-free status by facilitating native, natural succession as trees die.**
- **Maintain and expand invasive-free areas as time and budget allow.**
- **Identify and secure further source(s) of long-term funding for the Preserve.**
- **Implement a fire regime: wetlands every 2-6 years, woods every 1-4 years.**
- **Slowly reduce mowed areas and add these areas to the burn regime.**
- **Enhance the Preserve's biodiversity by restoring the old field/pasture area to prairie.**



**Figure 6** Education through discovery.



**Figure 7** Michigan lily on the Preserve.



## HISTORY: Donor Intent

Dr. Reichert and his family approached Legacy Land Conservancy with an interest in honoring the late Sue Reichert's (wife/mother) wishes to have the property protected and available to the community as an educational resource and respite. Her influences are seen in the native plantings and gardens around the cabins, benches, and other structures. Dr. Reichert's legacy of quiet introspection is evident in the well-placed and well-used benches, viewing tower, and sunset gazebo overlooking one of the ponds. The property, referred to as "The Farm" by the family, was regularly host to local Scout groups and other community organizations. The family's wishes are to maintain their parents' legacy and relationships with community groups.

Dr. Reichert also made provisions for "The Farm" to be doubly protected by placing a conservation easement on the property in 2006. When the property was deeded to Legacy in 2012, Livingston Land Conservancy became holder of the easement, thereby protecting the property from intentional development in every possible way. Additionally, in the gift agreement Dr. Reichert required access to the Preserve to be by written permission only. This limited access requirement was not an effort to keep the public out, but rather to protect this special place for everyone's enjoyment.



**Figure 8** Dr. Rudy Reichert in 2007



## Management Status

The area within the Preserve has been maintained for the last 40 years as a recreation property for the Reichert Family. Prior to the family's occupancy, Units F and E (see Map 5 on page 19) were cleared and planted with pines which are now mature and dying. Part of Unit F was cleared by the family for the famous Reichert Three-Hole Golf Course. Unit H was cleared and farmed unsuccessfully by previous owners and used as pasture by the Reichert Family. During the Family's ownership, Unit D was planted (as recommended by the Soil Conservation District) with honeysuckle to control erosion. This is the most degraded oak woodland present on the site. Units A, C, and D have been mostly undisturbed and are the most ecologically intact areas on the property. Areas around the ponds were cleared and mowed, and gardens were planted. These more manicured areas have been somewhat neglected in the last 10 years.

## OBJECTIVES: Education

Legacy seeks to incorporate educational goals with management of the property. Legacy hosts annual botanical hikes and has formed ongoing relationships with Laughing Duck Environmental Education Center and the Michigan Botanical Club. Laughing Duck is a local organization dedicated to inspiring care, conservation, and responsibility through outdoor activities. Laughing Duck uses the Preserve for much of their programming. The Michigan Botanical Club is the native plant society for the state.

Other educational plans involve: opening the Preserve once again to Scout groups and other outdoor education-focused groups, and installing educational signage throughout the preserve encouraging educational discovery and play.



**Figure 9** Hikers in the Preserve watch a pair of Sandhill Cranes.

## Structure Maintenance

Unlike Legacy's other preserves, the Reichert Nature Preserve is home to quite a few structures (see Map 6 on page 20). Most of these structures were built 20-35 years ago and are/ have been in need of repair. Legacy's goal is to balance personal and ecological safety with accessibility of the unique features available at the Preserve.

Development of maintenance or removal plans for all structures is important in achieving these goals.

All structures on the Preserve will be inspected annually by staff, including the cabins, and maintained as needs arise. At this time the intent is to maintain both of the Preserve's cabins.

Docks on the Preserve will be either removed or made safe. Legacy will maintain the floating dock on Big Lake, an access platform on Big Lake, and a kayak access dock from Portage Creek. All other water structures will be or have been removed.

The wetland viewing platform and gazebo are newer structures which were not approved as permanent structures and will be removed when they become no longer safe.



**Figure 10** Floating dock repair in the fall of 2014

The Preserve's observation tower is simultaneously an obvious resource and a unique problem. Currently the tower is locked and access is extremely limited. As funds and expertise become available the tower will be repaired and possibly modified to ensure it is consistent with pertinent building codes. At such time access will be granted for staff-attended events.

## Restoration

Management is broken up into “units” grouped by similar outcome. Management units are determined by looking at existing ecology types as well as future use of the area.

Restoration on the Preserve involves varied management techniques across the different management units. Overall, the goal is to return as much of the Preserve as possible to pre-settlement vegetation types, encouraging habitat regeneration for native animals. Areas which have been used recreationally will be maintained for public use and will not be restored to wild or inaccessible condition.



**Figure 11** David Mindell of PlantWise lays down a line of fire, extinguishing one side of the line as the fire moves outward and leaving a blackened area or “burn break” on the outside of the burn unit while the fire creeps into the interior.

## Invasive Species Control

Much of the restoration on this preserve will involve removing invasive species using hand pulling, selective herbicide treatment, and prescribed fire.

Herbaceous invasive species present at the preserve include: garlic mustard (*Allaria petiolata*), dame’s rocket (*Hesperis matronalis*), Japanese hedge parsley (*Torilis japonica*), bittercress (*Cardamine impatiens*), spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*), common motherwort (*Leonurus cardiaca*), and purple loosestrife (*Lythrum salicaria*). Invasive shrubs and vines on the preserve include: tree-of-heaven (*Ailanthus altissima*), autumn olive (*Elaeagnus umbellata*), honeysuckle (*Lonicera spp*), common buckthorn (*Rhamnus cathartica*), multiflora Rose (*Rosa multiflora*), Oriental bittersweet (*Celastrus orbiculatus*), and myrtle (*Vinca minor*).

Many of these invasives are only minimally present. Efforts should be made to target the immature and outlying populations first.



# IMPLEMENTATION

## Management Units

Nine distinct units have been identified to facilitate management of the Preserve:

**Unit A:** Southern Wet Meadow

**Unit B:** Southern Dry Forest - low quality

**Unit C:** Southern Dry Forest - high quality

**Unit D:** Emergent Marsh/Rich Tamarack Swamp

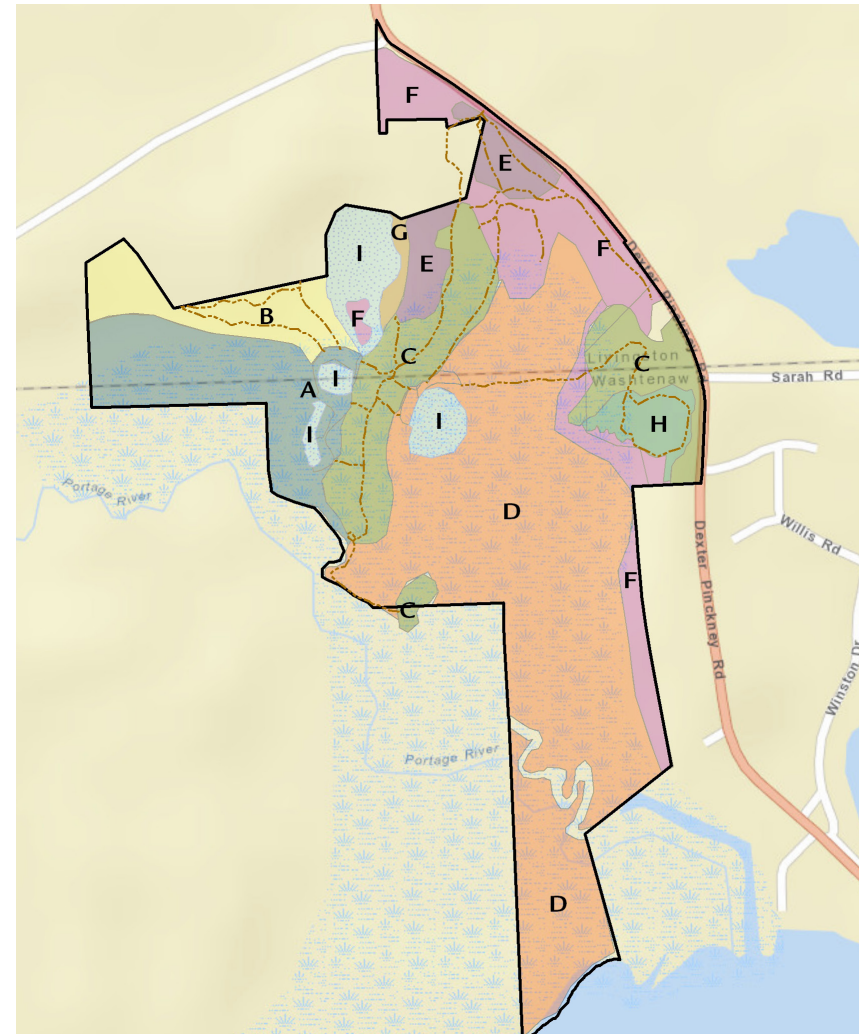
**Unit E:** Planted Pines

**Unit F:** Dry Mesic Southern Forest

**Unit G:** Recreation Area

**Unit H:** Mowed Area - old pasture

**Unit I:** Riparian - Ponds including 10-20 foot buffer strips



**Map 5 Reichert Nature** Preserve management units (note: boundaries are approximate)

## Structure Key

- A:** Bath House
  - B:** Covered Seating for six
  - C:** Covered Seating for four
  - D:** Tool Shed
  - E:** Look-out Tower
  - F:** Wetland Viewing Platform
  - G:** Sunset Gazebo
  - H:** Reichert Building
- Caretaker's Homestead**
- I:** Nick's Tree House
  - J:** Shed
  - K:** Barn
  - L:** Workshop
  - M:** Caretaker's Home
  - N:** Carport



**Map 6 Reichert Nature Preserve** structures (note: boundaries are approximate)

# Management Actions

**1. Conduct a biological survey** of animal species (see Appendix E for plant inventory data). In order to identify all species present within an area, a survey should be conducted at least 3 times: spring, summer, and fall. The time required to conduct a survey varies depending on plant community, travel time, size and accessibility of site, and surveyor. An inventory of 10 acres would average about 2 hours per visit (3), amounting to approximately 30-40 minutes/acre.

**2. Identify a set of EcoStewards to help maintain the preserve.** These volunteers work independently to manage adopted plots of land and projects within the preserve. Staff are needed for education, tool lending, documentation of activities, and planning.

|                   |                                                                    |
|-------------------|--------------------------------------------------------------------|
| Time Frame:       | Immediately                                                        |
| Personnel Needed: | Contract Professional or Professional Volunteer                    |
| Estimated Cost:   | \$1,400 - \$2,400                                                  |
| Approximate Time: | 70 Hours                                                           |
| Resources:        | David Mifsud<br>Herpetological Resource Management<br>313-268-6189 |
|                   |                                                                    |
| Time Frame:       | Immediately                                                        |
| Personnel Needed: | Staff                                                              |
| Approximate Time: | 5-10 hours per volunteer per year                                  |



**3. Install Legacy Land Conservancy Preserve signage** at parking lot, borders, lakes, and other boundaries. Install a trail map and educational sign at Preserve entrances. A sign with a map of the Preserve, trails, and adjacent trail systems should be installed to aid visitors in navigating the Preserve. Additionally, an educational sign with information about Legacy, the Preserve, its ecosystems, and rare, notable, and invasive species would enhance the visitor's experience and provide additional publicity for Legacy.

**4. Investigate opportunity to purchase adjoining parcels.**

The wetland complex in the Preserve continues onto adjacent lands to the northeast, the west and the south. Protection of adjoining parcels will increase the positive impact of the Preserve.

**5. Maintain and update a species list.**

An ongoing list of animals and plants observed on site will build the Preserve's species database and allow us to track changes over time. A species list maintained on Legacy's website can also serve to further engage the community in the Preserve's attributes as a natural and educational resource.

|                   |                                                                         |
|-------------------|-------------------------------------------------------------------------|
| Time Frame:       | <b>Immediately for entrance sign/within 3-5 years for other signage</b> |
| Personnel Needed: | <b>Staff, volunteer, or student to design maps and signs</b>            |
| Estimated Cost:   | <b>\$200/sign type</b>                                                  |
| Approximate Time: | <b>8-10 hours to install, plus time for designing and ordering</b>      |

|                   |                    |
|-------------------|--------------------|
| Time Frame:       | <b>Immediately</b> |
| Personnel Needed: | <b>Staff</b>       |
| Approximate Time: | <b>80 hours</b>    |

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| Time Frame:       | <b>Within 0-3 years</b>                                  |
| Personnel Needed: | <b>Staff or volunteer</b>                                |
| Approximate Time: | <b>2-3 hours to create, 1-3 hours per year to update</b> |

## 6. Maintain and improve trail system.

Immediate trail needs:

a) Install a trail to connect parking area to preserve proper.

b) Upgrade boardwalk between units C and D.

Maintenance trail needs:

a) Maintain hiking trails with trail markers and trim back vegetation. Maintain primary two-track through the Preserve going to Big Lake, to the Reichert Building, and to the caretaker's burn pile on the Reichert Family Trust parcel. All other two-tracks should revert to hiking trails.

|                   |                                      |
|-------------------|--------------------------------------|
| Time Frame:       | <b>Immediately</b>                   |
| Personnel Needed: | <b>Staff or volunteer</b>            |
| Approximate Time: | <b>3-4 hours for immediate needs</b> |
| Tools:            | <b>Chainsaw, handsaw, paint</b>      |

|                   |                             |
|-------------------|-----------------------------|
| Time Frame:       | <b>0-2 years</b>            |
| Personnel Needed: | <b>Staff or volunteer</b>   |
| Estimated Cost:   | <b>\$400</b>                |
| Approximate Time: | <b>8 hours</b>              |
| Tools/supplies:   | <b>Lumber, saws, screws</b> |

|                   |                                     |
|-------------------|-------------------------------------|
| Time Frame:       | <b>ongoing</b>                      |
| Personnel Needed: | <b>Staff/caretaker or volunteer</b> |
| Approximate Time: | <b>16-20 hours/year</b>             |

## 7. Structure Maintenance

- a) Annual inspections of all structures. Staff will look for rotting wood, water leakage, roofing issues, animal damage, structural instability, and wind and storm damage.
- b) Any maintenance requirements will be prioritized and implemented according to use.
- c) Repair the Big Lake access platform to make a safe place for kids to be close to the water for pond dipping.
- d) Modify current dock in Portage Creek for kayak access.
- e) Remove remaining dock on Devil's Lake. Re-purpose lumber as appropriate for other projects on site.

|                   |                                         |
|-------------------|-----------------------------------------|
| Time Frame:       | <b>Immediately</b>                      |
| Personnel Needed: | <b>Staff and/or qualified volunteer</b> |
| Approximate Time: | <b>8 -16 hours</b>                      |

|                   |                                         |
|-------------------|-----------------------------------------|
| Time Frame:       | <b>Immediately</b>                      |
| Personnel Needed: | <b>Staff and/or qualified volunteer</b> |
| Estimated Cost:   | <b>\$500 per year</b>                   |
| Approximate Time: | <b>24-32 hours</b>                      |

|                   |                                         |
|-------------------|-----------------------------------------|
| Time Frame:       | <b>Within 0-3 years</b>                 |
| Personnel Needed: | <b>Staff and/or qualified volunteer</b> |
| Estimated Cost:   | <b>\$250</b>                            |
| Approximate Time: | <b>30 hours</b>                         |

|                   |                                         |
|-------------------|-----------------------------------------|
| Time Frame:       | <b>Within 0-3 years</b>                 |
| Personnel Needed: | <b>Staff and/or qualified volunteer</b> |
| Estimated Cost:   | <b>\$50</b>                             |
| Approximate Time: | <b>10 hours</b>                         |

|                   |                                         |
|-------------------|-----------------------------------------|
| Time Frame:       | <b>Within 0-3 years</b>                 |
| Personnel Needed: | <b>Staff and/or qualified volunteer</b> |
| Approximate Time: | <b>6 hours</b>                          |



**7. Monitor for oak wilt.** Oak wilt is a fungus that affects red oak species. It spreads underground through roots and/or by insect vectors. Symptoms of the disease include leaf discoloration and wilting followed by rapid death. Trees are often defoliated within a few weeks of becoming infected. Managing for oak wilt includes preventing new infection centers (removing infected trees, avoiding injuries to healthy trees), controlling existing infection centers (trenching to disrupt grafted root systems to form “barrier lines”). **The Reichert Preserve may have oak wilt present.**  
Reference information available in Appendix F.

**8. Implement a plan if oak wilt is present.** Building and implementing a plan will require input from experts in the field. The cost of the project will vary greatly depending on the permeation of oak wilt on the Preserve.

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Time Frame:       | <b>Immediately</b>                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Personnel Needed: | <b>Staff and volunteers</b>                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Approximate Time: | <b>10-20 hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Resources:        | <b>Phillip S. Kurzeja</b><br><b>Forest Health Stewardship &amp; Urban</b><br><b>Forestry Unit Oak Wilt Mapping/</b><br><b>Community Outreach</b><br><b>Phone: (517) 284-5906</b><br><b>Cell: (517) 803-7129</b><br><b>e-mail: kurzejap@michigan.gov</b><br><b>Julie Crick</b><br><b>Natural Resources Educator</b><br><b>MSU Extension</b><br><b>Phone: (989)275-7179</b><br><b>Cell: (989)390-0317</b><br><b>e-mail: crickjul@anr.msu.edu</b> |

## 9. Restoration and invasive species removal.

### Unit A - Southern Wet Meadow

a) Burn every 2-4 years

b) Monitor reed canary grass population for balanced populations (don't let it take over).

c) Cut and treat purple loosestrife (*Lythricum salicaria*) with wetland approved herbicide, or use “bloody glove” method. Population is along Portage Creek near the Reichert Building cabin.

### Unit B - Degraded Southern Dry Forest

a) Burn every 2-4 years as areas are cleared of invasive shrubs(see above for reference information).

b) Remove invasive shrubs starting with eastern end of unit moving west.

|                   |                                                                      |
|-------------------|----------------------------------------------------------------------|
| Priority:         | <b>First</b>                                                         |
| Time Frame:       | <b>Immediately</b>                                                   |
| Personnel Needed: | <b>Contractor for Burn - PlantWise or Restoring Nature With Fire</b> |
| Estimated Cost:   | <b>\$100-\$500/acre depending on size</b>                            |
| Approximate Time: | <b>8 hours</b>                                                       |

|                   |                            |
|-------------------|----------------------------|
| Priority:         | <b>First</b>               |
| Time Frame:       | <b>Immediately</b>         |
| Personnel Needed: | <b>Volunteer/Staff</b>     |
| Approximate Time: | <b>10 hours</b>            |
| Tools needed:     | <b>Camera and GPS unit</b> |

|                   |                                                                     |
|-------------------|---------------------------------------------------------------------|
| Priority:         | <b>First</b>                                                        |
| Time Frame:       | <b>June-July</b>                                                    |
| Personnel Needed: | <b>Staff/volunteers</b>                                             |
| Approximate Time: | <b>8 hours</b>                                                      |
| Tools:            | <b>Cotton glove, protective gear and glyphosate-based herbicide</b> |

|                   |                                                           |
|-------------------|-----------------------------------------------------------|
| Priority:         | <b>First</b>                                              |
| Time Frame:       | <b>July-February</b>                                      |
| Personnel Needed: | <b>Staff/volunteers</b>                                   |
| Approximate Time: | <b>190 hours</b>                                          |
| Tools:            | <b>Brush blade, hand saws, glyphosate-based herbicide</b> |

## 9. Restoration and invasive species removal continued.

### Unit B - Degraded Southern Dry Forest continued.

c) Hand pull herbaceous invasives (garlic mustard, motherwort, dame's rocket, bittercress, Japanese hedge parsley, and Canada thistle present).

d) As invasives are removed from area re-seed with natives collected from Unit C.

### Unit C - Southern Dry Forest

a) Burn every 2-4 years (see Unit A for reference information).

b) Sweep and remove all herbaceous invasive species.

c) Remove invasive shrubs starting at southern end of ridge unit and moving north, then moving to unit near caretakers home.

d) Collect native seed for re-seeding other units.

|                   |                           |
|-------------------|---------------------------|
| Priority:         | <b>Third</b>              |
| Time Frame:       | <b>As able March-July</b> |
| Personnel Needed: | <b>staff/volunteers</b>   |
| Approximate Time: | <b>120 hours</b>          |

|                   |                               |
|-------------------|-------------------------------|
| Priority:         | <b>First</b>                  |
| Time Frame:       | <b>As seeds are available</b> |
| Personnel Needed: | <b>staff/volunteers</b>       |
| Approximate Time: | <b>10 hours</b>               |

|                   |                        |
|-------------------|------------------------|
| Priority:         | <b>First</b>           |
| Time Frame:       | <b>Annually</b>        |
| Personnel Needed: | <b>Staff/volunteer</b> |
| Approximate Time: | <b>120 hours</b>       |
| Tools:            | <b>Hand pull</b>       |

|                   |                                                               |
|-------------------|---------------------------------------------------------------|
| Priority:         | <b>First</b>                                                  |
| Time Frame:       | <b>Annually July-February</b>                                 |
| Personnel Needed: | <b>Staff/volunteers</b>                                       |
| Approximate Time: | <b>190 hours</b>                                              |
| Tools:            | <b>Brush blade, loppers, saws, glyphosate-based herbicide</b> |

|                   |                               |
|-------------------|-------------------------------|
| Priority:         | <b>First</b>                  |
| Time Frame:       | <b>As seeds are available</b> |
| Personnel Needed: | <b>staff/volunteers</b>       |
| Approximate Time: | <b>5 hours</b>                |



## 9. Restoration and invasive species removal continued.

### Unit D - Emergent Marsh

a) CAREFULLY burn every 2-4 years. Note this area has many poison sumac trees and should NEVER be burned in the growing season or in the fall when leaves are still present. Early spring burns should be undertaken with care.(See Unit A for burn cost reference information.)

b) Monitor annually for presence of invasives.

c) Remove *phragmites* along the creek in the southern end of the unit. Use cut and treat method with Rodeo or similar glyphosate-based herbicide approved for wetland use. Remove cut plants to reduces the nutrient load in the creek.

|                   |                         |
|-------------------|-------------------------|
| Priority:         | <b>First</b>            |
| Time Frame:       | <b>Annually</b>         |
| Personnel Needed: | <b>Staff/volunteers</b> |
| Approximate Time: | <b>8 hours/year</b>     |

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Priority:         | <b>Second</b>                                    |
| Time Frame:       | <b>0-3 years</b>                                 |
| Personnel Needed: | <b>Staff/volunteer</b>                           |
| Approximate Time: | <b>96 hours</b>                                  |
| Tools:            | <b>Loppers, saws, glyphosate-based herbicide</b> |

## 9. Restoration and invasive species removal continued.

### Unit E - Planted Pines

- a) Slowly take down dead and dying pine trees. As areas open up seed in species collected from Unit C and transplant oak and hickory saplings from other units. Pines harvested from this unit could be milled and used for structure maintenance and repair.

### Unit F - Degraded Dry Mesic Southern Forest

- a) Remove dead and dying pine trees that pose a threat to hikers or nearby roads.
- b) Remove herbaceous invasives (garlic mustard, motherwort, dame's rocket, bittercress, Japanese hedge parsley, and Canada thistle present) starting in unit near caretakers home moving first south, then north.
- c) Remove invasive shrubs starting in unit near caretakers home moving to the south first, then north. As areas open up seed in species collected from Unit C and transplant oak and hickory saplings from other units.

|                   |                           |
|-------------------|---------------------------|
| Priority:         | <b>Second</b>             |
| Time Frame:       | <b>Annually 0-3 years</b> |
| Personnel Needed: | <b>Staff/volunteers</b>   |
| Approximate Time: | <b>50 hours total</b>     |
| Tools:            | <b>Chainsaw, tractor</b>  |

|                   |                          |
|-------------------|--------------------------|
| Priority:         | <b>First</b>             |
| Time Frame:       | <b>Annually</b>          |
| Personnel Needed: | <b>Staff/volunteers</b>  |
| Approximate Time: | <b>8 hours annually</b>  |
| Tools:            | <b>Chainsaw, tractor</b> |

|                   |                                          |
|-------------------|------------------------------------------|
| Priority:         | <b>Third</b>                             |
| Time Frame:       | <b>Annually</b>                          |
| Personnel Needed: | <b>Staff/volunteers</b>                  |
| Approximate Time: | <b>100 hours total</b>                   |
| Tools:            | <b>None. Hot compost plant materials</b> |

|                   |                                                               |
|-------------------|---------------------------------------------------------------|
| Priority:         | <b>Third</b>                                                  |
| Time Frame:       | <b>Annually July-February</b>                                 |
| Personnel Needed: | <b>Staff/volunteers</b>                                       |
| Approximate Time: | <b>190 hours total</b>                                        |
| Tools:            | <b>Brush blade, loppers, saws, glyphosate-based herbicide</b> |



## 9. Restoration and invasive species removal continued.

### Unit G - Recreation Area

- a) Mow and maintain fire pit as needed.

### Unit H - Old Field/Pasture

- a) Remove existing cool season grasses, invasive shrubs, and orchard trees to restore area to prairie.

Herbicide all cool season grasses two times in one year.

Remove all woody species from interior of unit (leave any oak saplings), and all invasives from fence rows/borders.

Prescribed burn

Seed in native prairie plants in a mix of grasses and forbes. Weight forbes to encourage pollinators.

- b) Prairie maintenance: prescribed burns every year for first 3 years, every other year following. (See Unit A for burn cost reference information.) Other weeding as necessary.

|                   |                     |
|-------------------|---------------------|
| Priority:         | <b>First</b>        |
| Time Frame:       | <b>Annually</b>     |
| Personnel Needed: | <b>Caretaker</b>    |
| Approximate Time: | <b>8 hours/year</b> |
| Tools:            | <b>Tractor</b>      |

|                        |                                                                                |
|------------------------|--------------------------------------------------------------------------------|
| Priority:              | <b>Second</b>                                                                  |
| Time Frame:            | <b>0-3 years</b>                                                               |
| -Herbicide#1           | <b>Spring</b>                                                                  |
| -Herbicide#2           | <b>Summer of same year</b>                                                     |
| -Woody species removal | <b>Late summer of same year</b>                                                |
| -Prescribed burn       | <b>Fall of same year or following spring</b>                                   |
| -Seeding               | <b>Directly following prescribed burn</b>                                      |
| Personnel Needed:      | <b>Staff/volunteers/contractor: PlantWise</b>                                  |
| Estimated Cost:        | <b>\$10,500</b>                                                                |
| Approximate Time:      | <b>80 hours for installation</b>                                               |
| Tools:                 | <b>Chainsaw, brushblade, herbicide, boom sprayer, handsaws, loppers, rakes</b> |

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| Priority:         | <b>First (after prairie installation)</b>                |
| Time Frame:       | <b>Annually</b>                                          |
| Personnel Needed: | <b>Staff/volunteer</b>                                   |
| Approximate Time: | <b>8 hours/year</b>                                      |
| Tools:            | <b>Glyphosate-based herbicide and sprayer, hand pull</b> |



## 9. Restoration and invasive species removal continued.

### Unit I - Ponds and Riparian Areas

a) Water bodies themselves require little maintenance unless invasive species such as Eurasian milfoil (*Myriophyllum spicatum*) become an issue. Monitor annually.

b) Buffer areas should be burned regularly, every 2-4 years (see Unit A for reference information).

c) Remove invasive species from all buffer areas.

|                   |                         |
|-------------------|-------------------------|
| Priority:         | <b>Second</b>           |
| Time Frame:       | <b>Annually</b>         |
| Personnel Needed: | <b>Staff/volunteers</b> |
| Approximate Time: | <b>2-3 hours</b>        |
| Tools:            | <b>Boat</b>             |

|                   |                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Priority:         | <b>First</b>                                                                                                                                             |
| Time Frame:       | <b>Annually</b>                                                                                                                                          |
| Personnel Needed: | <b>Staff/volunteers</b>                                                                                                                                  |
| Approximate Time: | <b>8-15 hours total</b>                                                                                                                                  |
| Tools:            | <b>Cut and herbicide woody species using brushblade herbicide purple loosestrife using “bloody glove” technique, hand pull other herbaceous species.</b> |



- 11. Evaluate effectiveness of management strategies.** Compare data from biological surveys with species diversity and abundance from other local natural areas, such as those managed by the City of Ann Arbor's Natural Area Preservation. Monitor for wetland indicator species. Monitor change over time as areas are restored.
- 12. Monitor Preserve use.** Work with neighbors and regular visitors to the Preserve to determine if use in the Preserve is within established guidelines.
- 13. Update management plan in the next 3 years,** then every 5-8 years thereafter.

## CONCLUSION

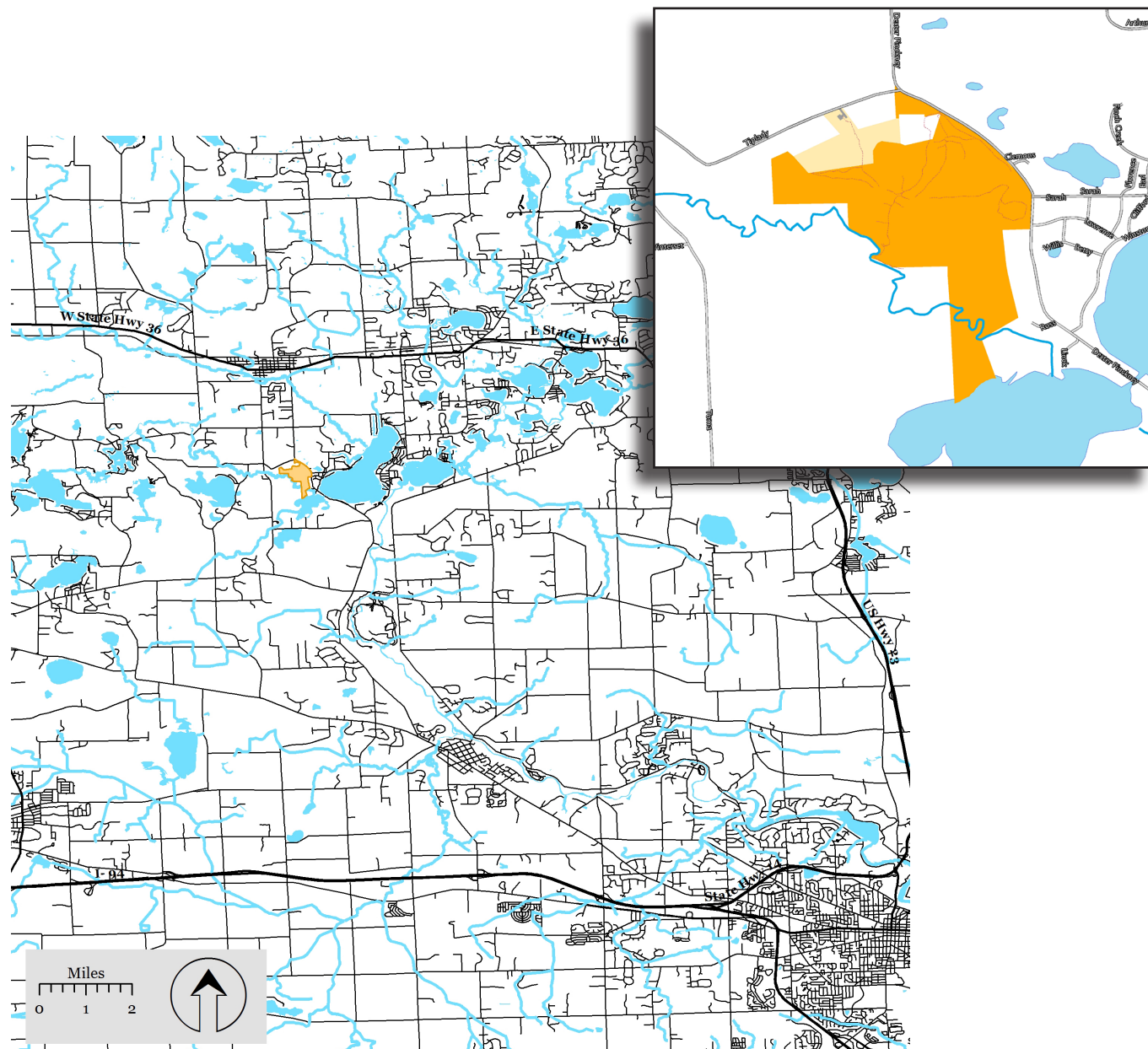
Reichert Nature Preserve possesses both increased opportunity for Legacy and increased responsibility due to the nature of a recreationally-used, high-quality natural area. With a Floristic Quality Index of 71, the Reichert Preserve is a top priority for management in order to protect this resource for the community.



## APPENDIX A

### Directions:

From Ann Arbor, take US-23 North for 4.3 miles to North Territorial Road. Head west on North Territorial for 8.3 miles to Dexter Pinckney Road. Follow Dexter Pinckney Road for 3.5 miles before turning left on Tiplady Road. The Preserve parking area is the second driveway on the left from the Dexter Pinckney/Tiplady intersection.



Location of the Reichert Nature Preserve (note: boundaries are approximate)  
(data source: CGI)



## APPENDIX B

### EXHIBIT A

#### LEGAL DESCRIPTION OF CONSERVATION EASEMENT

**Land in the Township of Putnam, Livingston County, Michigan more particularly described as follows:**

Part of the South 1/2 of Section 35, Town 1 North, Range 4 East described as follows: Commencing at the Southeast corner of said Section 35; thence along the South line of said Section 35, S. 89°57'00" W., 1220.79 feet to the point of beginning (said point also being more or less on the centerline of Dexter Pinckney Road); thence along said South line, S. 89°57'00" W., 1418.75 feet to the South 1/4 corner of said Section 35; thence along said South line, N. 89°23'49" W., 1310.91 feet to a point on the 1/8 line of said Section 35; thence along said 1/8 line, N. 00°15'46" E., 667.00 feet; thence N. 60°34'57" E., 197.04 feet; thence S. 30°28'25" E., 91.74 feet; thence N. 59°30'48" E., 5.74 feet; thence S. 30°29'12" E., 286.53 feet; thence N. 80°53'38" E., 706.81 feet to the edge of water as surveyed on 02-02-2006 said point also being traverse point "B"; thence along said edge of water 596.97 feet (more or less) to traverse point "C" said traverse point "C" being N. 54°01'37" E., 399.97 feet from said traverse point "B"; thence N. 74°57'31" E., 302.00 feet; thence N. 16°45'49" E., 356.63 feet to a point on the westerly Right-of-Way line of Dexter Pinckney Road (66' wide); thence along said Right-of-Way line N. 49°26'48" W., 18.73 feet; thence S. 71°52'56" W., 132.52 feet; thence 32.27 feet along an arc of a curve to the right, radius of 35.00 feet, central angle of 52°49'07", chord bears N. 81°42'31" W., 31.13 feet; thence N. 00°19'35" E., 43.20 feet; thence N. 89°40'25" W., 264.00 feet; thence S. 00°19'35" W., 48.83 feet; thence S. 72°34'14" W., 36.75 feet to a point on the North and South 1/4 line of said Section 35; thence along said North and South 1/4 line, N. 00°19'35" E., 375.00 feet to a point on the centerline of Tiplady Road (66 feet wide) more or less; thence along said centerline of Tiplady Road, N. 55°49'55" E., 59.69 feet; thence the following 13 courses along the centerline of Dexter Pinckney Road, more or less; 117.58 feet along an arc of a curve to the left, radius of 279.82 feet, central angle of 24°04'33", chord bears S. 46°12'21" E., 116.72 feet and S. 58°14'40" E., 205.86 feet and S. 49°26'48" E., 185.87 feet and S. 49°26'48" E., 322.00 feet and S. 48°20'12" E., 150.13 feet and S. 48°20'58" E. 21.86 feet and 213.92 feet along an arc of a curve to the right, radius of 1044.65 feet, central angle of 11°43'59", chord bears S. 42°28'58" E., 213.55 feet and S. 36°36'58" E., 103.30 feet and S. 35°12'08" E., 77.55 feet and S. 66°57'27" W., 11.43 feet and S. 39°03'44" E., 344.84 feet and S. 00°22'27" W., 21.48 feet and S. 19°55'30" E., 380.42 feet to the point of beginning.

Site containing:

2,048,204 square feet or 47.02 acres (gross).

1,976,537 square feet or 45.38 acres (calculated to the 33' Dexter Pinckney Rd.).

Tax Parcel No. 14-35-400-028.



A-1



**Land in the Township of Dexter, Washtenaw County, Michigan more particularly described as follows:**

TOGETHER WITH THE FOLLOWING DESCRIBED PREMISES: A part of the northwest fractional quarter of Section Two (2), Town One (1) South, Range Four (4) East, Dexter Township, described as follows: Beginning at the north quarter post of said Section Two (2), running thence west along the County Line 994.50 feet to an iron stake; thence south 85.0 feet to the center of a creek; thence southeasterly along the center of said creek to the intersection of the creek with the east and west quarter section line of said Section Two (2); thence east along the east and west quarter line 467.0 feet to the center post of said Section Two (2); thence north along the north and south quarter section line 970.0 feet to the point of beginning.

Tax Parcel No. 0402-200-001.

TOGETHER WITH THE FOLLOWING DESCRIBED PREMISES: Commencing at the Northeast corner of Section 2, thence South 89 degrees 17 minutes West 377.56 feet in the North line of said Section, thence South 89 degrees 57 minutes west 1185.70 feet in the North line of Section for a Place of Beginning, thence South 6 degrees 30 minutes West 396.16 feet, thence South 5 degrees 40 minutes West 170.00 feet, thence South 1 degree 30 minutes 30 seconds, East 174.33 feet, thence South 3 degrees 10 minutes East 194.78 feet to a point in the East and West quarter line, thence North 89 degrees 04 minutes West 934.55 feet in the East and West quarter line, to the center of the Section; thence Northerly in the North and South quarter line to the North quarter post of the Section, thence Easterly in the North line of the Section to the place of beginning, excepting: commencing at the center of Section, thence South 89 degrees 04 minutes East 598.38 feet in the East and West quarter line for a place of beginning, thence South 89 degrees 04 minutes East 275 feet to a point in the West line of highway, thence North 3 degrees 10 minutes West 191 feet; thence North 1 degree 30 minutes 30 seconds West 179.35 feet, thence North 5 degrees 40 minutes East 129.65 feet, thence North 89 degrees 04 minutes West 275 feet, thence South 5 degrees 40 minutes West 129.65 feet thence South 1 degree 30 minutes 30 seconds East 179.35 feet, thence South 3 degrees 10 minutes East 191 feet to the place of beginning, being a part of the Northeast fractional quarter of Section 2, Town 1 South, Range 4 East, Washtenaw County Michigan.

Tax Parcel No. 0402-125-001.

TOGETHER WITH THE FOLLOWING DESCRIBED PREMISES: Part of the southeast quarter of Section Two (2), Dexter Township, Washtenaw County, Michigan, beginning at the center of Section Two (2), Dexter Township, Washtenaw County, Michigan; thence south 89 degrees 4 minutes east 618.38 feet in the east and west quarter line; thence south 5 degrees 22 minutes east to a point in the northwesterly line of Lot Nine (9), Hell's Acres Subdivision; thence south 51 degrees 15 minutes west in said northwesterly line to the southwest corner of Lot Nine (9); thence south 52 degrees 47 minutes west 315 feet; thence south 17 degrees 10 minutes east 600 feet to a point on the shore of Little Portage Lake; thence southwesterly along said shore to the north and south quarter line of said Section Two (2), Dexter Township, Washtenaw County, Michigan; thence north along said north and south quarter line to the place of beginning, being a part of the southeast quarter of Town One (1) South, Range Four (4) East, Dexter Township, Washtenaw County, Michigan.

Tax Parcel No. 0402-400-001.

**SUBMITTED  
FOR RECORDING**

**AUG 25 2006**

Washtenaw County, MI  
Clerk Register's Office

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Lawrence Keslerbaum - Washtenaw



United States  
Department of  
Agriculture



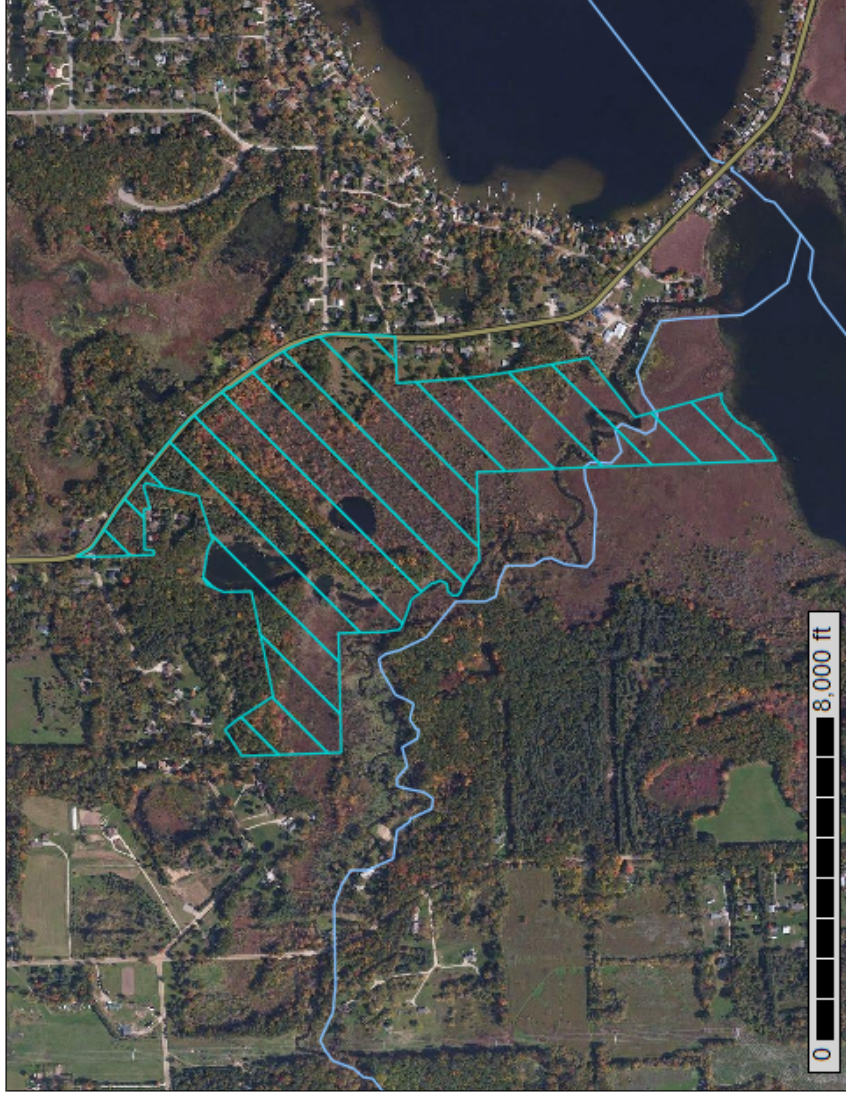
NRCS

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for Livingston County, Michigan, and Washtenaw County, Michigan

Reichert Nature Preserve



February 13, 2014



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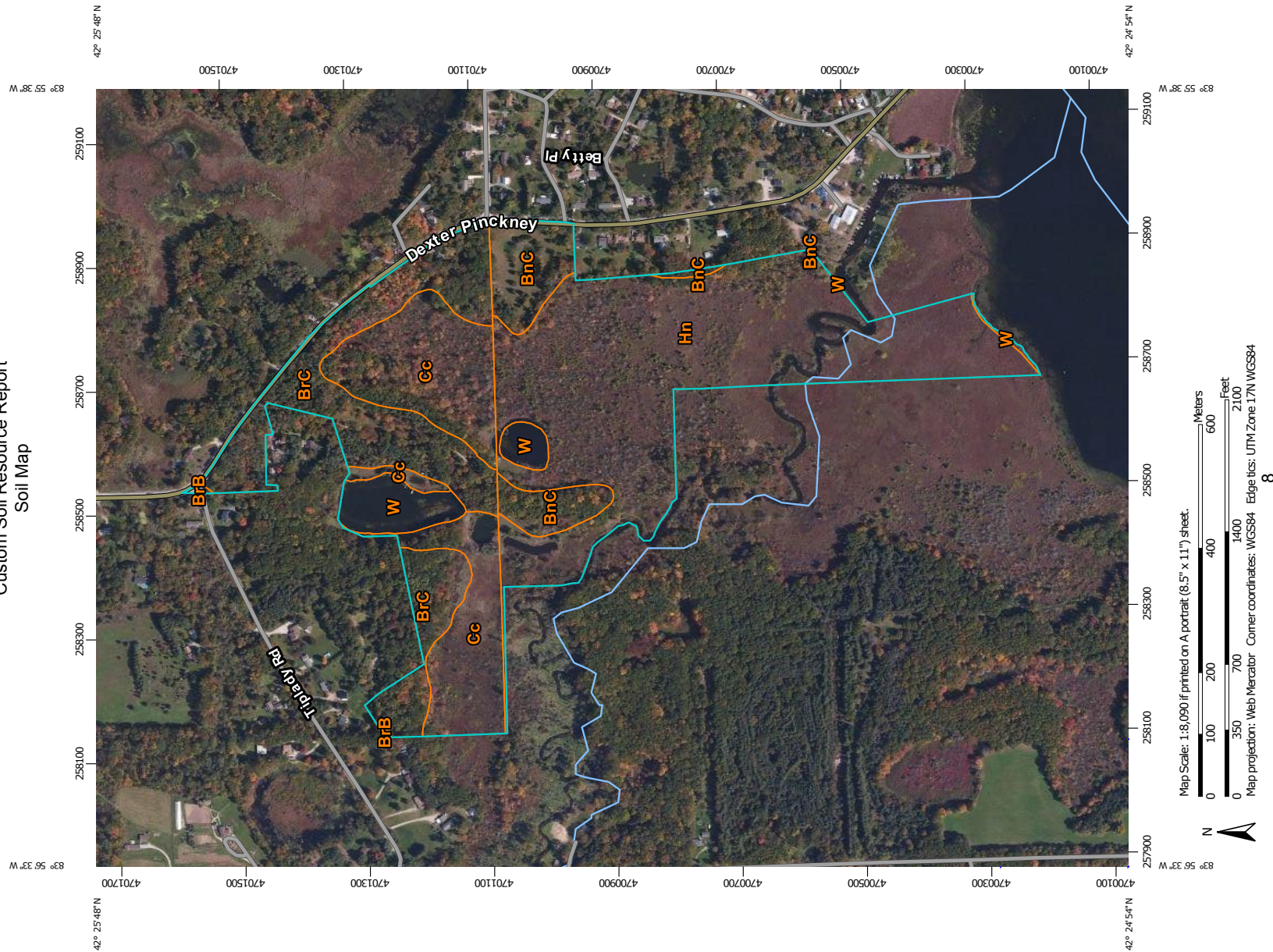
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Custom Soil Resource Report  
Soil Map



|                               |                                                                                       |                        |                                                                                   |                           |
|-------------------------------|---------------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------|---------------------------|
| <b>Area of Interest (AOI)</b> |    | Area of Interest (AOI) |  | Spoil Area                |
| <b>Soils</b>                  |    | Soil Map Unit Polygons |  | Stony Spot                |
|                               |    | Soil Map Unit Lines    |  | Very Stony Spot           |
|                               |    | Soil Map Unit Points   |  | Wet Spot                  |
| <b>Special Point Features</b> |    | Blowout                |  | Other                     |
|                               |    | Borrow Pit             |  | Special Line Features     |
|                               |    | Clay Spot              | <b>Water Features</b>                                                             | <b>Streams and Canals</b> |
|                               |    | Closed Depression      |  |                           |
|                               |    | Gravel Pit             | <b>Transportation</b>                                                             | <b>Rails</b>              |
|                               |    | Gravelly Spot          |  |                           |
|                               |    | Landfill               |  | Interstate Highways       |
|                               |    | Lava Flow              |  | US Routes                 |
|                               |    | Marsh or swamp         |  | Major Roads               |
|                               |  | Mine or Quarry         |  | Local Roads               |
|                               |  | Miscellaneous Water    | <b>Background</b>                                                                 | <b>Aerial Photography</b> |
|                               |  | Perennial Water        |  |                           |
|                               |  | Rock Outcrop           |                                                                                   |                           |
|                               |  | Saline Spot            |                                                                                   |                           |
|                               |  | Sandy Spot             |                                                                                   |                           |
|                               |  | Severely Eroded Spot   |                                                                                   |                           |
|                               |    | Sinkhole               |                                                                                   |                           |
|                               |    | Slide or Slip          |                                                                                   |                           |
|                               |    | Sodic Spot             |                                                                                   |                           |

## Map Unit Legend

| Livingston County, Michigan (MI093)   |                                          |              |                |
|---------------------------------------|------------------------------------------|--------------|----------------|
| Map Unit Symbol                       | Map Unit Name                            | Acres in AOI | Percent of AOI |
| BrB                                   | Boyer loamy sand, 2 to 6 percent slopes  | 0.1          | 0.1%           |
| BrC                                   | Boyer loamy sand, 6 to 12 percent slopes | 22.0         | 21.4%          |
| Cc                                    | Carlisle muck                            | 20.6         | 20.0%          |
| W                                     | Water                                    | 3.5          | 3.4%           |
| <b>Subtotals for Soil Survey Area</b> |                                          | <b>46.3</b>  | <b>44.9%</b>   |
| <b>Totals for Area of Interest</b>    |                                          | <b>103.1</b> | <b>100.0%</b>  |

| Washtenaw County, Michigan (MI161)    |                                          |              |                |
|---------------------------------------|------------------------------------------|--------------|----------------|
| Map Unit Symbol                       | Map Unit Name                            | Acres in AOI | Percent of AOI |
| BnC                                   | Boyer loamy sand, 6 to 12 percent slopes | 7.9          | 7.6%           |
| Hn                                    | Houghton muck                            | 47.6         | 46.2%          |
| W                                     | Water                                    | 1.4          | 1.3%           |
| <b>Subtotals for Soil Survey Area</b> |                                          | <b>56.8</b>  | <b>55.1%</b>   |
| <b>Totals for Area of Interest</b>    |                                          | <b>103.1</b> | <b>100.0%</b>  |



## Livingston County, Michigan

### BrB—Boyer loamy sand, 2 to 6 percent slopes

#### Map Unit Setting

*Elevation:* 840 to 1,010 feet  
*Mean annual precipitation:* 31 to 33 inches  
*Mean annual air temperature:* 47 to 48 degrees F  
*Frost-free period:* 136 to 173 days

#### Map Unit Composition

*Boyer and similar soils:* 93 percent  
*Minor components:* 7 percent

#### Description of Boyer

##### Setting

*Landform:* Glacial drainage channels, outwash plains, moraines  
*Landform position (two-dimensional):* Backslope, shoulder, summit, footslope, toeslope  
*Landform position (three-dimensional):* Rise  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex  
*Parent material:* Loamy over sandy and gravelly glaciofluvial deposits

##### Properties and qualities

*Slope:* 2 to 6 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 25 percent  
*Available water capacity:* Low (about 4.4 inches)

##### Interpretive groups

*Farmland classification:* Farmland of local importance  
*Land capability (nonirrigated):* 3s  
*Hydrologic Soil Group:* B

##### Typical profile

0 to 9 inches: Loamy sand  
 9 to 16 inches: Loamy sand  
 16 to 28 inches: Gravelly sandy loam  
 28 to 36 inches: Gravelly sandy clay loam  
 36 to 80 inches: Gravelly sand

#### Minor Components

##### Fox

*Percent of map unit:* 4 percent  
*Landform:* Valley trains, outwash plains, moraines  
*Landform position (two-dimensional):* Footslope, toeslope, backslope, shoulder, summit





## Custom Soil Resource Report

*Landform position (three-dimensional):* Rise  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex

### Oshtemo

*Percent of map unit:* 3 percent  
*Landform:* Outwash plains, moraines  
*Landform position (two-dimensional):* Backslope, toeslope, footslope, summit, shoulder  
*Landform position (three-dimensional):* Rise  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex

## BrC—Boyer loamy sand, 6 to 12 percent slopes

### Map Unit Setting

*Elevation:* 840 to 1,040 feet  
*Mean annual precipitation:* 31 to 33 inches  
*Mean annual air temperature:* 47 to 48 degrees F  
*Frost-free period:* 136 to 173 days

### Map Unit Composition

*Boyer and similar soils:* 93 percent  
*Minor components:* 7 percent

### Description of Boyer

#### Setting

*Landform:* Glacial drainage channels on moraines, outwash plains  
*Landform position (two-dimensional):* Backslope, shoulder, summit  
*Landform position (three-dimensional):* Rise  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex  
*Parent material:* Loamy over sandy and gravely glaciofluvial deposits

#### Properties and qualities

*Slope:* 6 to 12 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 25 percent  
*Available water capacity:* Low (about 4.4 inches)

#### Interpretive groups

*Farmland classification:* Farmland of local importance  
*Land capability (nonirrigated):* 3e  
*Hydrologic Soil Group:* B

### Typical profile

0 to 9 inches: Loamy sand  
 9 to 16 inches: Loamy sand  
 16 to 28 inches: Gravelly sandy loam  
 28 to 36 inches: Gravelly sandy clay loam  
 36 to 80 inches: Gravelly sand

### Minor Components

#### Fox

Percent of map unit: 4 percent  
 Landform: Valley trains, outwash plains, moraines  
 Landform position (*two-dimensional*): Footslope, toeslope, backslope, shoulder, summit  
 Landform position (*three-dimensional*): Rise  
 Down-slope shape: Linear  
 Across-slope shape: Convex

#### Oshtemo

Percent of map unit: 3 percent  
 Landform: Outwash plains, moraines  
 Landform position (*two-dimensional*): Summit, shoulder, backslope, toeslope, footslope  
 Landform position (*three-dimensional*): Rise  
 Down-slope shape: Linear  
 Across-slope shape: Convex

## Cc—Carlisle muck

### Map Unit Setting

Elevation: 830 to 1,050 feet  
 Mean annual precipitation: 31 to 33 inches  
 Mean annual air temperature: 47 to 48 degrees F  
 Frost-free period: 136 to 173 days

### Map Unit Composition

Carlisle and similar soils: 90 percent  
 Minor components: 10 percent

### Description of Carlisle

#### Setting

Landform: Depressions on glacial drainage channels, depressions on till plains, depressions on lake plains, depressions on moraines  
 Landform position (*two-dimensional*): Toeslope  
 Landform position (*three-dimensional*): Dip  
 Down-slope shape: Linear  
 Across-slope shape: Linear  
 Parent material: Herbaceous organic material and/or woody organic material



Custom Soil Resource Report

**Properties and qualities**

Slope: 0 to 2 percent  
Depth to restrictive feature: More than 80 inches  
Drainage class: Very poorly drained  
Capacity of the most limiting layer to transmit water (*Ksat*): Moderately high to high (0.20 to 6.00 in/hr)  
Depth to water table: About 0 inches  
Frequency of flooding: None  
Frequency of ponding: Frequent  
Available water capacity: Very high (about 23.9 inches)

**Interpretive groups**

Farmland classification: Farmland of local importance  
Land capability (nonirrigated): 5w  
Hydrologic Soil Group: D

**Typical profile**

0 to 23 inches: Muck  
23 to 80 inches: Muck

**Minor Components**

**Linwood**

Percent of map unit: 5 percent  
Landform: Depressions on till plains, depressions on lake plains, depressions on moraines  
Landform position (two-dimensional): Toeslope  
Landform position (three-dimensional): Dip  
Down-slope shape: Linear  
Across-slope shape: Linear

**Tawas**

Percent of map unit: 5 percent  
Landform: Depressions on till plains, depressions on lake plains, depressions on outwash plains, depressions on moraines  
Landform position (two-dimensional): Toeslope  
Landform position (three-dimensional): Dip  
Down-slope shape: Linear  
Across-slope shape: Linear

**W—Water**

**Map Unit Setting**

Elevation: 830 to 1,160 feet  
Mean annual precipitation: 31 to 33 inches  
Mean annual air temperature: 47 to 48 degrees F  
Frost-free period: 136 to 173 days

**Map Unit Composition**

Water: 100 percent

## Washtenaw County, Michigan

### BnC—Boyer loamy sand, 6 to 12 percent slopes

#### Map Unit Setting

*Elevation:* 570 to 980 feet

*Mean annual precipitation:* 33 to 40 inches

*Mean annual air temperature:* 48 to 55 degrees F

*Frost-free period:* 140 to 180 days

#### Map Unit Composition

*Boyer and similar soils:* 85 percent

*Minor components:* 15 percent

#### Description of Boyer

##### Setting

*Landform:* Kames, hills on outwash plains, hills on valley trains

*Landform position (two-dimensional):* Footslope, toeslope, backslope, shoulder, summit

*Landform position (three-dimensional):* Crest, base slope, side slope, nose slope, head slope, interfluvium

*Down-slope shape:* Linear

*Across-slope shape:* Convex

##### Properties and qualities

*Slope:* 6 to 12 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 25 percent

*Available water capacity:* Low (about 4.5 inches)

##### Interpretive groups

*Farmland classification:* Farmland of local importance

*Land capability (nonirrigated):* 3e

*Hydrologic Soil Group:* B

##### Typical profile

*0 to 8 inches:* Loamy sand

*8 to 18 inches:* Loamy sand

*18 to 32 inches:* Sandy loam

*32 to 60 inches:* Gravelly coarse sand

#### Minor Components

##### Wasepi

*Percent of map unit:* 3 percent

*Landform:* Drainageways on outwash plains, drainageways on lake plains, drainageways on deltas, drainageways on valley trains

*Landform position (two-dimensional):* Footslope, toeslope

*Landform position (three-dimensional):* Base slope, side slope

*Down-slope shape:* Linear





## Custom Soil Resource Report

*Across-slope shape:* Convex

### Kendallville

*Percent of map unit:* 3 percent

*Landform:* Hills on till plains

*Landform position (two-dimensional):* Footslope, toeslope, backslope, shoulder, summit

*Landform position (three-dimensional):* Interfluvial, head slope, nose slope, side slope, base slope, crest

*Down-slope shape:* Linear

*Across-slope shape:* Convex

### Oshtemo

*Percent of map unit:* 3 percent

*Landform:* Hills on outwash plains, hills on valley trains, hills on beach ridges

*Landform position (two-dimensional):* Footslope, toeslope, backslope, shoulder, summit

*Landform position (three-dimensional):* Interfluvial, head slope, nose slope, side slope, base slope, crest

*Down-slope shape:* Linear

*Across-slope shape:* Convex

### Spinks

*Percent of map unit:* 3 percent

*Landform:* Hills on outwash plains, hills on valley trains, hills on terraces

*Landform position (two-dimensional):* Footslope, toeslope, backslope, shoulder, summit

*Landform position (three-dimensional):* Crest, base slope, side slope, nose slope, head slope, interfluvial

*Down-slope shape:* Linear

*Across-slope shape:* Convex

### Fox

*Percent of map unit:* 3 percent

*Landform:* Hills on kames, hills on outwash plains, hills on terraces, hills on valley trains

*Landform position (two-dimensional):* Summit, shoulder, backslope, toeslope, footslope

*Landform position (three-dimensional):* Interfluvial, head slope, nose slope, side slope, base slope, crest

*Down-slope shape:* Linear

*Across-slope shape:* Convex

## Hn—Houghton muck

### Map Unit Setting

*Elevation:* 570 to 980 feet

*Mean annual precipitation:* 33 to 40 inches

*Mean annual air temperature:* 48 to 55 degrees F

*Frost-free period:* 140 to 180 days

## Map Unit Composition

*Houghton and similar soils:* 90 percent  
*Minor components:* 10 percent

## Description of Houghton

### Setting

*Landform:* Depressions on moraines, depressions on till plains, depressions on lake plains, depressions on outwash plains  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear

### Properties and qualities

*Slope:* 0 to 2 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Very poorly drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.20 to 5.95 in/hr)  
*Depth to water table:* About 0 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* Frequent  
*Available water capacity:* Very high (about 23.9 inches)

### Interpretive groups

*Farmland classification:* Farmland of local importance  
*Land capability (nonirrigated):* 5w  
*Hydrologic Soil Group:* A/D

### Typical profile

0 to 7 inches: Muck  
 7 to 60 inches: Muck

## Minor Components

### Palms

*Percent of map unit:* 4 percent  
*Landform:* Depressions on lake plains, depressions on moraines, depressions on till plains  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear

### Edwards

*Percent of map unit:* 3 percent  
*Landform:* Depressions on moraines, depressions on till plains, depressions on lake plains, depressions on outwash plains  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear

### Adrian

*Percent of map unit:* 3 percent  
*Landform:* Depressions on moraines, depressions on till plains, depressions on outwash plains, depressions on lake plains  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear

*Across-slope shape: Linear*

## **W—Water**

### **Map Unit Setting**

*Elevation: 570 to 980 feet  
Mean annual precipitation: 33 to 40 inches  
Mean annual air temperature: 48 to 55 degrees F  
Frost-free period: 140 to 180 days*

### **Map Unit Composition**

*Water: 100 percent*



## Report—Camp Areas, Picnic Areas, and Playgrounds (MI) (Reichert Soil Data for Camping, Picnic and Playgrounds)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

| Camp Areas, Picnic Areas, and Playgrounds (MI)—Livingston County, Michigan |                  |                                    |       |                                    |       |                                    |       |
|----------------------------------------------------------------------------|------------------|------------------------------------|-------|------------------------------------|-------|------------------------------------|-------|
| Map symbol and soil name                                                   | Pct. of map unit | Camp areas (MI)                    |       | Picnic areas (MI)                  |       | Playgrounds (MI)                   |       |
|                                                                            |                  | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| BrB—Boyer loamy sand, 2 to 6 percent slopes                                |                  |                                    |       |                                    |       |                                    |       |
| Boyer                                                                      | 93               | Not limited                        |       | Not limited                        |       | Somewhat limited                   |       |
|                                                                            |                  |                                    |       |                                    |       | Slope                              | 0.50  |
|                                                                            |                  |                                    |       |                                    |       | Gravel                             | 0.22  |
| BrC—Boyer loamy sand, 6 to 12 percent slopes                               |                  |                                    |       |                                    |       |                                    |       |
| Boyer                                                                      | 93               | Somewhat limited                   |       | Somewhat limited                   |       | Somewhat limited                   |       |
|                                                                            |                  | Slope                              | 0.04  | Slope                              | 0.04  | Slope                              | 1.00  |
|                                                                            |                  |                                    |       |                                    |       | Gravel                             | 0.22  |
| Cc—Carlisle muck                                                           |                  |                                    |       |                                    |       |                                    |       |
| Carlisle                                                                   | 90               | Not rated                          |       | Not rated                          |       | Not rated                          |       |
| W—Water                                                                    |                  |                                    |       |                                    |       |                                    |       |
| Water                                                                      | 100              | Not rated                          |       | Not rated                          |       | Not rated                          |       |

| Camp Areas, Picnic Areas, and Playgrounds (MI)—Washtenaw County, Michigan |                  |                                    |       |                                    |       |                                    |       |
|---------------------------------------------------------------------------|------------------|------------------------------------|-------|------------------------------------|-------|------------------------------------|-------|
| Map symbol and soil name                                                  | Pct. of map unit | Camp areas (MI)                    |       | Picnic areas (MI)                  |       | Playgrounds (MI)                   |       |
|                                                                           |                  | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| BnC—Boyer loamy sand, 6 to 12 percent slopes                              |                  |                                    |       |                                    |       |                                    |       |
| Boyer                                                                     | 85               | Somewhat limited                   |       | Somewhat limited                   |       | Somewhat limited                   |       |
|                                                                           |                  | Slope                              | 0.04  | Slope                              | 0.04  | Slope                              | 1.00  |
|                                                                           |                  |                                    |       |                                    |       | Gravel                             | 0.18  |
| Hn—Houghton muck                                                          |                  |                                    |       |                                    |       |                                    |       |
| Houghton                                                                  | 90               | Not rated                          |       | Not rated                          |       | Not rated                          |       |
| W—Water                                                                   |                  |                                    |       |                                    |       |                                    |       |
| Water                                                                     | 100              | Not rated                          |       | Not rated                          |       | Not rated                          |       |



# Custom Soil Resource Report

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

| Water Features—Livingston County, Michigan   |                  |                |           |             |             |               |           |           |          |           |
|----------------------------------------------|------------------|----------------|-----------|-------------|-------------|---------------|-----------|-----------|----------|-----------|
| Map unit symbol and soil name                | Hydrologic group | Surface runoff | Month     | Water table |             | Ponding       |           |           | Flooding |           |
|                                              |                  |                |           | Upper limit | Lower limit | Surface depth | Duration  | Frequency | Duration | Frequency |
|                                              |                  |                |           | <i>Ft</i>   | <i>Ft</i>   | <i>Ft</i>     |           |           |          |           |
| BrB—Boyer loamy sand, 2 to 6 percent slopes  |                  |                |           |             |             |               |           |           |          |           |
| Boyer                                        | B                | Very low       | Jan-Dec   | —           | —           | —             | —         | None      | —        | None      |
| BrC—Boyer loamy sand, 6 to 12 percent slopes |                  |                |           |             |             |               |           |           |          |           |
| Boyer                                        | B                | Low            | Jan-Dec   | —           | —           | —             | —         | None      | —        | None      |
| Cc—Carlisle muck                             |                  |                |           |             |             |               |           |           |          |           |
| Carlisle                                     | D                | Negligible     | January   | 0.0         | >6.0        | —             | —         | None      | —        | None      |
|                                              |                  |                | February  | 0.0         | >6.0        | —             | —         | None      | —        | None      |
|                                              |                  |                | March     | 0.0         | >6.0        | 0.0-0.5       | Very long | Frequent  | —        | None      |
|                                              |                  |                | April     | 0.0         | >6.0        | 0.0-0.5       | Very long | Frequent  | —        | None      |
|                                              |                  |                | May       | 0.0         | >6.0        | 0.0-0.5       | Very long | Frequent  | —        | None      |
|                                              |                  |                | June      | 0.0         | >6.0        | 0.0-0.5       | Long      | Frequent  | —        | None      |
|                                              |                  |                | July      | 0.5         | >6.0        | —             | —         | None      | —        | None      |
|                                              |                  |                | August    | 1.0         | >6.0        | —             | —         | None      | —        | None      |
|                                              |                  |                | September | 0.5         | >6.0        | —             | —         | None      | —        | None      |
|                                              |                  |                | October   | 0.0         | >6.0        | 0.0-0.5       | Long      | Frequent  | —        | None      |
|                                              |                  |                | November  | 0.0         | >6.0        | 0.0-0.5       | Long      | Frequent  | —        | None      |
|                                              |                  |                | December  | 0.0         | >6.0        | —             | —         | None      | —        | None      |
| W—Water                                      |                  |                |           |             |             |               |           |           |          |           |
| Water                                        | —                | —              | Jan-Dec   | —           | —           | —             | —         | None      | —        | None      |



# Custom Soil Resource Report

| Water Features—Washtenaw County, Michigan    |                  |                |           |             |             |               |           |           |          |           |
|----------------------------------------------|------------------|----------------|-----------|-------------|-------------|---------------|-----------|-----------|----------|-----------|
| Map unit symbol and soil name                | Hydrologic group | Surface runoff | Month     | Water table |             | Ponding       |           |           | Flooding |           |
|                                              |                  |                |           | Upper limit | Lower limit | Surface depth | Duration  | Frequency | Duration | Frequency |
|                                              |                  |                |           | <i>Ft</i>   | <i>Ft</i>   | <i>Ft</i>     |           |           |          |           |
| BnC—Boyer loamy sand, 6 to 12 percent slopes |                  |                |           |             |             |               |           |           |          |           |
| Boyer                                        | B                | Low            | Jan-Dec   | —           | —           | —             | —         | None      | —        | None      |
| Hn—Houghton muck                             |                  |                |           |             |             |               |           |           |          |           |
| Houghton                                     | A/D              | Very low       | January   | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | February  | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | March     | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | April     | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | May       | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | June      | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | September | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | October   | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | November  | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
|                                              |                  |                | December  | 0.0         | >6.0        | 0.0-1.0       | Very long | Frequent  | —        | None      |
| W—Water                                      |                  |                |           |             |             |               |           |           |          |           |
| Water                                        | —                | —              | Jan-Dec   | —           | —           | —             | —         | None      | —        | None      |



## Report—Ponds and Embankments (MI) (Reichert Soil Data for Ponds and Embankments)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

| Ponds and Embankments (MI)—Livingston County, Michigan |                  |                                    |       |                                    |       |                                    |       |
|--------------------------------------------------------|------------------|------------------------------------|-------|------------------------------------|-------|------------------------------------|-------|
| Map symbol and soil name                               | Pct. of map unit | Pond reservoir areas (MI)          |       | Embankments, dikes, and levees     |       | Aquifer-fed excavated ponds        |       |
|                                                        |                  | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| BrB—Boyer loamy sand, 2 to 6 percent slopes            |                  |                                    |       |                                    |       |                                    |       |
| Boyer                                                  | 93               | Somewhat limited                   |       |                                    |       |                                    |       |
|                                                        |                  | Seepage                            | 1.00  |                                    |       |                                    |       |
| BrC—Boyer loamy sand, 6 to 12 percent slopes           |                  |                                    |       |                                    |       |                                    |       |
| Boyer                                                  | 93               | Somewhat limited                   |       |                                    |       |                                    |       |
|                                                        |                  | Seepage                            | 1.00  |                                    |       |                                    |       |
| Cc—Carlisle muck                                       |                  |                                    |       |                                    |       |                                    |       |
| Carlisle                                               | 90               | Somewhat limited                   |       |                                    |       |                                    |       |
|                                                        |                  | Seepage                            | 1.00  |                                    |       |                                    |       |
| W—Water                                                |                  |                                    |       |                                    |       |                                    |       |
| Water                                                  | 100              | Not rated                          |       |                                    |       |                                    |       |

# Custom Soil Resource Report

| Ponds and Embankments (MI)—Washtenaw County, Michigan |                  |                                    |       |                                    |       |                                    |       |
|-------------------------------------------------------|------------------|------------------------------------|-------|------------------------------------|-------|------------------------------------|-------|
| Map symbol and soil name                              | Pct. of map unit | Pond reservoir areas (MI)          |       | Embankments, dikes, and levees     |       | Aquifer-fed excavated ponds        |       |
|                                                       |                  | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| BnC—Boyer loamy sand, 6 to 12 percent slopes          |                  |                                    |       |                                    |       |                                    |       |
| Boyer                                                 | 85               | Somewhat limited                   |       |                                    |       |                                    |       |
|                                                       |                  | Seepage                            | 1.00  |                                    |       |                                    |       |
| Hn—Houghton muck                                      |                  |                                    |       |                                    |       |                                    |       |
| Houghton                                              | 90               | Somewhat limited                   |       |                                    |       |                                    |       |
|                                                       |                  | Seepage                            | 1.00  |                                    |       |                                    |       |
| W—Water                                               |                  |                                    |       |                                    |       |                                    |       |
| Water                                                 | 100              | Not rated                          |       |                                    |       |                                    |       |





## Michigan's Natural Communities

### Southern Shrub-Carr

State Rank: S4

#### County Distribution Map

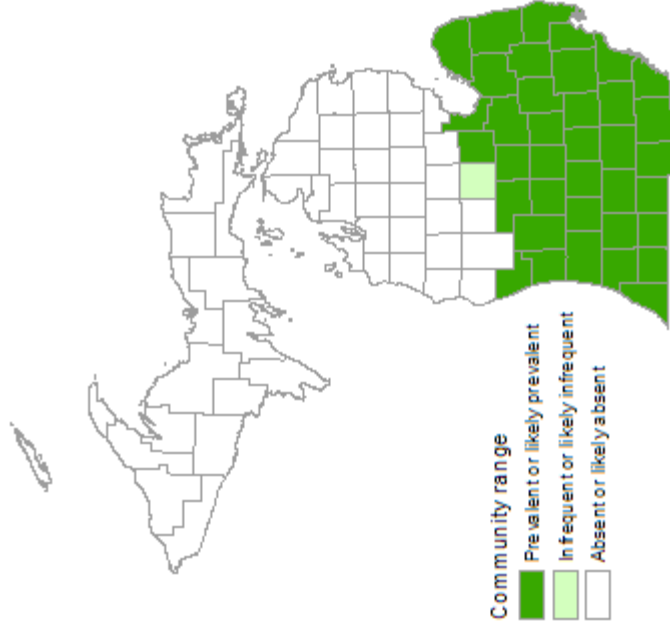


Photo by Michael A. Kos

#### Overview

Southern shrub-carr is a moderate to long persistent successional shrub community dominated by willows (*Salix* spp.), dogwoods (i.e., *Cornus sericea*, *C. foemina*, and *C. amomum*), winterberry (*Ilex verticillata*), and bog birch (*Betula pumila*). This community is successional intermediate among a variety of open, herbaceous wetlands (i.e., southern wet meadow, prairie fen, wet-mesic prairie, and lakeplain wet-mesic prairie) and forested wetlands such as rich tamarack swamp and southern hardwood swamp. It typically occurs on saturated, organic soil and is characterized by fluctuating water levels and poor drainage conditions. Southern shrub-carr is found primarily south of the climatic tension zone in southern Lower Michigan and is frequent in other Midwestern states such as Illinois, Indiana, Iowa, Minnesota, and Wisconsin. North of the climatic tension zone, wet-ground, tall shrub communities are typically dominated by tag alder (*Alnus incana*) and are classified as northern shrub thicket.

## Landscape Context

Shrub-carr typically occurs as bands along streams, rivers, and lakes, on glacial lakeplains and outwash plains, and within outwash channels and depressions on ice-contact topography and moraines. Sites are characterized by little to no slope and can range from small pockets or narrow bands to extensive acreages. The community often occurs as part of a large wetland complex, where it may form a transition zone between open herbaceous wetlands and forested wetlands.

## Soils

Shrub-carr is usually found on seasonally inundated, saturated organic soils such as sapric peat with neutral to mildly alkaline pH and the capacity to retain excessive water.

## Natural Processes

Shrub-carr typically originates when shrub species invade fens, sedge meadows, wet prairies, and prairie fens following an alteration to the fire or hydrologic regime. Fire suppression and events that lower local or regional water tables allow shrubs to colonize open wetlands and assume dominance. Conversely, beaver-induced flooding limits shrub and tree encroachment and maintains open conditions of meadows and fens. The extent of southern shrub-carr in Michigan has greatly expanded since European settlement due to widespread fire suppression, hydrologic alterations, and a dramatic decline in the beaver population.

Once shrub-carr has become established, frequent disturbance allows it to persist rather than succeed to a forested swamp community. Beaver herbivory and windthrow can limit tree longevity and help maintain southern shrub-carr. Given that shrub-carr occurs along streams, rivers, and lake edges, the community is well adapted to seasonal hydrologic cycling. However, prolonged flooding can kill shrubs and cause conversion to shallow ponds, emergent marsh, southern wet meadow, prairie fen, or wet prairie depending on landscape position, soils, and depth and duration of flooding. In the absence of flooding and fire, southern shrub-carr typically succeeds to closed-canopy swamp forest, such as southern hardwood swamp and rich tamarack swamp.

## Vegetation

There are commonly three distinct vegetation layers in a southern shrub-carr community. The most pronounced is the shrub layer, which typically exhibits little stratification or layering, and ranges in height from 1.5 to 5.5 m (5 to 18 ft, average 2.6 m or 8.6 ft). Common species in the shrub layer may include dogwoods (*C. amomum*, *Cornus foemina*, and *C.sericea*), willows (*Salix*

*bebbiana*, *S. discolor*, *S. exigua*, *S. petiolaris*, *S. serissima*, and *S. eriocephala*), winterberry (*Ilex verticillata*), elderberry (*Sambucus canadensis*), swamp rose (*Rosa palustris*), poison sumac (*Toxicodendron vernix*), smooth highbush blueberry (*Vaccinium corymbosum*), American hazelnut (*Corylus americana*), black chokeberry (*Aronia prunifolia*), and nannyberry (*Viburnum lentago*). The shrub layer can be dense to patchy depending on the successional state and local site conditions within the community. The second vegetation layer is an intermediate layer of tall herbaceous plants and short shrubs and can include sedges (*Carex stricta*, *C. comosa*, *C. hystericina*, and *C. lacustris*), water plantain (*Alisma subcordatum*), swamp milkweed (*Asclepias incarnata*), bluejoint grass (*Calamagrostis canadensis*), water hemlock (*Cicuta maculata*), water horsetail (*Equisetum fluviatile*), marsh fleabane (*Erigeron philadelphicus*), common boneset (*Eupatorium perfoliatum*), rattlesnake grass (*Glyceria canadensis*), softstem bulrush (*Schoenoplectus tabernaemontani*), bulrush (*Scirpus pendulus*), Canada goldenrod (*Solidago canadensis*), marsh fern (*Thelypteris palustris*), bog birch (*Betula pumila*), swamp gooseberry (*Ribes hirtellum*), meadowsweet (*Spiraea alba*), raspberries (*Rubus* spp.), and shrubby cinquefoil (*Dasiphora fruticosa*). A third vegetative layer of smaller herbaceous plants may also occur and include species such as bedstraws (*Galium* spp.), clearest (*Pilea pumila*), northern bugle weed (*Lycopus uniflorus*), Canada mayflower (*Maianthemum canadense*), and marsh bellflower (*Campanula aparinoides*). Overall, the vegetation of shrub-carrs is highly variable due to frequent disturbances and small-scale temporal and spatial differences in microtopography, soil moisture, and nutrient availability.

## Noteworthy Animals

Because many of the prevalent shrubs produce fruit in late summer, shrub-carr provides important foraging habitat for migrating and over-wintering songbirds. The community provides nesting habitat for the common yellow throat. Ruffed grouse and American woodcock also utilize the community. Large ant mounds, particularly those built by members of the genus *Formica*, have been observed in shrub-carr and indicate that a site was formerly an open herbaceous wetland prior to shrub colonization.

## Rare Plants

- *Hypericum sphaerocarpum* (round-fruited St. John's-wort, state threatened)
- *Lygodium palmatum* (climbing fern, state endangered)
- *Pycnanthemum muticum* (broad-leaved mountain mint, state threatened)

- *Acris crepitans blanchardi* (Blanchard's cricket frog, state special concern)
- *Catocala illecta* (magdalen underwing, state special concern)
- *Clemmys guttata* (spotted turtle, state threatened)
- *Erynnis p. persius* (Persius duskywing, state threatened)
- *Gomphus quadricolor* (rapids clubtail, state special concern)
- *Hemileuca maia* (barrens buckmoth, state special concern)
- *Lanius ludovicianus migrans* (migrant loggerhead shrike, state endangered)
- *Neonympha m. mitchellii* (Mitchell's satyr, federal/state endangered)
- *Nycticorax nycticorax* (black-crowned night-heron, state special concern)
- *Papaipema speciosissima* (regal fern borer, state special concern)
- *Sistrurus c. catenatus* (eastern massasauga, federal candidate species and state special concern)
- *Terrapene c. carolina* (eastern box turtle, state special concern)
- *Williamsonia fletcheri* (ebony boghaunter, state special concern)

### Biodiversity Management Considerations

Southern shrub-carr is a widespread community type in the Great Lakes region and likely occupies a greater percentage of wetland acreage today than it did in the 1800s due to fire suppression and alterations to hydrologic regimes. The community contributes significantly to the overall biodiversity of southern Michigan by providing habitat to a wide variety of plant and animal species including several rare species. However, southern shrub-carr has replaced many rare and declining wetland communities such as prairie fen, southern wet meadow, and rich tamarack swamp. Where shrub encroachment threatens to convert less common open wetlands to shrub-dominated systems, prolonged flooding, repeated prescribed fires, mowing, or herbicide application to cut shrub stumps can be employed to maintain open conditions. On sites that are succeeding to swamp forest, allowing succession to proceed unhindered will favor an increase of less common swamp systems. Southern shrub-carr can be maintained by cutting tree species. While southern shrub-carr has replace many declining and rare communities, it does provide important ecosystem services, protecting water quality by assimilating nutrients, trapping sediment, and retaining storm water and floodwater.

Invasive species that threaten to reduce the diversity and alter the community structure of southern shrub-carr include glossy buckthorn (*Frangula alnus*), common buckthorn (*Rhamnus cathartica*), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*Typha x glauca*), reed (*Phragmites australis* subsp. *australis*), and reed



canary grass (*Phalaris arundinacea*). Monitoring for these and other invasive species followed by prompt and sustained control efforts will help protect the ecological integrity of southern shrub-carr and adjacent natural communities.

### Variation

Community size, shape, and species composition can vary significantly, depending on landscape context. Generally, occurrences on poorly drained, level outwash plains and lakeplains are larger than those associated with narrow outwash channels and stream corridors.

### Similar Natural Communities

[Prairie fen](#), [southern wet meadow](#), [northern shrub thicket](#), [inundated shrub swamp](#), [southern hardwood swamp](#), and [rich tamarack swamp](#).

### Relevant Literature

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### Page Citation

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



[All Communities](#)

# Michigan's Natural Communities

## Dry-mesic Southern Forest

State Rank: S3

Global Rank: G4

### Overview

Dry-mesic southern forest is a fire-dependent, oak or oak-hickory forest type on generally dry-mesic sites found south of the climatic tension zone in southern Lower Michigan. Frequent fires maintain semi-open conditions, promoting oak regeneration and ground and shrub layer diversity.

### Landscape Context

This natural community occurs principally on glacial outwash, coarse-textured moraines, sandy glacial lakeplains, kettle-kame topography, and sand dunes.



Photo by Adrienne L. Bozic

### Soils

Soils are typically sandy loam or loam and slightly acid to neutral in pH.

### Natural Processes

Fire, windthrow, and insect outbreaks and pathogens associated with oak defoliation and decline are the prevalent natural disturbance factors influencing dry-mesic southern forest. Historically, frequent, low-intensity surface fires generated conditions suitable for sustaining advanced oak regeneration and helped keep oak pathogens and invertebrate acorn predators at low levels. Tree density in circa 1800 oak forests was likely lower than that observed today under conditions of fire suppression, and helped limit root-grafting and the spread of several oak pathogens. Frequent small-scale wind disturbance or gap-phase dynamics allows for growth of suppressed oak saplings and canopy ascension of understory oaks. Prolonged periods of fire suppression in oak openings can result in the succession to closed-canopy dry-mesic southern forest and likely accounts for the existence of many oak forests observed today.

### Vegetation

The canopy layer generally is dominated or codominated by white oak (*Quercus alba*) and black oak (*Quercus velutina*), with white oak being the more frequent dominant. Red oak (*Q. rubra*) can occur as a canopy codominant, especially where soils and topographic position favor less droughty conditions such as north- to east-facing slopes and footslopes. Hickories such as pignut hickory (*Carya glabra*), shagbark hickory (*C. ovata*), and bitternut hickory (*C. cordiformis*) are often canopy codominants. Prevalent



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Dry-mesic Southern Forest

canopy associates may include red maple (*Acer rubrum*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), scarlet oak (*Quercus coccinea*), basswood (*Tilia americana*), and sassafras (*Sassafras albidum*). Prevalent species of the subcanopy include red maple, hickories, alternate-leaved dogwood (*Cornus alternifolia*), flowering dogwood (*Cornus florida*), ironwood (*Ostrya virginiana*), cherries (*Prunus* spp.), and sassafras (*Sassafras albidum*). Characteristic shrubs include serviceberries (*Amelanchier* spp.), witch hazel (*Hamamelis virginiana*), and choke cherry (*Prunus virginiana*). In fire-suppressed systems, mesophytic trees and shrubs are often dominant in the subcanopy and shrub layers. Typical herbaceous species include doll's eyes (*Actaea pachypoda*), hog peanut (*Amphicarpaea bracteata*), jack-in-the-pulpit (*Arisaema triphyllum*), bearded shorthusk (*Brachelytrium erectum*), hairy woodland brome (*Bromus pubescens*), white bear sedge (*Carex albusina*), rosy sedge (*C. convoluta*), enchanter's nightshade (*Circaea lutetiana*), spotted coral-root (*Corallorhiza maculata*), pointed-leaf tick-trefoil (*Desmodium glutinosum*), naked-flower tick-trefoil (*D. nudiflorum*), fragrant bedstraw (*Galium triflorum*), black snakeroot (*Sanicula marilandica*), bristly greenbrier (*Smilax tamnoides*), large-flowered bellwort (*Uvularia grandiflora*), and downy yellow violet (*Viola pubescens*).

## Noteworthy Animals

The now extinct passenger pigeon (*Ectopistes migratorius*) was likely a keystone species in oak ecosystems, roosting in oak forests by the thousands.

## Rare Plants

*Agrimonia rostellata* (beaked agrimony, state special concern)  
*Arabis missouriensis* var. *deamii* (Missouri rock-cress, state special concern)  
*Aristolochia serpentaria* (Virginia snakeroot, state threatened)  
*Baptisia leucophaea* (cream wild indigo, state endangered)  
*Castanea dentata* (American chestnut, state endangered)  
*Demnstaedia punctilobula* (hay-scented fern, state threatened)  
*Eupatorium sessilifolium* (upland boneset, state threatened)  
*Geum virginianum* (pale avens, state special concern)  
*Houstonia caerulea* (blueets, state special concern)  
*Linum virginianum* (Virginia flax, state threatened)  
*Liparis liliifolia* (purple twayblade, state special concern)  
*Quercus shumardii* (Shumard's oak, state special concern)  
*Scutellaria elliptica* (hairy skullcap, state special concern)  
*Silene stellata* (starry campion, state threatened)  
*Silene virginica* (fire pink, state threatened)  
*Triphora trianthophora* (three-birds orchid, state threatened)  
*Viburnum prunifolium* (black haw, state special concern)

## Rare Animals

*Accipiter cooperii* (Cooper's hawk, state special concern)  
*Ambystoma opacum* (marbled salamander, state threatened)  
*Anguispira kochi* (banded globe, state special concern)  
*Battus philenor* (pipevine swallowtail, state special concern)  
*Buteo lineatus* (red-shouldered hawk, state threatened)  
*Catocala dulcicola* (quiet underwing, state special concern)  
*Catocala robinsoni* (Robinson's underwing, state special concern)  
*Dendroica cerulea* (cerulean warbler, state special concern)

*Elaphe o. obsoleta* (black rat snake, state special concern)  
*Emydoidea blandingii* (Blanding's turtle, state special concern)  
*Erynnis baptisiae* (wild indigo duskywing, state special concern)  
*Fixsenia favonius ontario* (northern hairstreak, state special concern)  
*Mesomphix cupreus* (copper button, state special concern)  
*Microtus pinetorum* (woodland vole, state special concern)  
*Neononocephalus retusus* (conehead grasshopper, state special concern)  
*Nerodia erythrogaster neglecta* (copperbelly watersnake, federal threatened and state endangered)  
*Nicrophorus americanus* (American burying beetle, federal/state endangered)  
*Oecanthus pini* (pinetree cricket, federal/state endangered)  
*Papaipema cerina* (golden borer, state special concern)  
*Pygarcia spraguei* (Sprague's pygarcia, state special concern)  
*Sistrurus c. catenatus* (eastern massasauga, federal candidate species and state special concern)  
*Terrapene c. carolina* (eastern box turtle, state special concern)  
*Vallonia albula* (land snail, state special concern)  
*Wilsonia citrina* (hooded warbler, state special concern)  
*Xolotrema denotata* (velvet wedge, state special concern)

## Biodiversity Management Considerations

Fire is the single most significant factor in preserving oak ecosystems. The use of prescribed fire is an imperative management tool for promoting oak regeneration, deterring the succession of shade-tolerant species, and reducing the encroachment by invasive shrubs such as honeysuckles and autumn olive. Fire management should be orchestrated in conjunction with the management of fire-dependent communities such as oak barrens, dry sand prairie, prairie fen, and coastal plain marsh. Many current dry-mesic southern forests are degraded oak openings that have been long deprived of fire. Open canopy conditions can be restored by mechanical thinning or girdling. Restored sites will need to be maintained by periodic prescribed fire and may require investment in native plant seedling where seed and plant banks are inadequate. Herbicide application to stumps is likely necessary where woody invasive species or red maple are well established.

Monitoring and control efforts to detect and remove invasive species are critical to the long-term viability of dry southern forest. Invasive species that threaten the diversity and community structure include garlic mustard (*Alliaria petiolata*), black swallow-wort (*Vincetoxicum nigrum*), white swallow-wort (*V. rossicum*), Oriental bittersweet (*Celastrus orbiculatus*), common buckthorn (*Rhamnus cathartica*), autumn olive (*Elaeagnus umbellata*), Eurasian honeysuckles (*Lonicera morrowii*, *L. japonica*, *L. maackii*, *L. sempervirens*, *L. tatarica*, *L. xbella*, and *L. xylosteum*), multiflora rose (*Rosa multiflora*), and Norway maple (*Acer platanoides*).

## Variation

Red oak can occur as a codominant on moister soils. Toward the transition zone, white pine (*Pinus strobus*) becomes a canopy associate.

## Similar Natural Communities

[Dry southern forest](#), [dry-mesic northern forest](#), [mesic southern forest](#), and [oak openings](#).

## Relevant Literature

Abrams, M.D. 1992. Fire and the development of oak forests. *BioScience* 42(5): 346-353.





Dry-mesic Southern Forest

- Brewer, L.G., T.W. Hodler, and H.A. Raup. 1984. Presettlement vegetation of southwestern Michigan. *Michigan Botanist* 23: 153-156.
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- Rodewald, A.D. 2003. Decline of oak forests and implications for forest wildlife conservation. *Natural Areas Journal* 23(4): 368-371.

For a full list of references used to create this description, please refer to the [natural community abstract](#) for dry-mesic southern forest.

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### More Information

Dry-mesic southern forest natural community abstract

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# Michigan's Natural Communities

## Emergent Marsh

State Rank: S4

Global Rank: GU

### Overview

Emergent marsh is a shallow-water wetland along the shores of lakes and streams characterized by emergent narrow- and broad-leaved herbs and grass-like plants as well as floating-leaved herbs. Common plants include water plantain (*Alisma plantago-aquatica*), sedges (*Carex* spp.), spike-rushes (*Eleocharis acicularis* spp.), pond-lilies (*Nuphar* spp.), pickerel weed (*Pontederia cordata*), arrowheads (*Sagittaria* spp.), bulrushes (*Schoenoplectus* spp.), and cat-tails (*Typha* spp.). The community occurs on both mineral and organic soils.

### Landscape Context

Michigan's landscape is the result of recent continental glaciation, creating thousands of lake basins, drainage networks, and poorly drained depressions that support wetland vegetation. Emergent marshes line the margins of many streams and inland lakes, as well as protected portions of the Great Lakes shoreline, where it is classified as Great Lakes marsh.

### Soils

Emergent marsh can develop on all textures of glacial sediment, including rock, gravel, sand, silt, or clay. Typically there is an accumulation of circumneutral to alkaline, fine organic sediments overlying the mineral soil. Where organic sediments are acid, the wetlands tend to develop into peatlands rather than remain as marsh.

### Natural Processes

Emergent marshes are subject to frequent or seasonal flooding. Periods of low water facilitate seed bank expression and seedling establishment when litter levels are low. Beaver dams in nearby streams cause major changes to soils and vegetation. One of the most important results of flooding is the creation of oxygen-deprived sediments and accumulation of peat. Muskrat feeding within emergent marshes can create openings that are colonized by submergent and floating vegetation. Historically, where emergent marshes bordered fire-dependent uplands, wildfires likely burned across the community, reducing litter levels and

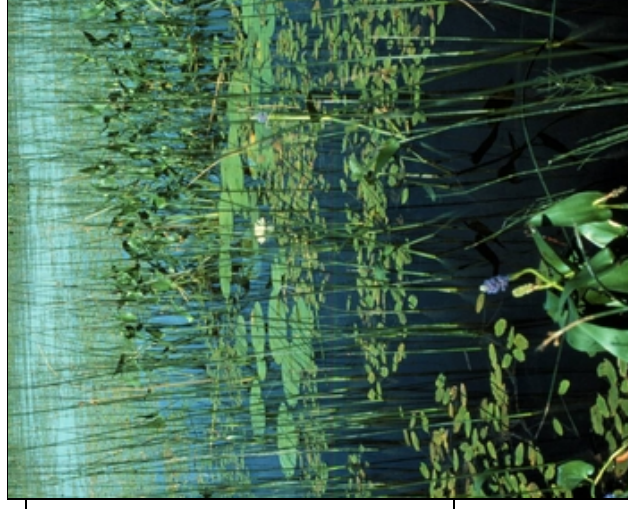


Photo by Dennis A. Albert

facilitating seed bank expression and seedling establishment.

## Vegetation

Emergent marsh is a broad wetland type, characterized by a wide diversity of emergent and floating-leaved plant species. Some of the more common species and genera include water plantain (*Alisma plantago-aquatica*), sedges (*Carex comosa*, *C. lacustris*, *C. lasiocarpa*, *C. oligosperma*, *C. stricta*, and many more), spike-rushes (*Eleocharis acicularis*, *E. elliptica*, *E. equisetoides*, *E. obtusa*, *E. quinqueflora*, *E. smallii*, and others), manna grass (i.e., *Glyceria borealis*, *G. canadensis*, and *G. striata*), cut grass (*Leersia oryzoides*), small duckweed (*Lemna minor*), yellow pond-lily (*Nuphar advena* and *N. variegata*), sweet-scented water-lily (*Nymphaea odorata*), smartweeds (*Polygonum amphibium*, *P. hydropiper*, *P. lapathifolium*, and others), pickerel weed (*Pontederia cordata*), common arrowhead (*Sagittaria graminea*, *S. latifolia*, *S. montevidensis*, and *S. rigida*), bulrushes (*Schoenoplectus acutus*, *S. pungens*, *S. subterminalis*, and *S. tabernaemontani*), bur-reeds (*Sparganium americanum*, *S. angustifolium*, *S. chlorocarpum*, *S. eurycarpum*, *S. fluctuans*, and *S. minimum*), great duckweed (*Spirodela polyrrhiza*), cat-tails (*Typha angustifolia* and *T. latifolia*), water-meals (*Wolffia* spp.), and wild-rice (*Zizania aquatica* and *Z. palustris*).

Marshes often consist of distinct zones. Along the drier margins of the emergent marsh, grasses and sedges typically dominate. In the broad marshes along the Great Lakes shoreline, this grass-sedge-dominated zone is treated as part of the larger Great Lakes marsh. Along lakes and streams, the shallow, inner marsh protected from wave action or current is often dense, with considerable plant diversity. Closer to the open water, species diversity is reduced due to deeper water, more anaerobic conditions, and greater erosion by waves or current. Most species in the outer marsh are perennial rhizomatous plants strongly adapted to aquatic habitats.

## Noteworthy Animals

Emergent marshes provide habitat to a broad diversity of aquatic invertebrates, many of which occupy and feed on decomposing vegetation. The invertebrates support numerous species of fish, amphibians (frogs), reptiles (snakes and turtles), waterfowl, water birds, and wetland mammals like muskrat (*Ondatra zibethicus*). Muskrats and beaver (*Castor canadensis*) can profoundly influence the hydrology of emergent marshes and surrounding wetlands. Muskrats create open water channels, and beavers can cause substantial flooding through their dam-building activities. Emergent marshes flood seasonally, especially in the spring, providing temporary habitat and spawning grounds for fish such as northern pike (*Esox lucius*), and many other organisms listed above.

## Rare Plants

*Armoracia lacustris* (lakecress, state threatened)  
*Beckmannia syzigachne* (slough grass, state threatened)  
*Calamagrostis stricta* (narrow-leaved reedgrass, state threatened)  
*Callitriche hermaphroditiaca* (autumnal water-starwort, state special concern)  
*Callitriche heterophylla* (large water-starwort, state threatened)  
*Cyperus acuminatus* (nut-grass, presumed extirpated from Michigan)  
*Cyperus flavescens* (yellow nut-grass, state special concern)  
*Eleocharis caribaea* (spike-rush, state threatened)  
*Eleocharis equisetoides* (horsetail spike-rush, state special concern)  
*Glyceria acutiflora* (manna grass, presumed extirpated from Michigan)  
*Gratiola aurea* (hedge-hyssop, state threatened)

*Hibiscus laevis* (smooth rose-mallow, state special concern)  
*Hibiscus moscheutos* (rose mallow, state special concern)  
*Justicia americana* (water-willow, state threatened)  
*Juncus militaris* (bayonet rush, state threatened)  
*Lemna valdiviana* (pale duckweed, presumed extirpated from Michigan)  
*Littorella uniflora* (American shore-grass, state special concern)  
*Mimulus alatus* (wing-stemmed monkey-flower, presumed extirpated from Michigan)  
*Myriophyllum alterniflorum* (alternate-leaved water-milfoil, state special concern)  
*Myriophyllum farwellii* (Farwell's water-milfoil, state threatened)  
*Nelumbo lutea* (American lotus, state threatened)  
*Nuphar pumila* (small yellow pond-lily, state endangered)  
*Nymphaea tetragona* ssp. *leibergii* (pygmy water-lily, state endangered)  
*Potamogeton confervoides* (alga pondweed, state special concern)  
*Potamogeton hillii* (Hill's pondweed, state threatened)  
*Ranunculus ambigens* (spearwort, state threatened)  
*Ranunculus macounii* (Macoun's buttercup, state threatened)  
*Sabatia angularis* (rose pink, state threatened)  
*Sagittaria montevidensis* (arrowhead, state threatened)  
*Zizania aquatica* var. *aquatica* (wild-rice, state threatened)

## Rare Animals

*Botaurus lentiginosus* (American bittern, state special concern)  
*Chlidonias niger* (black tern, state special concern)  
*Emydoidea blandingii* (Blanding's turtle, state special concern)  
*Ixobrychus exilis* (least bittern, state threatened)  
*Rallus elegans* (king rail, state endangered)  
*Sterna forsteri* (Forster's tern, state special concern)

## Biodiversity Management Considerations

Eliminating off-road vehicle (ORV) traffic, nutrient and sediment inputs, dredging, ditching, and draining activity, and invasive species populations is integral to protecting the ecological integrity of high quality emergent marsh. Dredging for marl has destroyed many marshes along the edges of small lakes in eastern Upper Michigan and in portions of Lower Michigan. Ditching and subsequent drainage allow shrubs and trees to establish and eventually replace emergent marshes. ORVs can disturb sediments and introduce seed from invasive plants like purple loosestrife (*Lythrum salicaria*) and narrow-leaved cat-tail (*Typha angustifolia*). In addition to purple loosestrife and narrow-leaved cat-tail, invasive species that threaten diversity in emergent marsh include reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), hybrid cat-tail (*Typha x glauca*), frogbit (*Hydrocharis morsus-ranae*), watercress (*Nasturtium officinale*), and European marsh thistle (*Cirsium palustre*). Increased nutrient input in the form of runoff from agricultural fields and lawns, leaking septic systems, and sewage discharge can result in an expansion of invasive plants such as narrow-leaved cat-tail, hybrid cat-tail, reed, and reed canary grass, and accompanying loss of native plant and animal diversity. Increased sedimentation resulting from soil disturbances upslope creates ideal conditions for colonization and expansion of reed canary grass and purple loosestrife.

Where emergent marsh borders fire-dependent upland communities, management should include prescription burning of both the marsh and adjacent uplands to facilitate seed bank expression and seedling establishment.



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## Variation

Emergent marshes can be dominated by a diversity of emergent plants. NatureServe and many states and regions subdivide and name their emergent marshes on the basis of dominant species (e.g., spike-rush marsh, bulrush marsh, cat-tail marsh, etc).

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## Similar Natural Communities

[Subemergent marsh](#), [Great Lakes marsh](#), [intermittent wetland](#), [coastal plain marsh](#), [southern wet meadow](#), and [northern wet meadow](#).

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## Page Citation

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

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[All Communities](#)

# Michigan's Natural Communities

## Rich Tamarack Swamp

State Rank: S3

Global Rank: G4

### Overview

Rich tamarack swamp is a groundwater-influenced, minerotrophic, forested wetland dominated by tamarack (*Larix laricina*) that occurs on deep organic soils predominantly south of the climatic tension zone in southern Lower Michigan. This natural community type was known as relict conifer swamp in previous versions of the natural community classification.

### Landscape Context

Rich tamarack swamp occurs in outwash channels, outwash plains, and kettle depressions throughout southern Lower Michigan. The community is often found where groundwater seeps occur at the bases of moraines. Rich tamarack swamps typically occur in association with headwater streams and adjacent to inland lakes. In large wetland complexes, rich tamarack swamp is typically associated with southern shrub-carr, prairie fen, southern wet meadow, and emergent marsh.



Photo by Joshua G. Cohen

### Soils

The organic soils underlying rich tamarack swamp are typically comprised of deep (> 2.5 m) peat containing large amounts of woody debris and occasionally layers of sedge-dominated peat. The soil profile often contains or is underlain by marl, a calcium carbonate precipitate that accumulates as sediment in shallow lake bottoms. Because glacial till in southern Michigan is typically high in calcium and magnesium, the groundwater discharge into rich tamarack swamp has high levels of alkalinity and dissolved calcium and magnesium carbonates.

### Natural Processes

Windthrow, insect outbreak, beaver flooding, and fire are all important forms of natural disturbance for rich tamarack swamp. Trees growing in the anaerobic conditions associated with a high water table and peat soils tend to be shallowly rooted and are thus, especially prone to windthrow. The light gaps created by windthrow help to regenerate tamarack and maintain the community's dense shrub layer. In addition, the coarse woody debris and pit and mound microtopography that results from windthrow add to the community's complex structure and floristic diversity.

Periodic outbreaks of larch sawfly (*Pristiphora erichsonii*) and eastern larch beetle (*Dendroctonus*

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Rich Tamarack Swamp

*simplex*), both native insect species, and the introduced tamarack casebearer (*Coleophora laricella*) can cause significant mortality of tamarack. The defoliation associated with an insect outbreak results in increased light reaching the understory, which may promote tamarack regeneration and high shrub-layer density. However, these defoliation events also promote the growth of red maple, which subsequently reduces the amount of light available to the understory and ground layers and results in lower species richness.

Due to the strong influence of groundwater, water levels in rich tamarack swamps tend to fluctuate less than in many other wetland types. However, the community is subject to seasonal water fluctuations and long-term flooding associated with beaver dams or blocked road culverts. Although the roots of tamarack form elevated hummocks that allow it to withstand small-scale water level fluctuations, prolonged flood events result in tamarack mortality and the conversion of rich tamarack swamp to emergent marsh, southern wet meadow, or southern shrub-carr.

While fire is not a frequent form of direct disturbance in rich tamarack swamps, its influence on the surrounding landscape is very important to the successional dynamics of this community. With the widespread absence of fire in southern Michigan, tamarack, a common tree within prairie fens, has completely colonized many sites that were previously occupied by prairie fen, thus forming many of the rich tamarack swamps we see today. Additionally, fire suppression in the surrounding landscape has facilitated the increase and dominance of red maple within upland forests. As a result, red maple is now more likely to colonize rich tamarack swamps and replace tamarack, especially following disturbances such as insect outbreaks and windthrows.

## Vegetation

The structure of this community is largely shaped by tamarack, the dominant tree species. The roots of tamarack often form extensive mats that stand elevated above adjacent pools of standing water and provide a substrate for a diverse wetland ground flora that differs from that of the inundated mudflats between root hummocks. The varied microtopography fosters biocomplexity and high species richness. Tamarack windthrows and tip-up mounds also add to the heterogeneous structure of the ground and shrub layers. Because of the open branching and spire-like shape of tamarack, the shrub layer of rich tamarack swamp receives a high level of light and is typically both very dense and diverse. The shrub layer may contain as many as 28 species, with multiple species intertwined and over-topping one another so that total shrub-layer cover may reach 90 to 130%.

In addition to tamarack, other common tree species include black ash (*Fraxinus nigra*), yellow birch (*Betula alleghaniensis*), American elm (*Ulmus americana*), red maple (*Acer rubrum*), swamp white oak (*Quercus bicolor*), quaking aspen (*Populus tremuloides*), red cedar (*Juniperus virginiana*), and in some locations white pine (*Pinus strobus*) and northern white-cedar (*Thuja occidentalis*). Common tall shrub species include poison sumac (*Toxicodendron vernix*), winterberry (*Ilex verticillata*), smooth highbush blueberry (*Vaccinium corymbosum*), gray dogwood (*Cornus foemina*), silky dogwood (*C. amomum*), swamp rose (*Rosa palustris*), American hazelnut (*Corylus americana*), nannyberry (*Viburnum lentago*), juneberry (*Amelanchier arborea*), black chokeberry (*Aronia prunifolia*), and pussy willow (*Salix discolor*). Low shrub species common to rich tamarack swamp include swamp gooseberry (*Ribes hirtellum*), wild red raspberry (*Rubus strigosus*), bog birch (*Betula pumila*), sage willow (*Salix candida*), swamp fly honeysuckle (*Lonicera oblongifolia*), alder-leaved buckthorn (*Rhamnus alnifolia*), common juniper (*Juniperus communis*), shrubby cinquefoil (*Potentilla fruticosa*), and bog willow (*Salix pedicellaris*). Common woody vines include poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and riverbank grape (*Vitis riparia*).

Because of the high frequency of canopy disturbance and open structure of tamarack, the ground flora is composed of a heterogeneous mixture of shade-tolerant and intolerant wetland plants. In addition, the stark difference in moisture levels between the elevated root hummocks and saturated muck flats also

significantly increases the diversity of wetland species found in the ground flora. Common ground flora in rich tamarack swamp include the following species: smooth swamp aster (*Aster firmus*), swamp aster (*A. puniceus*), eastern lined aster (*A. lanceolatus*), nodding bur-marigold (*Bidens cernuus*), tall swamp-marigold (*B. coronatus*), false nettle (*Boehmeria cylindrica*), bluejoint grass (*Calamagrostis canadensis*), marsh marigold (*Caltha palustris*), marsh bellflower (*Campanula aparinoides*), Pennsylvania bitter cress (*Cardamine pennsylvanica*), sedges (*Carex comosa*, *C. hystericina*, *C. lacustris*, *C. leptalea*, and *C. stricta*), water hemlock (*Cicuta bulbifera*), spinulose woodfern (*Dryopteris carthusiana*), water horsetail (*Equisetum fluviale*), rough bedstraw (*Galium asprellum*), bog bedstraw (*G. labradoricum*), stiff bedstraw (*G. tinctorium*), fowl marna grass (*Glyceria striata*), jewelweed (*Impatiens capensis*), cut grass (*Leersia oryzoides*), small duckweed (*Lemna minor*), northern bugle weed (*Lycopus uniflorus*), tufted loosestrife (*Lysimachia thyrsoiflora*), Canada mayflower (*Maianthemum canadense*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), cleareweed (*Pilea pumila*), dwarf raspberry (*Rubus pubescens*), common arrowhead (*Sagittaria latifolia*), mad-dog skullcap (*Scutellaria lateriflora*), golden ragwort (*Senecio aureus*), swamp goldenrod (*Solidago patula*), rough goldenrod (*S. rugosa*), false mayflower (*Smilacina trifolia*), skunk cabbage (*Symplocarpus foetidus*), marsh fern (*Thelypteris palustris*), starflower (*Trientalis borealis*), and violets (*Viola* spp.).

While mosses, especially brown mosses (*Amblystegiaceae*), are prevalent throughout the ground layer, sphagnum mosses (*Sphagnum* spp.) are usually only locally distributed.

### Noteworthy Animals

Beaver-induced flooding can result in widespread mortality of tamarack and other species not adapted to inundated conditions. Periodic outbreaks of the larch sawfly (*Pristiphora erichsonii*) and tamarack casebearer (*Coleophora laricella*) result in significant reductions in tamarack-cover, and repeated defoliation events can cause tamarack-mortality. Fall migrating songbirds and other resident birds and small mammals feed on the abundance of fruit produced by the dense shrub layer of rich tamarack swamp.

### Rare Plants

*Berula erecta* (water parsnip, state threatened)  
*Cacalia plantaginea* (prairie Indian-plantain, state special concern)  
*Calamagrostis stricta* (narrow-leaved reedgrass, state threatened)  
*Cypripedium candidum* (white lady's-slipper, state threatened)  
*Drosera anglica* (English sundew, state special concern)  
*Filipendula rubra* (queen-of-the-prairie, state threatened)  
*Muhlenbergia richardsonis* (mat muhly, state threatened)  
*Phlox maculata* (sweet william phlox, state threatened)  
*Poa paludigena* (bog bluegrass, state threatened)  
*Polemonium reptans* (Jacob's ladder, state threatened)  
*Sporobolus heterolepis* (prairie dropseed, state special concern)  
*Valeriana edulis* var. *ciliata* (edible valerian, state threatened)

### Rare Animals

*Clemmys guttata* (spotted turtle, state special concern)  
*Emydoidea blandingii* (Blanding's turtle, state special concern)  
*Oecanthus laricis* (tamarack tree cricket, state special concern)  
*Neonympha m. mitchellii* (Mitchell's satyr butterfly, federal/state endangered)  
*Sistrurus c. catenatus* (eastern massasauga, federal candidate species and state special concern)





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## Biodiversity Management Considerations

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The presence of conifer-dominated wetlands in southern Michigan contributes significantly to the region's overall biodiversity. Protecting the hydrology of rich tamarack swamp is critical for its continued existence and may include avoiding surface water inputs to the community from drainage ditches and agricultural fields, clearing blocked road culverts, which can cause prolonged flooding, and maintaining native vegetation types in the uplands surrounding the community.

Invasion by red maple can cause rich tamarack swamp to shift toward hardwood domination, resulting in a significant decrease in shrub-layer cover and loss of shade-intolerant species such as tamarack. Reducing red maple cover in rich tamarack swamps by girdling in conjunction with trunk-application of wetland-approved herbicide may be effective in limiting its dominance. Ideally, this type of management would accompany the use of prescribed fire and removal of red maple in the upland forests adjacent to the swamp as well as hydrologic restoration where necessary. Significantly reducing red maple cover within the swamp and adjacent upland will help ensure that characteristic natural disturbance events, such as windthrow and insect outbreaks, result in tamarack regeneration rather than further proliferation of red maple.

Invasive species that can reduce species diversity and alter community structure include glossy buckthorn (*Rhamnus frangula*), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*Typha x glauca*), reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), and European marsh thistle (*Cirsium palustre*), the latter species mostly restricted to northern Michigan at present. Glossy buckthorn is probably the greatest threat to rich tamarack swamps as it is capable of completely dominating the shrub and ground layers. Removing glossy buckthorn can be accomplished with cutting, accompanied by herbicide application and by using spot-burning to eliminate seedlings. Regular monitoring for invasive species followed by prompt and sustained control efforts will help protect the ecological integrity of rich tamarack swamp and other adjacent natural communities.

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## Variation

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Throughout northern Michigan and near the tension zone in mid-Michigan, northern white-cedar (*Thuja occidentalis*) replaces tamarack as the dominant tree species in groundwater-influenced, forested wetlands. Rainwater-fed (ombrotrophic) acidic, tamarack and black spruce swamps also occur in southern Michigan and are classified as poor conifer swamp. Many large wetland complexes contain zones of both minerotrophic tamarack swamp (e.g., rich tamarack swamp) near the upland edge where groundwater seeps occur, as well as ombrotrophic tamarack swamp (e.g., poor conifer swamp) near the center of the complex. In the ombrotrophic zone, deep peat separates the vegetation from the influence of groundwater and sphagnum mosses acidify the surface peat.

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## Similar Natural Communities

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[Rich conifer swamp](#), [hardwood-conifer swamp](#), [southern hardwood swamp](#), [northern hardwood swamp](#), [poor conifer swamp](#), [prairie fen](#), [southern shrub-carr](#), and [southern wet meadow](#).

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## Relevant Literature

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- Curtis, J.T. 1959. The vegetation of Wisconsin. University of Wisconsin Press, Madison, WI. 657 pp.
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For a full list of references used to create this description, please refer to the [natural community abstract](#) for rich tamarack swamp.

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## More Information

Rich tamarack swamp natural community abstract

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## Page Citation

Kost, M.A., D.A. Albert, J.G. Cohen, B.S. Slaughter, R.K. Schillo, C.R. Weber, and K.A. Chapman.  
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# Michigan's Natural Communities

## Southern Wet Meadow

State Rank: S3

Global Rank: G4?

### Overview

Southern wet meadow is an open, groundwater-influenced (minerotrophic), sedge-dominated wetland that occurs in central and southern Lower Michigan. Open conditions are maintained by seasonal flooding, beaver-induced flooding, and fire. Sedges in the genus *Carex*, in particular tussock sedge (*Carex stricta*), dominate the community. Southern wet meadow, commonly referred to as sedge meadow, also occurs in Iowa, Illinois, Indiana, Minnesota, North Dakota, Wisconsin, and Ontario.



Photo by Joshua G. Cohen

### Landscape Context

Southern wet meadow occurs on glacial lakebeds, lakeplains, and in depressions on glacial outwash and moraines. The community frequently occurs along the margins of lakes and streams, where seasonal flooding or beaver-induced flooding is common.

### Soils

Southern wet meadow typically occurs on neutral to strongly alkaline organic soils (i.e., sapric to hemic peat), but saturated mineral soil may also support the community. Because of the calcareous nature of the glacial drift in the regions where southern wet meadow occurs, its soils typically contain high levels of calcium and magnesium.

### Natural Processes

Water levels in southern wet meadow may fluctuate seasonally, reaching their peak in spring and lows in late summer, but typically remain at or near the soil's surface throughout the year. The structure of southern wet meadow is largely influenced by tussock sedge, which forms large tussocks up to 0.5 m high on which many additional species successfully establish above the zone of seasonal inundation. Community structure may depend on a consistently high water table as the tussocks of *Carex stricta* rapidly decompose when water levels are reduced by tiling. In addition to seasonal flooding, beaver-induced flooding also maintains open conditions by killing encroaching trees and shrubs.

Southern wet meadow is a fire-dependent natural community. By reducing leaf litter and allowing light to reach the soil surface and stimulate seed germination, fire can play an important role in maintaining southern wet meadow seed banks. Fire plays a critical role in maintaining species richness by creating open

microsites for small species. Another critically important attribute of fire is its ability to temporarily reduce shrub and tree cover.

In the absence of fire or beaver-induced flooding, all but the wettest sedge meadows typically convert to shrub-carr and eventually swamp forest. Prolonged flooding may also create new southern wet meadows by killing trees and shrubs of swamp forests and shrub-carrs, thus allowing shade-intolerant wet meadow species such as tussock sedge to become established.

## Vegetation

Southern wet meadow is typically dominated by tussock sedge. Because its roots form large hummocks or tussocks, the species is responsible for the community's hummock and hollow structure. As the shaded areas between tussocks are often covered with standing water and leaf litter, many of the shorter species inhabiting sedge meadows grow almost exclusively from the sides or tops of *Carex stricta* tussocks. Additional common sedges include *Carex aquatilis*, *C. comosa*, *C. bebbii*, *C. hystericina*, *C. lacustris*, *C. pellita*, *C. lasiocarpa*, *C. prairea*, *C. rostrata*, *C. sartwellii*, *C. stipata*, and *C. vulpinoidea*. The most dominant grass species in southern wet meadow is bluejoint grass (*Calamagrostis canadensis*), sometimes occurring as a codominant with tussock sedge. Other common grasses include fringed bromes (*Bromus ciliatus*), fowl manna grass (*Glyceria striata*), marsh wild timothy (*Muhlenbergia glomerata*), leafy satin grass (*M. mexicana*), and fowl meadow grass (*Poa palustris*). A wide variety of wetland forbs and several ferns occur in southern wet meadow, including swamp milkweed (*Asclepias incarnata*), swamp aster (*Aster puniceus*), smooth swamp aster (*A. firmus*), marsh bellflower (*Campanula aparinoides*), water hemlock (*Cicuta bulbifera*), swamp thistle (*Cirsium muticum*), joe-pye-weed (*Eupatorium maculatum*), common boneset (*Eupatorium perfoliatum*), rough bedstraw (*Galium asprellum*), marsh pea (*Lathyrus palustris*), northern bugle weed (*Lycopus uniflorus*), tufted loosestrife (*Lysimachia thyrsiflora*), cleareweed (*Pilea pumila*), water smartweed (*Polygonum amphibium*), Virginia mountain mint (*Pycnanthemum virginianum*), great water dock (*Rumex orbiculatus*), common arrowhead (*Sagittaria latifolia*), common skullcap (*Scutellaria galericulata*), Canada goldenrod (*Solidago canadensis*), late goldenrod (*S. gigantea*), swamp goldenrod (*S. patula*), purple meadow rue (*Thalictrum dasycarpum*), marsh St. John's-wort (*Triadenum fraseri*), marsh fern (*Thelypteris palustris*), and sensitive fern (*Onoclea sensibilis*).

## Noteworthy Animals

Muskrat (*Ondatra zibethicus*) commonly build lodges in southern wet meadows, which when abandoned are used by Canada geese (*Branta canadensis*) as nesting sites. Sandhill cranes (*Grus canadensis*) and marsh wrens (*Cistothorus palustris*, state special concern) also use the community for nesting habitat. Beaver help maintain open conditions through dam building and subsequent flooding and also through herbivory of shrubs and trees.

## Rare Plants

*Gentianella quinquefolia* (stiff gentian, state threatened)  
*Mimulus alatus* (wing-stemmed monkey flower, presumed extirpated from Michigan)  
*Pycnanthemum muticum* (broad-leaved mountain mint, state threatened)

## Rare Animals

*Acris crepitans blanchardi* (Blanchard's cricket frog, state special concern)  
*Ambystoma texanum* (smallmouth salamander, state endangered)  
*Asio flammeus* (short-eared owl, state endangered)



*Botaurus lentiginosus* (American bittern, state special concern)  
*Calephelis mutica* (swamp metalmark, state special concern)  
*Circus cyaneus* (northern harrier, state threatened)  
*Cistothorus palustris* (marsh wren, state special concern)  
*Clonophis kirtlandii* (Kirtland's snake, state endangered)  
*Emydoidea blandingii* (Blanding's turtle, state special concern)  
*Euphyes dukesi* (Dukes' skipper, state threatened)  
*Meroplecton ambigua* (Newman's brocade, state special concern)  
*Neoconocephalus lyristis* (bog conehead, state special concern)  
*Neoconocephalus retusus* (conehead grasshopper, state special concern)  
*Neonympha m. mitchellii* (Mitchell's satyr, federal/state threatened)  
*Nerodia erythrogaster neglecta* (copperbelly watersnake, federal threatened and state endangered)  
*Oarisma poweshiek* (Poweshiek skipperling, state threatened)  
*Orchelimum concinnum* (red-faced meadow katydid, state special concern)  
*Orchelimum delicatum* (delicate meadow katydid, state special concern)  
*Papaipema cerina* (golden borer, state special concern)  
*Papaipema maritima* (maritime sunflower borer, state special concern)  
*Papaipema speciosissima* (regal fern borer, state special concern)  
*Paroxya hoosieri* (Hoosier locust, state special concern)  
*Phalaropus tricolor* (Wilson's phalarope, state special concern)  
*Rallus elegans* (king rail, state endangered)  
*Sistrurus c. catenatus* (eastern massasauga, federal candidate species and state special concern)  
*Spartiniphaga inops* (spartina moth, state special concern)  
*Speyeria idalia* (regal fritillary, state endangered)

## Biodiversity Management Considerations

Because restoration of degraded southern wet meadows can be difficult in the absence of favorable hydrology, intact organic soils, and a viable seed source for *Carex stricta*, conservation efforts should focus on protecting and managing existing southern wet meadows. Maintaining the natural hydrology of southern wet meadow is imperative for the community's continued existence. This may include avoiding surface water inputs to the meadow from drainage ditches and agricultural fields, and protecting groundwater recharge areas by maintaining native vegetation types in the uplands around the community. Management for southern wet meadows should include the use of prescribed fire to help reduce litter, stimulate seed germination, promote seedling establishment and plant growth, limit shrub and tree encroachment, and control invasive species. Ideally, prescribed fire management of southern wet meadows would be orchestrated with that of surrounding fire-dependent wetland and upland communities. If prescribed burning is not feasible, mowing can be used to reduce woody plant cover but should be restricted to the winter, when ground frost will reduce disturbance to soils, herbaceous plants, and hydrology, or late summer and fall when meadows are dry. Because most wetland shrubs are capable of resprouting when cut (or burned), the application of herbicides to recently cut stumps may be required to maintain open conditions.

Monitoring and control efforts to detect and remove invasive species are critical to the long-term viability of southern wet meadow. Invasive species that threaten the diversity and community structure include purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), reed (*Phragmites australis*), narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*Typha x glauca*), glossy buckthorn (*Rhamnus frangula*), and multiflora rose (*Rosa multiflora*).

## Variation

Community structure and plant diversity can vary significantly among southern wet meadows depending on

the dominant species of sedge. Wet meadows dominated by tussock sedge have complex microtopography, which fosters high levels of forb diversity. Wet meadows dominated by lake sedge typically have little microtopographic complexity and low forb diversity.

## Similar Natural Communities

[Emergent marsh](#), [northern wet meadow](#), [poor fen](#), [prairie fen](#), [wet prairie](#), [lakeplain wet prairie](#), [Great Lakes marsh](#), and [southern shrub-carl](#).

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For a full list of references used to create this description, please refer to the [natural community abstract](#) for southern wet meadow.

## More Information

Southern wet meadow natural community abstract

## Page Citation

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# Reichert Preserve

Compiled by Bev Walters and Aunita Erskine, 2014

including plants of Ridge, Wet Meadow, Swamp, Fen Area and other species

## FLORISTIC QUALITY DATA

|       |                      |                    |
|-------|----------------------|--------------------|
| 260   | Total Species        |                    |
| 243   | Total Native Species | 4.56 NATIVE MEAN C |
| 93.5  | % Native Species     | 4.26 W/Adventives  |
| 71.01 | NATIVE FQI           | -0.1 NATIVE MEAN W |
| 68.65 | W/Adventives         | 0.0 W/Adventives   |

| C | SCIENTIFIC NAME                    | COMMON NAME                | W  | LISTED |
|---|------------------------------------|----------------------------|----|--------|
| 1 | Acer rubrum                        | RED MAPLE                  | 0  |        |
| 2 | Acer saccharinum                   | SILVER MAPLE               | -3 |        |
| 1 | Achillea millefolium               | YARROW                     | 3  |        |
| * | AGROSTIS GIGANTEA                  | REDSOIL                    | -3 |        |
| 5 | Agrostis perennans                 | AUTUMN BENT                | 3  |        |
| 4 | Amelanchier arborea                | JUNE BERRY                 | 3  |        |
| 5 | Amphicarpaea bracteata             | HOG-PEANUT                 | 0  |        |
| 5 | Andropogon gerardii                | BIG BLUESTEM               | 0  |        |
| 3 | Anemone virginiana                 | THIMBLEWEED                | 3  |        |
| 2 | Antennaria parlinii                | SMOOTH PUSSYTOES           | 5  |        |
| 3 | Apios americana                    | GROUNDNUT                  | -3 |        |
| 3 | Apocynum cannabinum (A. sibiricum) | INDIAN-HEMP                | 0  |        |
| 6 | Arabis pycnocarpa (A. hirsuta)     | HAIRY ROCK CRESS           | 3  |        |
| 5 | Aralia nudicaulis                  | WILD SASSAPARILLA          | 3  |        |
| 5 | Arisaema triphyllum                | JACK-IN-THE-PULPIT         | 0  |        |
| 5 | Aronia prunifolia                  | CHOKEBERRY                 | -3 |        |
| 6 | Asclepias incarnata                | SWAMP MILKWEED             | -5 |        |
| 1 | Asclepias syriaca                  | COMMON MILKWEED            | 5  |        |
| * | ASPARGUS OFFICINALIS               | GARDEN ASPARAGUS           | 3  |        |
| 4 | Athyrium filix-femina              | LADY FERN                  | 0  |        |
| * | BERBERIS VULGARIS                  | COMMON BARBERRY            | 3  |        |
| 7 | Betula alleghaniensis              | YELLOW BIRCH               | 0  |        |
| 8 | Betula pumila                      | BOG BIRCH                  | -5 |        |
| 7 | Bidens trichosperma (B. coronatus) | TICKSEED-SUNFLOWER         | -5 |        |
| 5 | Boehmeria cylindrica               | FALSE NETTLE               | -5 |        |
| 6 | Bromus ciliatus                    | FRINGED BROME              | -3 |        |
| 3 | Calamagrostis canadensis           | BLUE-JOINT                 | -5 |        |
| 6 | Caltha palustris                   | MARSH-MARIGOLD             | -5 |        |
| 7 | Campanula aparinoides              | MARSH BELLFLOWER           | -5 |        |
| 6 | Campanula rotundifolia             | HAREBELL                   | 3  |        |
| 1 | Carex blanda                       | SEDGE                      | 0  |        |
| 6 | Carex bromoides                    | SEDGE                      | -3 |        |
| 5 | Carex gracilescens                 | SEDGE                      | 3  |        |
| 4 | Carex gracillima                   | SEDGE                      | 3  |        |
| 6 | Carex lacustris                    | SEDGE                      | -5 |        |
| 8 | Carex lasiocarpa                   | SEDGE                      | -5 |        |
| 8 | Carex laxiculmis                   | SEDGE                      | 3  |        |
| 2 | Carex pellita (C. lanuginosa)      | SEDGE                      | -5 |        |
| 4 | Carex pennsylvanica                | SEDGE                      | 5  |        |
| 2 | Carex radiata (C. rosea)           | STRAIGHT-STYLED WOOD SEDGE | 0  |        |
| 1 | Carex stipata                      | SEDGE                      | -5 |        |
| 4 | Carex stricta                      | SEDGE                      | -5 |        |
| 1 | Carex vulpinoidea                  | SEDGE                      | -5 |        |
| 6 | Carpinus caroliniana               | BLUE-BEECH                 | 0  |        |
| 5 | Carya glabra                       | PIGNOT HICKORY             | 3  |        |
| 5 | Carya ovata                        | SHAGBARK HICKORY           | 3  |        |
| 5 | Celtis tenuifolia                  | DWARF HACKBERRY            | 5  | SC     |

| C | SCIENTIFIC NAME                        | COMMON NAME              | W  | LISTED |
|---|----------------------------------------|--------------------------|----|--------|
| 7 | Cephalanthus occidentalis              | BUTTONBUSH               | -5 |        |
| * | CERASTIUM FONTANUM                     | MOUSE-EAR CHICKWEED      | 3  |        |
| 7 | Chelone glabra                         | TURTLEHEAD               | -5 |        |
| 5 | Cicuta bulbifera                       | WATER HEMLOCK            | -5 |        |
| 4 | Cicuta maculata                        | WATER HEMLOCK            | -5 |        |
| * | CIRSIIUM ARVENSE                       | CANADA THISTLE           | 3  |        |
| 6 | Cirsium muticum                        | SWAMP THISTLE            | -5 |        |
| 4 | Claytonia virginica                    | SPRING-BEAUTY            | 3  |        |
| 8 | Collinsia canadensis                   | RICHWEED                 | 0  |        |
| 5 | Comandra umbellata                     | BASTARD-TOADFLAX         | 3  |        |
| * | CONVALLARIA MAJALIS                    | LILY-OF-THE-VALLEY       | 5  |        |
| 5 | Cornus alternifolia                    | ALTERNATE-LEAVED DOGWOOD | 3  |        |
| 2 | Cornus amomum                          | SILKY DOGWOOD            | -3 |        |
| 8 | Cornus florida                         | FLOWERING DOGWOOD        | 3  |        |
| 1 | Cornus foemina                         | GRAY DOGWOOD             | 0  |        |
| 2 | Cornus sericea (C. stolonifera)        | RED-OSIER                | -3 |        |
| 5 | Corylus americana                      | HAZELNUT                 | 3  |        |
| 5 | Cypripedium parviflorum (C. calceolus) | YELLOW LADY-SLIPPER      | 0  |        |
| * | DACTYLIS GLOMERATA                     | ORCHARD GRASS            | 3  |        |
| 8 | Dasiphora fruticosa (Potentilla f.)    | SHRUBBY CINQUEFOIL       | -3 |        |
| 6 | Desmodium illinoense                   | PRAIRIE TICK-TREFOIL     | 5  |        |
| 5 | Dichanthelium latifolium (Panicum l.)  | BROAD-LEAVED PANIC GRASS | 3  |        |
| 4 | Dioscorea villosa (Dioscorea villosa)  | WILD YAM                 | 0  |        |
| 5 | Doellingeria umbellata (Aster u.)      | FLAT-TOPPED WHITE ASTER  | -3 |        |
| 5 | Dryopteris carthusiana                 | SPINULOSE WOODFERN       | -3 |        |
| * | ELAEAGNUS UMBELLATA                    | AUTUMN-OLIVE             | 3  |        |
| 4 | Elymus virginicus                      | VIRGINIA WILD-RYE        | -3 |        |
| 3 | Epilobium coloratum                    | CINNAMON WILLOW-HERB     | -5 |        |
| 6 | Epilobium leptophyllum                 | FEN WILLOW-HERB          | -5 |        |
| 0 | Equisetum arvense                      | COMMON HORSETAIL         | 0  |        |
| 7 | Equisetum fluviatile                   | WATER HORSETAIL          | -5 |        |
| 2 | Equisetum hyemale                      | SCOURING RUSH            | 0  |        |
| 2 | Erigeron philadelphicus                | PHILADELPHIA FLEABANE    | 0  |        |
| 5 | Euonymus obovata                       | RUNNING STRAWBERRY-BUSH  | 3  |        |
| 4 | Eupatorium perfoliatum                 | BONESET                  | -3 |        |
| 4 | Euphorbia corollata                    | FLOWERING SPURGE         | 5  |        |
| 4 | Eurybia macrophylla (Aster m.)         | BIG-LEAVED ASTER         | 5  |        |
| 3 | Euthamia graminifolia                  | GRASS-LEAVED GOLDENROD   | 0  |        |
| 4 | Eutrochium maculatum (Eupatorium m.)   | JOE-PYE-WEED             | -5 |        |
| 7 | Floerkea proserpinacoides              | FALSE MERMAID            | 0  |        |
| 2 | Fragaria vesca                         | WOODLAND STRAWBERRY      | 3  |        |
| 2 | Fragaria virginiana                    | WILD STRAWBERRY          | 3  |        |
| 5 | Fraxinus americana                     | WHITE ASH                | 3  |        |
| 6 | Fraxinus nigra                         | BLACK ASH                | -3 |        |
| 2 | Fraxinus pennsylvanica                 | RED ASH                  | -3 |        |
| 0 | Galium aparine                         | ANNUAL BEDSTRAW          | 3  |        |
| 5 | Galium asprellum                       | ROUGH BEDSTRAW           | -5 |        |
| 3 | Galium boreale                         | NORTHERN BEDSTRAW        | 0  |        |
| 4 | Galium circaezans                      | WHITE WILD LICORICE      | 3  |        |
| 5 | Galium concinnum                       | SHINING BEDSTRAW         | 3  |        |
| 6 | Galium pilosum                         | HAIRY BEDSTRAW           | 5  |        |
| 6 | Galium trifidum                        | SMALL BEDSTRAW           | -3 |        |
| 5 | Gaultheria procumbens                  | WINTERGREEN              | 3  |        |
| 7 | Gaylussacia baccata                    | HUCKLEBERRY              | 3  |        |
| 4 | Geranium maculatum                     | WILD GERANIUM            | 3  |        |
| 1 | Geum canadense                         | WHITE AVENS              | 0  |        |
| 1 | Hackelia virginiana                    | BEGGAR'S LICE            | 3  |        |
| 5 | Hamamelis virginiana                   | WITCH-HAZEL              | 3  |        |





| C  | SCIENTIFIC NAME                                     | COMMON NAME                   | W  | LISTED |
|----|-----------------------------------------------------|-------------------------------|----|--------|
| 5  | Helianthus divaricatus                              | WOODLAND SUNFLOWER            | 5  |        |
| 5  | Helianthus giganteus                                | TALL SUNFLOWER                | -3 |        |
| 8  | Helianthus occidentalis                             | WESTERN SUNFLOWER             | 3  |        |
| 6  | Helianthus tuberosus                                | JERUSALEM-ARTICHOKE           | 0  |        |
| 6  | Hepatica americana                                  | ROUND-LOBED HEPATICA          | 5  |        |
| 8  | Heuchera americana                                  | ALUM ROOT                     | 3  |        |
| 5  | Hydodesmum glutinosum (Desmodium g.)                | CLUSTERED-LEAVED TICK-TREFOIL | 5  |        |
| 7  | Hydodesmum nudiflorum (Desmodium n.)                | NAKED TICK-TREFOIL            | 5  |        |
| 5  | Ilex verticillata                                   | MICHIGAN HOLLY                | -3 |        |
| 2  | Impatiens capensis                                  | SPOTTED TOUCH-ME-NOT          | -3 |        |
| *  | IRIS PSEUDACORUS                                    | YELLOW FLAG                   | -5 |        |
| 5  | Iris virginica                                      | SOUTHERN BLUE FLAG            | -5 |        |
| 7  | Juncus brachycephalus                               | RUSH                          | -5 |        |
| 4  | Juniperus communis                                  | COMMON or GROUND JUNIPER      | 3  |        |
| 3  | Juniperus virginiana                                | RED-CEDAR                     | 3  |        |
| 5  | Krigia biflora                                      | FALSE DANDELION               | 3  |        |
| 4  | Laportea canadensis                                 | WOOD NETTLE                   | -3 |        |
| 5  | Larix laricina                                      | TAMARACK                      | -3 |        |
| 8  | Lathyrus ochroleucus                                | PALE VETCHLING                | 5  |        |
| 7  | Lathyrus palustris                                  | MARSH PEA                     | -3 |        |
| 5  | Leersia virginica                                   | WHITE GRASS                   | -3 |        |
| *  | LIGUSTRUM VULGARE                                   | COMMON PRIVET                 | 3  |        |
| 7  | Lindera benzoin                                     | SPICEBUSH                     | -3 |        |
| 10 | Lithospermum canescens                              | HOARY PUCCOON                 | 5  |        |
| 4  | Lobelia siphilitica                                 | GREAT BLUE LOBELIA            | -3 |        |
| 5  | Lonicera dioica                                     | RED HONEYSUCKLE               | 3  |        |
| 5  | Luzula multiflora                                   | COMMON WOOD RUSH              | 3  |        |
| 2  | Lycopus americanus                                  | COMMON WATER HOREHOUND        | -5 |        |
| 2  | Lycopus uniflorus                                   | NORTHERN BUGLE WEED           | -5 |        |
| 4  | Lysimachia ciliata                                  | FRINGED LOOSESTRIFE           | -3 |        |
| 8  | Lysimachia quadrifolia                              | FOUR-LEAVED LOOSESTRIFE       | 3  |        |
| 6  | Lysimachia thyrsiflora                              | TUFTED LOOSESTRIFE            | -5 |        |
| *  | LYTHRUM SALICARIA                                   | PURPLE LOOSESTRIFE            | -5 |        |
| 4  | Maianthemum canadense                               | CANADA MAYFLOWER              | 3  |        |
| 5  | Maianthemum racemosum (Smilacina r.)                | FALSE SPIKENARD               | 3  |        |
| 5  | Maianthemum stellatum (Smilacina s.)                | STARRY FALSE SOLOMON-SEAL     | 0  |        |
| 3  | Matteuccia struthiopteris                           | OSTRICH FERN                  | 0  |        |
| 3  | Mentha canadensis (M. arvensis)                     | WILD MINT                     | -3 |        |
| 10 | Micranthes pennsylvanica (Saxifraga p.)             | SWAMP SAXIFRAGE               | -5 |        |
| 5  | Mimulus ringens                                     | MONKEY-FLOWER                 | -5 |        |
| 8  | Mitella diphylla                                    | BISHOP'S-CAP                  | 3  |        |
| 2  | Monarda fistulosa                                   | WILD-BERGAMOT                 | 3  |        |
| 9  | Morus rubra                                         | RED MULBERRY                  | 3  |        |
| 3  | Muhlenbergia mexicana                               | LEAFY SATIN GRASS             | -3 |        |
| 7  | Nuphar variegata                                    | YELLOW POND-LILY              | -5 |        |
| 6  | Nymphaea odorata                                    | SWEET-SCENTED WATERLILY       | -5 |        |
| 2  | Onoclea sensibilis                                  | SENSITIVE FERN                | -3 |        |
| 5  | Osmunda cinnamomea                                  | CINNAMON FERN                 | -3 |        |
| 5  | Osmunda regalis                                     | ROYAL FERN                    | -5 |        |
| 6  | Oxypolis rigidior                                   | COWBANE                       | -5 |        |
| 5  | Packera aurea (Senecio a.)                          | GOLDEN RAGWORT                | -3 |        |
| 3  | Packera paupercula (Senecio p., Senecio plattensis) | BALSAM RAGWORT                | 0  |        |
| 5  | Parthenocissus quinquefolia                         | VIRGINIA CREEPER              | 3  |        |
| 10 | Pedicularis canadensis                              | WOOD-BETONY                   | 3  |        |
| 8  | Pedicularis lanceolata                              | SWAMP-BETONY                  | -3 |        |
| 6  | Persicaria amphibia (Polygonum a.)                  | WATER SMARTWEED               | -5 |        |
| 0  | Phalaris arundinacea                                | REED CANARY GRASS             | -3 |        |
| 7  | Phlox pilosa                                        | PRAIRIE PHLOX                 | 3  |        |

| C | SCIENTIFIC NAME                      | COMMON NAME              | W  | LISTED |
|---|--------------------------------------|--------------------------|----|--------|
| 5 | Phragmites australis var. americanus | REED                     | -3 |        |
| 4 | Phryma leptostachya                  | LOPSEED                  | 3  |        |
| * | POA COMPRESSA                        | CANADA BLUEGRASS         | 3  |        |
| * | POA PRATENSIS                        | KENTUCKY BLUEGRASS       | 3  |        |
| 3 | Podophyllum peltatum                 | MAY-APPLE                | 3  |        |
| 4 | Polygonatum biflorum                 | SOLOMON-SEAL             | 3  |        |
| 5 | Polygonatum pubescens                | DOWNY SOLOMON SEAL       | 5  |        |
| 1 | Populus deltoides                    | COTTONWOOD               | 0  |        |
| 4 | Populus grandidentata                | BIG-TOOTH ASPEN          | 3  |        |
| 1 | Populus tremuloides                  | QUAKING ASPEN            | 0  |        |
| 2 | Potentilla simplex                   | OLD-FIELD CINQUEFOIL     | 3  |        |
| 5 | Prenanthes altissima                 | TALL WHITE LETTUCE       | 3  |        |
| 0 | Prunella vulgaris                    | SELF-HEAL                | 0  |        |
| 2 | Prunus serotina                      | WILD BLACK CHERRY        | 3  |        |
| 2 | Prunus virginiana                    | CHOKE CHERRY             | 3  |        |
| 0 | Pteridium aquilinum                  | BRACKEN FERN             | 3  |        |
| 5 | Pycnanthemum virginianum             | COMMON MOUNTAIN MINT     | -3 |        |
| 6 | Pyrola elliptica                     | LARGE-LEAVED SHINLEAF    | 3  |        |
| 5 | Quercus alba                         | WHITE OAK                | 3  |        |
| 8 | Quercus bicolor                      | SWAMP WHITE OAK          | -3 |        |
| 4 | Quercus ellipsoidalis (Q. coccinea)  | HILL'S OAK               | 5  |        |
| 5 | Quercus macrocarpa                   | BUR OAK                  | 3  |        |
| 7 | Quercus prinoides                    | DWARF CHINQUAPIN OAK     | 3  |        |
| 5 | Quercus rubra                        | RED OAK                  | 3  |        |
| 6 | Quercus velutina                     | BLACK OAK                | 5  |        |
| 0 | Ranunculus abortivus                 | SMALL-FLOWERED BUTTERCUP | 0  |        |
| 5 | Ranunculus recurvatus                | HOOKED CROWFOOT          | -3 |        |
| 8 | Rhamnus alnifolia                    | ALDER-LEAVED BUCKTHORN   | -5 |        |
| 7 | Rhus aromatica                       | FRAGRANT SUMAC           | 5  |        |
| 6 | Ribes americanum                     | WILD BLACK CURRANT       | -3 |        |
| 6 | Ribes hirtellum                      | SWAMP GOOSEBERRY         | -3 |        |
| 4 | Rosa carolina                        | PASTURE ROSE             | 3  |        |
| * | ROSA MULTIFLORA                      | MULTIFLORA ROSE          | 3  |        |
| 5 | Rosa palustris                       | SWAMP ROSE               | -5 |        |
| 1 | Rubus allegheniensis                 | COMMON BLACKBERRY        | 3  |        |
| 1 | Rubus occidentalis                   | BLACK RASPBERRY          | 5  |        |
| 4 | Rubus pubescens                      | DWARF RASPBERRY          | -3 |        |
| 3 | Rubus setosus                        | BRISTLY BLACKBERRY       | -3 |        |
| 9 | Rumex orbiculatus                    | GREAT WATER DOCK         | -5 |        |
| 1 | Salix bebbiana                       | BEBB'S WILLOW            | -3 |        |
| 1 | Salix discolor                       | PUSSY WILLOW             | -3 |        |
| 3 | Sambucus canadensis                  | ELDERBERRY               | -3 |        |
| 4 | Sanicula marilandica                 | BLACK SNAKEROOT          | 3  |        |
| 2 | Sanicula odorata (S. gregaria)       | BLACK SNAKEROOT          | 0  |        |
| 5 | Sassafras albidum                    | SASSAFRAS                | 3  |        |
| 5 | Sceptridium dissectum                | CUT-LEAVED GRAPE-FERN    | 0  |        |
| 5 | Scutellaria galericulata             | MARSH SKULLCAP           | -5 |        |
| 7 | Sisyrinchium albidum (S. hastile)    | COMMON BLUE-EYED-GRASS   | 3  |        |
| 5 | Sium suave                           | WATER-PARSNIP            | -5 |        |
| 5 | Smilax hispida (S. tamnoides)        | BRISTLY GREENBRIER       | 0  |        |
| * | SOLANUM DULCAMARA                    | BITTERSWEET NIGHTSHADE   | 0  |        |
| 1 | Solidago altissima                   | TALL GOLDENROD           | 3  |        |
| 6 | Solidago caesia                      | BLUESTEM GOLDENROD       | 3  |        |
| 1 | Solidago canadensis                  | CANADA GOLDENROD         | 3  |        |
| 3 | Solidago gigantea                    | LATE GOLDENROD           | -3 |        |
| 3 | Solidago juncea                      | EARLY GOLDENROD          | 5  |        |
| 6 | Solidago patula                      | SWAMP GOLDENROD          | -5 |        |
| 3 | Solidago rugosa                      | ROUGH-LEAVED GOLDENROD   | 0  |        |

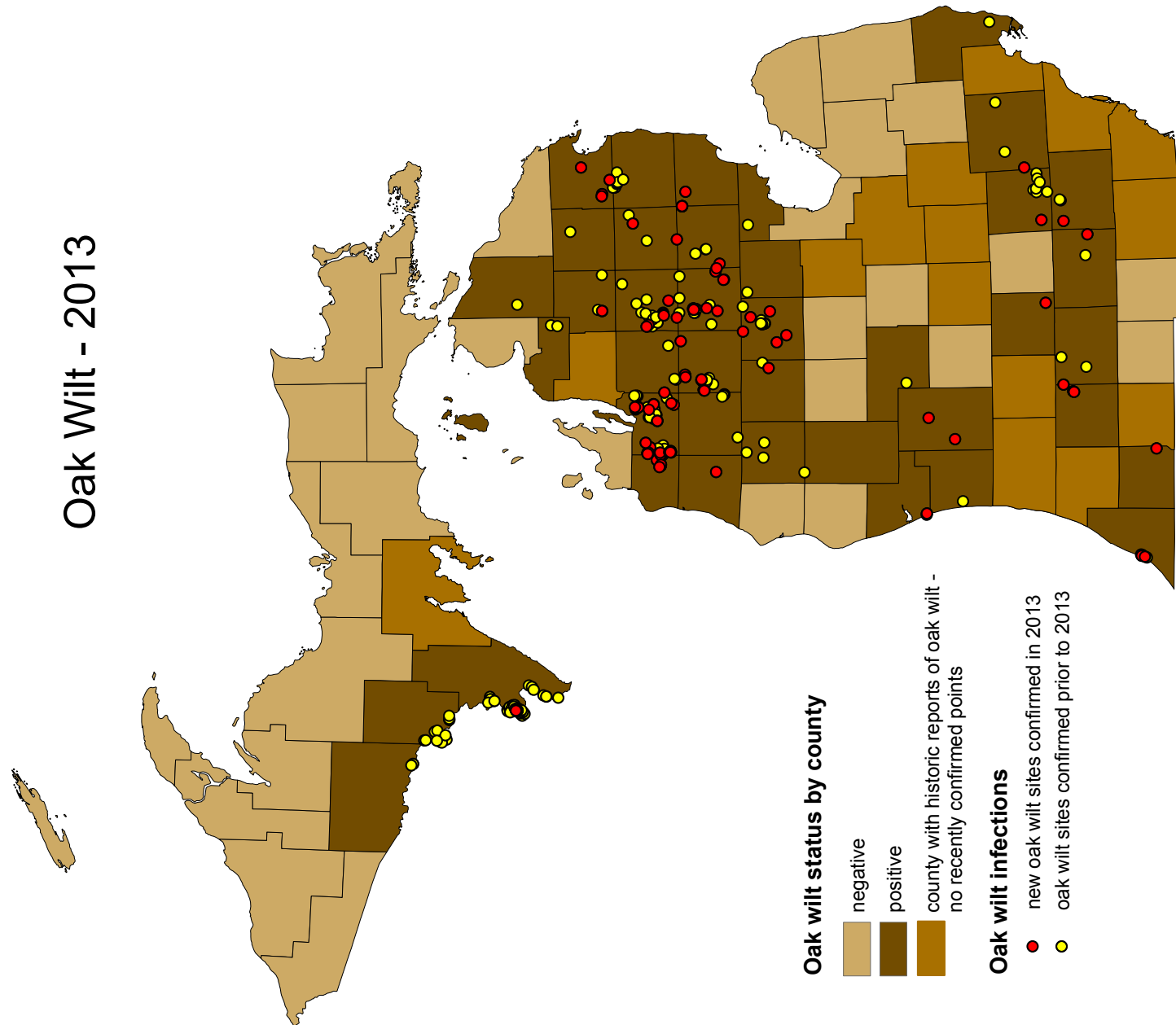


| C | SCIENTIFIC NAME                        | COMMON NAME                 | W  | LISTED |
|---|----------------------------------------|-----------------------------|----|--------|
| 5 | Spartina pectinata                     | CORDGRASS                   | -3 |        |
| 4 | Spiraea alba                           | MEADOWSWEET                 | -3 |        |
| 5 | Stellaria longifolia                   | LONG-LEAVED CHICKWEED       | -3 |        |
| 4 | Symphotrichum cordifolium (Aster c.)   | HEART-LEAVED ASTER          | 5  |        |
| 4 | Symphotrichum firmum (Aster puniceus)  | SMOOTH SWAMP ASTER          | -3 |        |
| 5 | Symphotrichum laeve (Aster l.)         | SMOOTH ASTER                | 3  |        |
| 2 | Symphotrichum lateriflorum (Aster l.)  | CALICO ASTER                | 0  |        |
| 3 | Symphotrichum novae-angliae (Aster n.) | NEW ENGLAND ASTER           | -3 |        |
| 1 | Symphotrichum pilosum (Aster p.)       | HAIRY ASTER                 | 3  |        |
| 5 | Symphotrichum puniceum (Aster p.)      | SWAMP ASTER                 | -5 |        |
| 6 | Symplocarpus foetidus                  | SKUNK-CABBAGE               | -5 |        |
| 8 | Taenidia integerrima                   | YELLOW-PIMPERNEL            | 5  |        |
| * | TARAXACUM OFFICINALE                   | COMMON DANDELION            | 3  |        |
| 4 | Teucrium canadense                     | WOOD-SAGE                   | -3 |        |
| 3 | Thalictrum dasycarpum                  | PURPLE MEADOW-RUE           | -3 |        |
| 6 | Thalictrum dioicum                     | EARLY MEADOW-RUE            | 3  |        |
| 8 | Thalictrum thalictroides (Anemone t.)  | RUE-ANEMONE                 | 3  |        |
| 2 | Thelypteris palustris                  | MARSH FERN                  | -3 |        |
| 5 | Tilia americana                        | BASSWOOD                    | 3  |        |
| * | TORILIS JAPONICA                       | HEDGE-PARSLEY               | 3  |        |
| 2 | Toxicodendron radicans                 | POISON-IVY                  | 0  |        |
| 6 | Toxicodendron vernix                   | POISON SUMAC                | -5 |        |
| 5 | Trillium grandiflorum                  | COMMON TRILLIUM             | 3  |        |
| 1 | Typha latifolia                        | BROAD-LEAVED CAT-TAIL       | -5 |        |
| 1 | Ulmus americana                        | AMERICAN ELM                | -3 |        |
| 6 | Vaccinium corymbosum                   | HIGHBUSH BLUEBERRY          | -3 |        |
| 7 | Vaccinium pallidum                     | HILLSIDE BLUEBERRY          | 5  |        |
| 4 | Vernonia missurica                     | MISSOURI IRONWEED           | 0  |        |
| 6 | Viburnum acerifolium                   | MAPLE-LEAVED VIBURNUM       | 5  |        |
| 4 | Viburnum lentago                       | NANNYBERRY                  | 0  |        |
| 5 | Viburnum trilobum (V. opulus)          | AMERICAN HIGHBUSH-CRANBERRY | -3 |        |
| 8 | Vicia caroliniana                      | PALE or WOOD VETCH          | 5  |        |
| 5 | Viola cucullata                        | MARSH VIOLET                | -5 |        |
| 9 | Viola pedata                           | BIRDFOOT VIOLET             | 5  |        |
| 6 | Viola rostrata                         | LONG-SPURRED VIOLET         | 3  |        |
| 6 | Vitis aestivalis                       | SUMMER GRAPE                | 3  |        |
| 3 | Vitis riparia                          | RIVER-BANK GRAPE            | 0  |        |
| 3 | Zanthoxylum americanum                 | PRICKLY-ASH                 | 3  |        |
| 6 | Zizia aurea                            | GOLDEN ALEXANDERS           | 0  |        |

Also: Sparganium sp., Quercus bicolor x Q. prinoides, Solidago caesia x S. rugosa, Cypripedium sp. (perhaps C. reginae)

## APPENDIX F

### Oak Wilt - 2013







MICHIGAN DEPARTMENT OF NATURAL RESOURCES  
FOREST, MINERAL AND FIRE MANAGEMENT

## OAK WILT

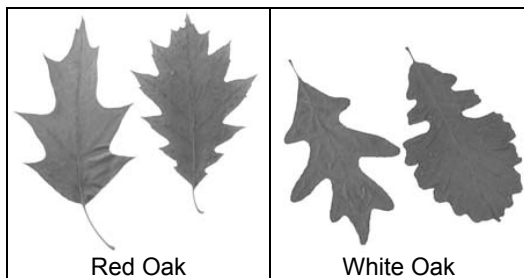
*This information is provided by Michigan State University Extension and the Michigan Department of Natural Resources*

Oak wilt is a disease that infects and kills ornamental and forest oak trees. In recent years, oak wilt has expanded dramatically and is found throughout Michigan.

It is easier to prevent oak wilt than to eliminate it once it becomes established. In Michigan, foresters, firewood cutters, landscapers, utility and road commission crews and others who work around trees need to be familiar with oak wilt and how to prevent it from spreading.

### What is Oak Wilt?

Oak wilt is a tree disease caused by a fungus that plugs the water-conducting system of oak trees. To block the spread of the fungus, trees produce gums and resins which also plug the system, causing infected trees to die quickly.



Oak wilt is mainly a problem of red oak trees.

This group includes northern red oak, black oak and pin oak. Red oaks will die within a few weeks after becoming infected. White oaks are more resistant and the disease progresses more slowly.

### How Does Oak Wilt Spread?

Diseased trees pass the fungus to adjacent healthy trees through root grafts. In addition, the fungus can be carried to new areas by sap-feeding beetles, which move spores from infected trees to freshly-wounded healthy trees.

Oak wilt, like gypsy moth and other exotic forest pests, can also be moved in firewood. Infected firewood can form spore-producing pads under the bark which attract sap-feeding beetles. Beetles feed on these pads and transfer oak wilt spores to healthy trees, sometimes several miles away. Healthy trees become infected when the spores enter through fresh wounds in the bark.

### Preventing Oak Wilt

Wounding a red oak tree between April 15<sup>th</sup> and July 15<sup>th</sup> can lead to oak wilt. Wounding may be accidental (e.g. lawnmowers), intentional (e.g. pruning live branches) or weather-related (e.g. wind storms). While fresh sap is only attractive to sap-feeding insects for several hours after a wound occurs, the beetles are numerous and widespread during this period and the risk of oak wilt being transferred is high.

Fortunately, prevention is easy - do not injure or prune oak trees between mid-April and mid-July. Remember, once a tree becomes infected, the fungus will spread to nearby oak trees through interconnected (grafted) root systems. Root grafts between oak trees of the same species are very common and can occur between trees more than 50 feet apart.

Prevention is critical. It is much easier, cheaper and more effective to practice prevention than to try to stop the disease once it is established.

### Controlling Oak Wilt

Controlling the spread of the oak wilt fungus between healthy and infected trees is simple in theory but difficult and expensive in practice. The key is to stop the movement of the fungus by severing root grafts between healthy and infected trees. Removing infected trees without severing root grafts first is not effective because the fungus stays alive in the root system and can still move into healthy trees. Removing an infected tree BEFORE the root grafts have been severed can actually speed the movement of the fungus into surrounding trees.

Vibratory plows (also called cable plows) or trenchers with five-foot blades or booms are the most effective way to break interconnected root systems. The placement of these barriers is extremely important. Barriers must be placed far enough out from infected trees to ensure that the disease has been isolated in the root systems within the barrier circle. This will include trees that may not yet be infected, but are close enough to infected trees to be grafted. Trees inside the barrier circle should be removed, cut and covered with a tarp for one year to prevent beetles from reaching the spore pads.

Fungicides containing the active ingredient propiconazole (e.g. Alamo<sup>®</sup>) may be effective, but they are expensive, must be applied by a licensed applicator using special equipment, and must be used before or shortly after infection takes place.

For more information, contact:

Roger Mech  
Michigan Department of Natural Resources  
8717 N. Roscommon Road  
Roscommon, MI 48653  
Telephone No.:(989) 275- 5151

Robert Heyd  
Michigan Department of Natural Resources  
1990 US-41 South  
Marquette, MI 49855  
Telephone No.:(906) 228-6561

**Prepared by:**  
Russell Kidd, Michigan State University Extension  
Roger Mech, Michigan Department of Natural Resources

IC 4166-C (05/07/2003)



LEGACY  
Land Conservancy

REICHERT NATURE PRESERVE 2015

## APPENDIX G

### BASELINE DOCUMENTATION REPORT

for the

Dr. Rudolph E. Reichert, Jr.

### CONSERVATION EASEMENT

Dexter Township, Washtenaw County, Michigan  
Putnam Township, Livingston County, Michigan

Granted to

WASHTENAW LAND TRUST

August 23, 2006

prepared by

Catherine Marquardt  
P.O. Box 2343  
Ann Arbor, MI 48106



## BASELINE DOCUMENTATION REPORT

for the

DR. RUDOLPH E. REICHERT, JR. CONSERVATION EASEMENT

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See Nowak & Faus survey for accurate boundary lines.
7. Photo monitoring points. On-site photographs taken by Catherine Marquardt in June 2006 on CD.
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### ACKNOWLEDGEMENT OF CONDITION OF PROPERTY

The undersigned parties to the Conservation Easement on approximately 55 acres in Section 2, Dexter Township, Washtenaw County, Michigan and on approximately 48 acres in Section 35, Putnam Township, Livingston County, Michigan, executed on August 23, 2006 (date), acknowledge and agree that, to the best of their knowledge, the information contained in this Baseline Documentation Report is an accurate representation of the Property at the time of the granting of the Easement. The parties acknowledge that the Grantor has provided the Land Trust full access to the Property to survey and inventory its condition.

GRANTOR

WASHTENAW LAND TRUST

Rudolph E. Reichert, Jr.

Susan Lackey, Executive Director

## Rudolph E. Reichert, Jr. Conservation Easement

### Narrative History and Background Information

Dr. Rudolph E. Reichert, Jr. has lived his entire life in Washtenaw County. He attended University of Michigan Medical School and then practiced cardiology and internal medicine at the St. Joseph Mercy Hospital in Ann Arbor.

In 1964, Dr. Reichert asked a patient who was a real estate agent whether he could recommend any property for sale in the area that had water on it. Dr. Reichert was looking for a place where he, his wife, Sue, and their four children could spend time in the country. In 1964, he purchased 27 acres with a house on Little Portage Lake, in Putnam Township in Livingston County.

Over the years, Dr. Reichert continued to purchase adjacent properties in Putnam and Dexter Townships so that he now owns 126 acres in Washtenaw and Livingston Counties. The property is home to a wide diversity of habitats, including dry oak forests atop of sandy knames, several wetland habitats in kettle depressional areas, a number of ponds, and footage along Portage Creek and Little Portage Lake. The diversity of habitat is home to a vast number of plants and animals, including a number of rare species in Michigan.

The Reichert family has devoted countless hours of work to capitalize on the stunning natural features of the property and to make the place enjoyable for all.

When Dr. Reichert first acquired the property, the current ponds were connected hydrologically, smaller in size, and filled with vegetation. Impoundments were installed and several ponds have been dredged to enlarge them and clear the water for swimming and other passive recreation. Docks have been installed, and a small cabin along with several picnic shelters have been built adjacent to the large pond.

A longtime gardener and volunteer at the University of Michigan Matthaei Botanical Gardens, Dr. Reichert explained that Sue, who died in 2004, got the whole family interested in gardening. Along with a large vegetable garden, the family has planted numerous flowers and trees around the house and cabins.

A vast network of trails around the property have also been created, all wide enough to allow a golf cart can pass through so that even those who cannot walk the far reaches of the property can enjoy it. The Reicherts used the trails for walking, but also for riding their horses and cross-country skiing in winter.





The Reicherts kept as many as five horses on the property. A wire fence is still standing on the northern portion of the property where the horses were kept in pasture. They had access to a small pond for water. Currently, one rescue horse, Justin, lives in the barn.

Dr. Reichert shared that one of his favorite places on the property was on the top of a hill overlooking Portage Creek. For years, he came to sit on the top of the bank to look out over the running water to get away from the chaos of everyday life. Currently he can enjoy the view from a screened porch, connected to a one-room cabin.

Dr. Reichert has long recognized the value of preserving the quality of nature and water, especially moving water, for the health of the environment and for the health of humans. He has chosen to preserve this property in a way to benefit his family, as well as the community.

A new 11-acre parcel in the northeast portion of the property has been created for his children. One house on 2.4 acre parcel will also be separated from the main parcel. His son, Rudy, will continue to live in this home, where he has resided for the past 10 years. The remaining 100 acres will be protected through a Conservation Easement and donated to the Washtenaw Land Trust so that all can share the beauty and appreciate the diversity of this property.

#### Location:

The property is located in both Livingston and Washtenaw Counties, in Putnam and Livingston Townships respectively. To reach the property from Ann Arbor, take US 23 north to the North Territorial exit. Turn left (west) onto North Territorial Road and travel west until the intersection with Dexter-Pinckney Road. Turn right (north) at the stoplight onto Dexter-Pinckney Road and travel north for several miles. The caretaker's home (1950 Dexter-Pinckney Road) is on the west side of the road, just north of Sarah Road. Mr. Reichert's house (11774 Dexter-Pinckney Road) is accessed from the next driveway north, also on the west side of the road. This driveway is shared with another house, owed by an unrelated party. Mr. Reichert's house is the located south of the first. A gravel driveway continues beyond Mr. Reichert's house down to the ponds.

#### Property boundaries:

A professional survey was completed and all property corners have been staked. Fencing exists throughout the property but does not always accurately reflect the property boundaries.



Natural Resources Evaluation  
Rudolph E. Reichert, Jr.  
Conservation Easement  
Prepared by Catherine Marquardt  
July 3, 2006

A. Physiographic and Ecological Setting

1. Physiographic Features. The site is composed of glacial debris left over from the last major period of glaciation, which receded from this part of Michigan around 14,000 years ago. Glacial till in this area is composed of unstratified sand, gravel, silt, and clay in eskers, kames and moraines, while sorted silts, sand and gravel are found in outwash plains and alluvial fans. Present-day rivers and creeks are most often found in areas of glacial outwash channels.

2. Ecological Features. Portage Creek is the western boundary for a portion of the property and flows through the southern portion of the property, eventually flowing into Little Portage Lake. The property includes Little Portage Lake shoreline, west of the creek outlet. The property is part of the kettle-kame complex found in the interlobate region of southeastern Michigan, with dry oak forest on the kames and a vast wetland complex in the depressional areas. Four ponds have been constructed.

B. Geology and Soils

1. The site is characterized by soils which result from glacial processes. Deep glacial till overlies bedrock within the area.

2. Soils. The soil types identified by the U.S. Department of Agriculture soil survey are shown on the attached maps from Washtenaw County GIS and MSU RSGIS. Their general characteristics are listed below, in approximate order from most to least prevalent soil type. Houghton muck comprises approximately 75% of the property, with Boyer loamy sand comprising about 12% of the property. The remainder of the property is open water.

Hn - Houghton muck. Soils with a very high water table and subject to flooding.

BnC - Boyer loamy sand, 6-12% slopes. Well-drained soils formed in loamy and sandy deposits underlain by gravely coarse sand, with a low available water capacity.

C. Hydrology.

1. Surface Hydrology. Portage Creek flows along the western edge of the northern parcel, then through the middle of the southern portion of the property, draining into Little Portage Lake. Approximately 27 acres of



Little Portage Lake is included in the property. Three ponds have been created by installing impoundments and dredging to enlarge them and to remove aquatic vegetation. When the largest pond was created, the island was added. Sand was also loaded on top of plastic in the winter to smother the bottom vegetation and to create a sandy bottom for swimming in the largest pond. The fourth pond (southeast) was also dredged to enlarge it by one-third its original size.

2. Subsurface Hydrology. Subsurface hydrological detail is unknown.

D. Vegetation.

1. Potential Habitat Types.
2. Present Habitat Types.

**Dry Oak Forest** occurs on the northern portion of the property, mostly in Livingston County, on the Boyer sandy loam. This type of forest also occurs on a ridge which runs from the east of the large pond and continues southwest to Portage Creek.

A wetland complex exists on Houghton Muck soils with a variety of natural communities:

**Relict Conifer Swamp** is found directly south of the southeastern pond. Tamaracks dominate this natural community

**Marsh**, dominated by cattails, is found in pockets adjacent to Portage Creek.

**Fen, sedge meadow and shrub-carr** communities are intermingled throughout the wetland complex.

Because there is so much diversity of vegetation and varying water levels, it would be difficult to clearly map where one natural community begins and ends.

A full vegetative survey would most likely reveal a number of high quality and/or rare plants due to the high quality and diversity of natural communities. The following plants were identified on an initial walk through the property:

**Dwarf hackberry** (*Celtis tenuifolia*), special concern in Michigan  
**Whorled loosestrife** (*Lysimachia quadriflora*), coefficient of conservation of 10 (highest possible rank of a plant which grows in an undisturbed area)

Dr. Reichert reported that his wife, Sue, and another Matthaei Botanical Garden docent had seen a lady's slipper orchid in the relict conifer swamp area, most likely a Showy Lady's Slipper (*Cypripedium reginae*) due to the habitat (coefficient of conservation=9).

E. Wildlife

No unusual wildlife species were observed during the site visit.

Dr. Reichert and Mr. Rayer report regularly observing Massasauga rattlesnakes (*Sistrurus catenatus catenatus*). This species is listed as special concern in Michigan.

They have also reported beaver activity along Portage Creek.



**TIN. - B.4E.**



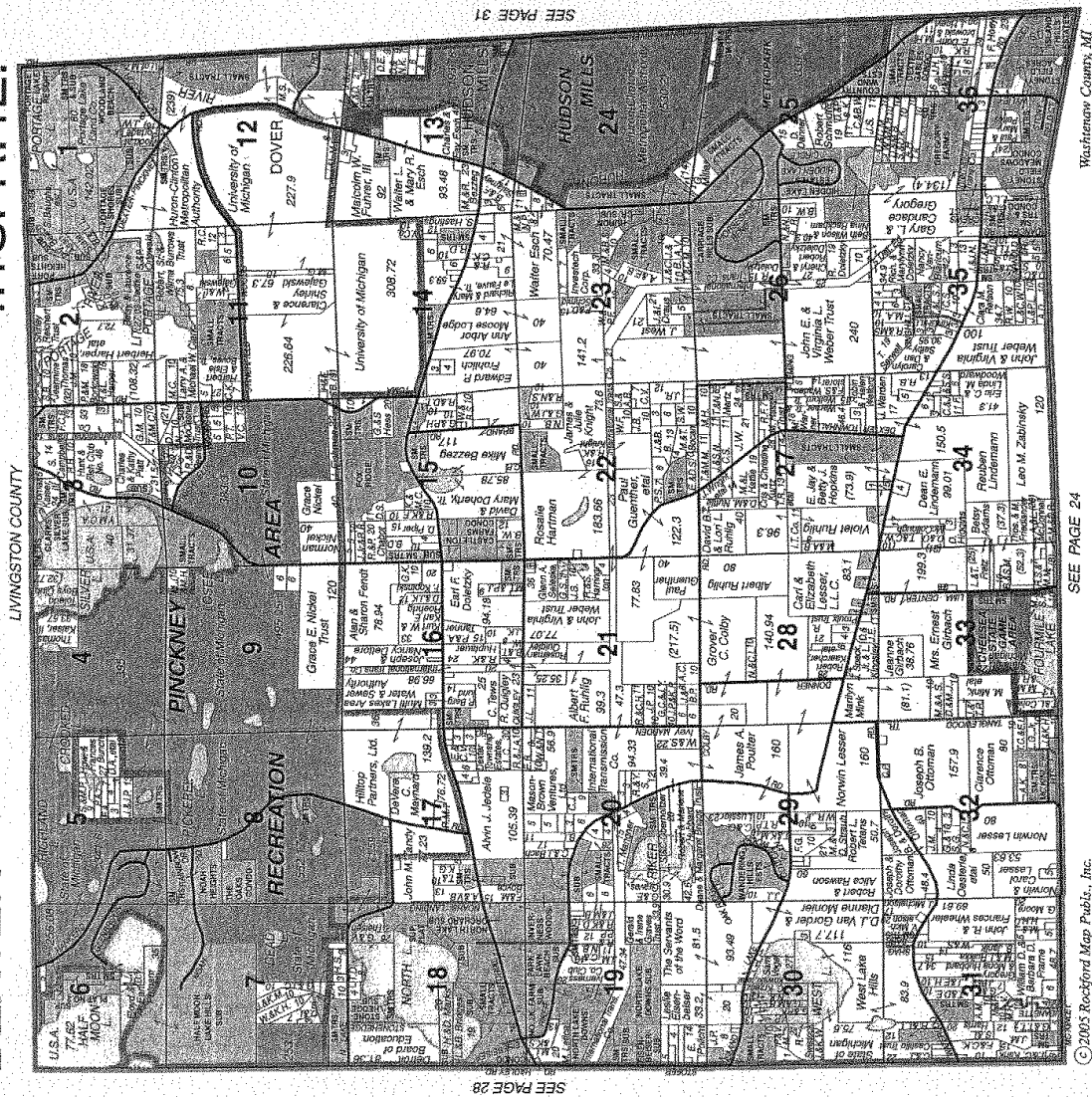




Reichert Conservation Easement  
Washtenaw Land Trust

DEXTER

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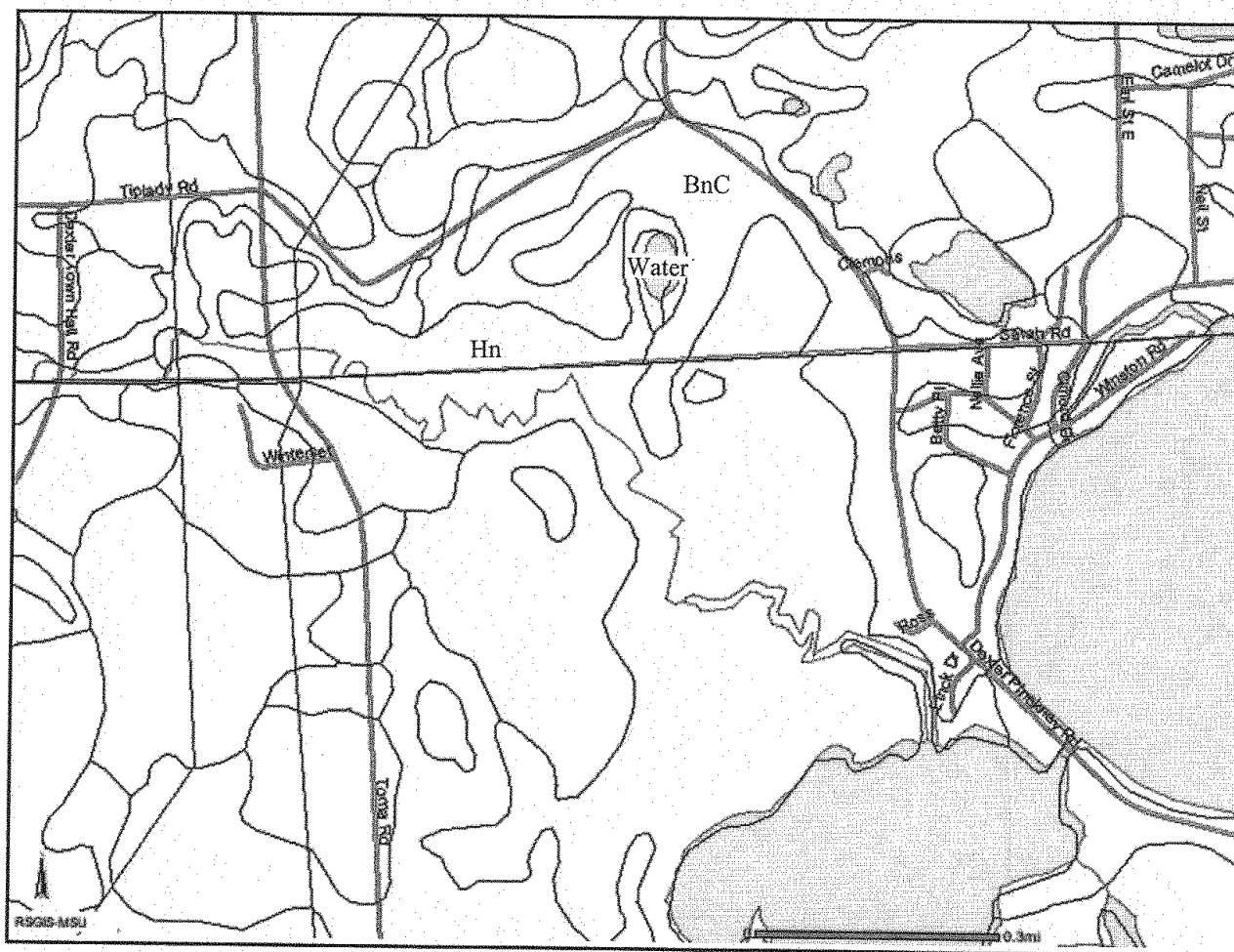
# Reichert Conservation Easement Washtenaw Land Trust



**Soils**  
Washtenaw County GIS



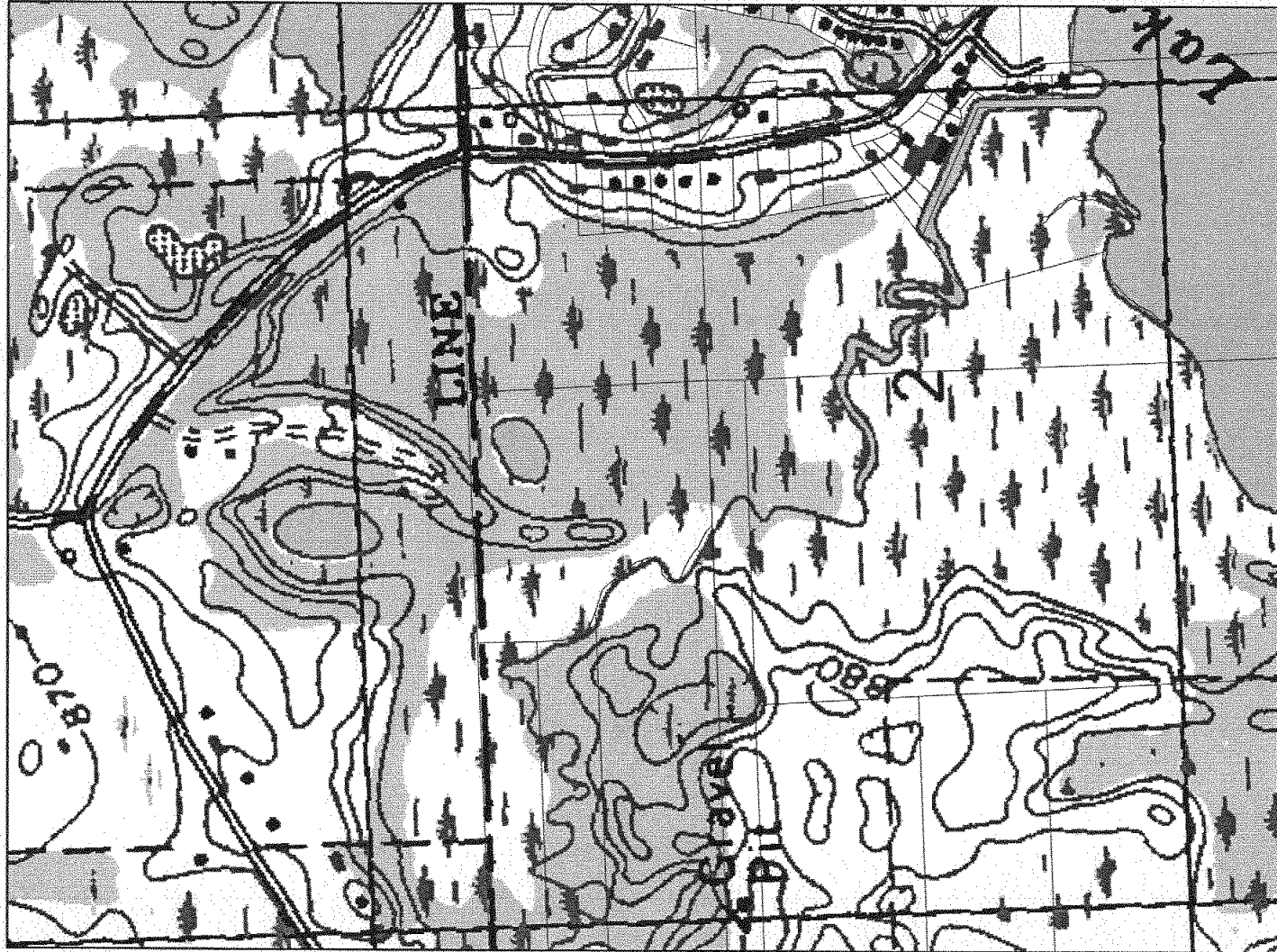
# Reichert Conservation Easement Washtenaw Land Trust



Soils  
RSGIS-MSU



Reichert Conservation Easement  
Washtenaw Land Trust



USGS Topographic Map - Pinckney Quad



**Reichert Conservation Easement  
Washtenaw Land Trust**



**Aerial Photograph  
Washtenaw County Photos 2005**





# Reichert Conservation Easement Washtenaw Land Trust

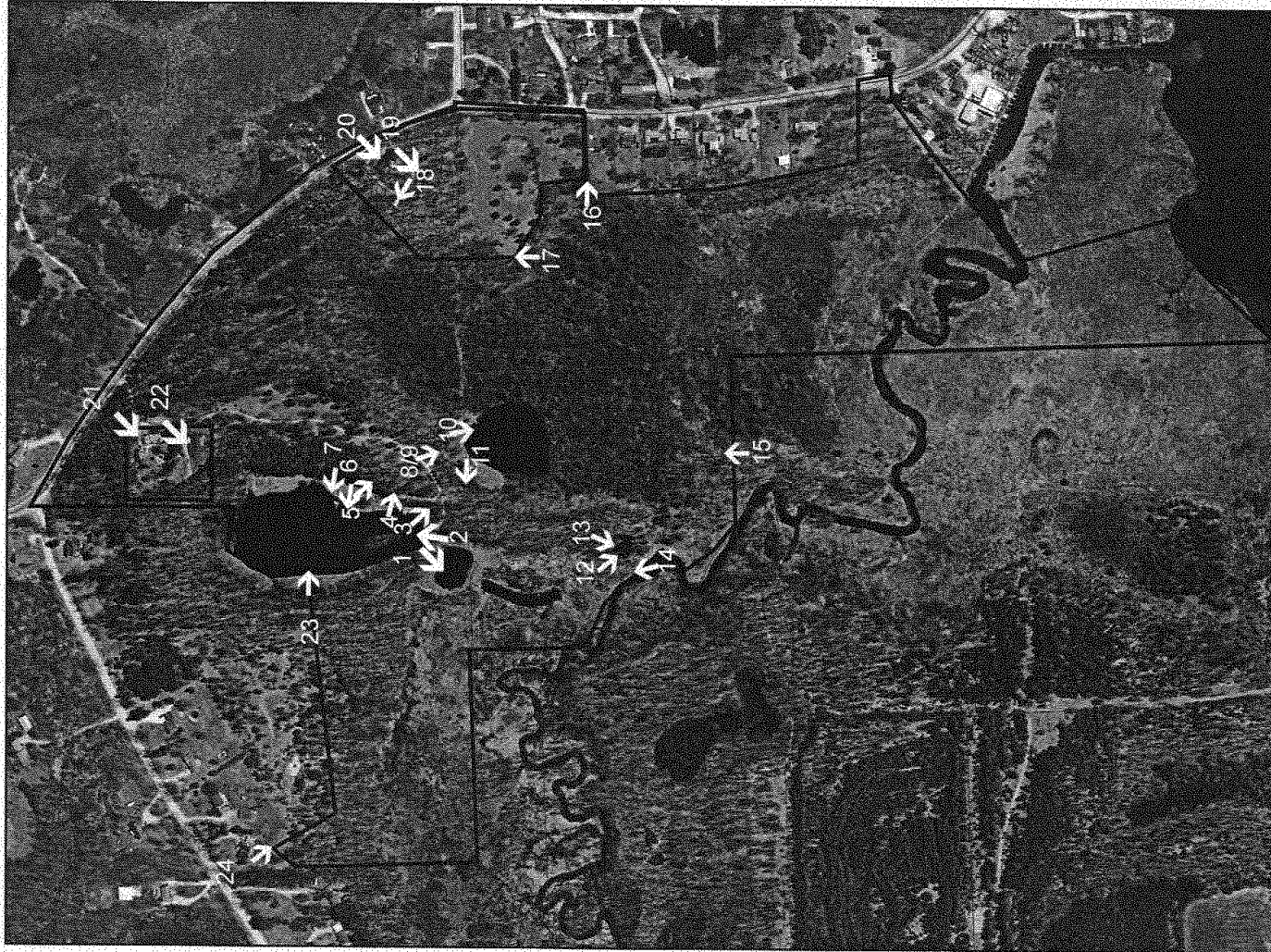


Photo points - June 2006  
by Catherine Marquardt









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