

TAMARACK PRESERVE

STEWARDSHIP AND RESTORATION MANAGEMENT PLAN



VILLAGE OF MENOMONEE FALLS

WAUKESHA COUNTY, WISCONSIN

LAND MANAGEMENT PLAN BY: JOAN KAISER, JOE LEHRMANN, ERIN LAKICH, AND KAMIS
SHOEMAKER

PREPARED FOR: WAUKESHA COUNTY LAND CONSERVANCY, INC.

FALL 2020



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INTRODUCTION AND PURPOSE

Waukesha County Land Conservancy, Inc. is a non-profit conservation organization that has protected nearly 2,900 acres since its establishment in 1992 through conservation easements and owned properties. WCLC is funded through memberships, donations, and grants.

Waukesha County Land Conservancy's mission statement is to protect the environmentally significant lands of Waukesha County. The Ephemeral ponds are crucial for amphibian habitat and the Oak woodland on site is of statewide significance, highlighting the importance of the property to WCLC.

PROPERTY OVERVIEW

LOCATION AND ACCESS

Name:	Tamarack Preserve
Acreage	148.104 acres
Location:	Town of Menomonee Falls
	Waukesha County
Tax Key	MNFV0087999
PLSS	SW1/4 & NW1/4 SEC 22 T8N R20E
Legal Description	PT SW1/4 & NW1/4 SEC 22 T8N R20E COM NW COR N89 26'E 699.00 FT N89 26'E 1955.66 FT S00 00'W 3975.39 FT S89 34'W 1326.98 FT N00 00'E 1324.06 FT S89 31'W 628.09 FT N00 00'E 2647.06 FT TO BGN EX CERT SURV 2110 EX R2733/1160 DOC# 3135167 & DOC# 3135168 & DOC# 3135169
Acquisition Date	2004
Address	Adjacent property: N72W16829 Good Hope RD, Menomonee Falls, WI 53051

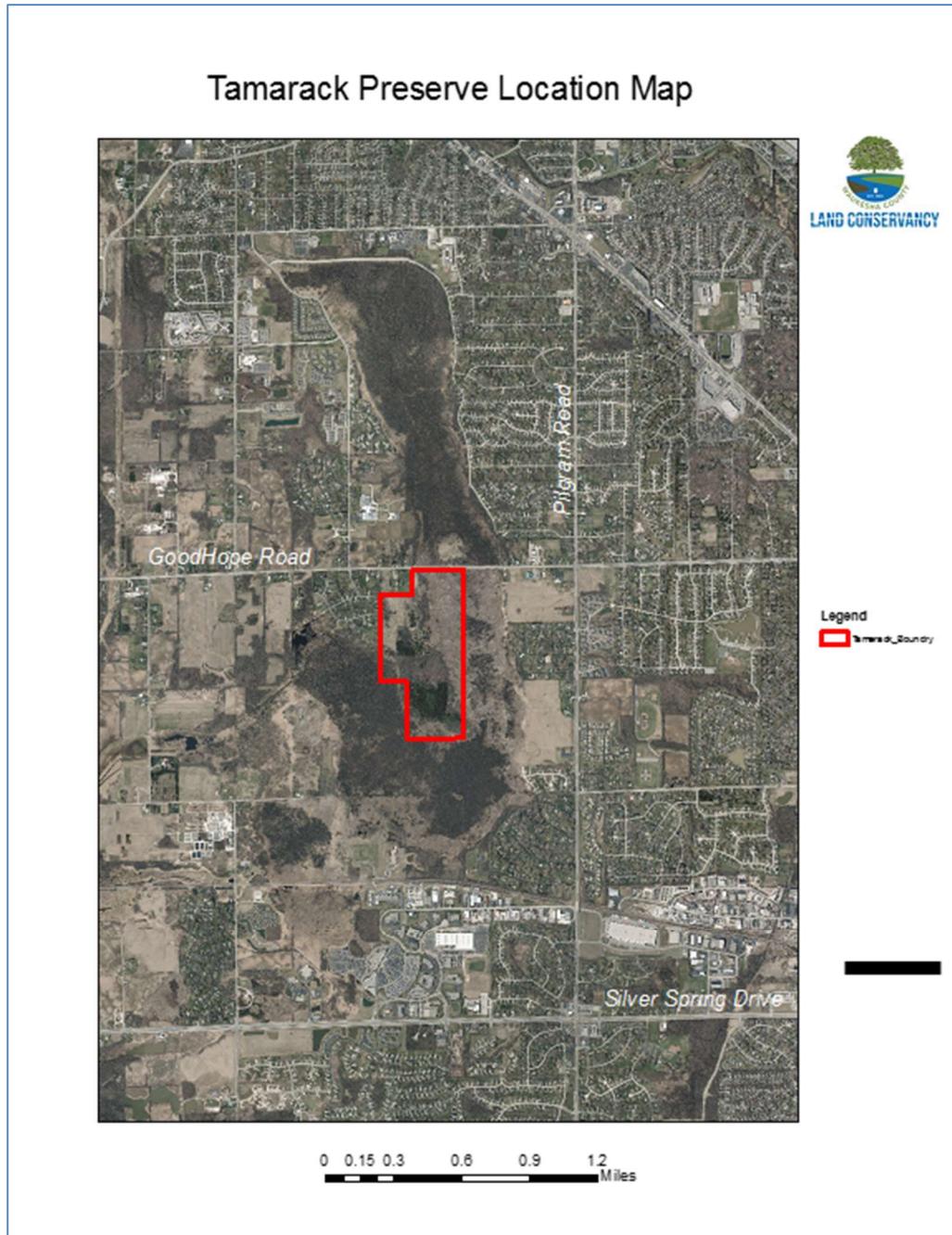
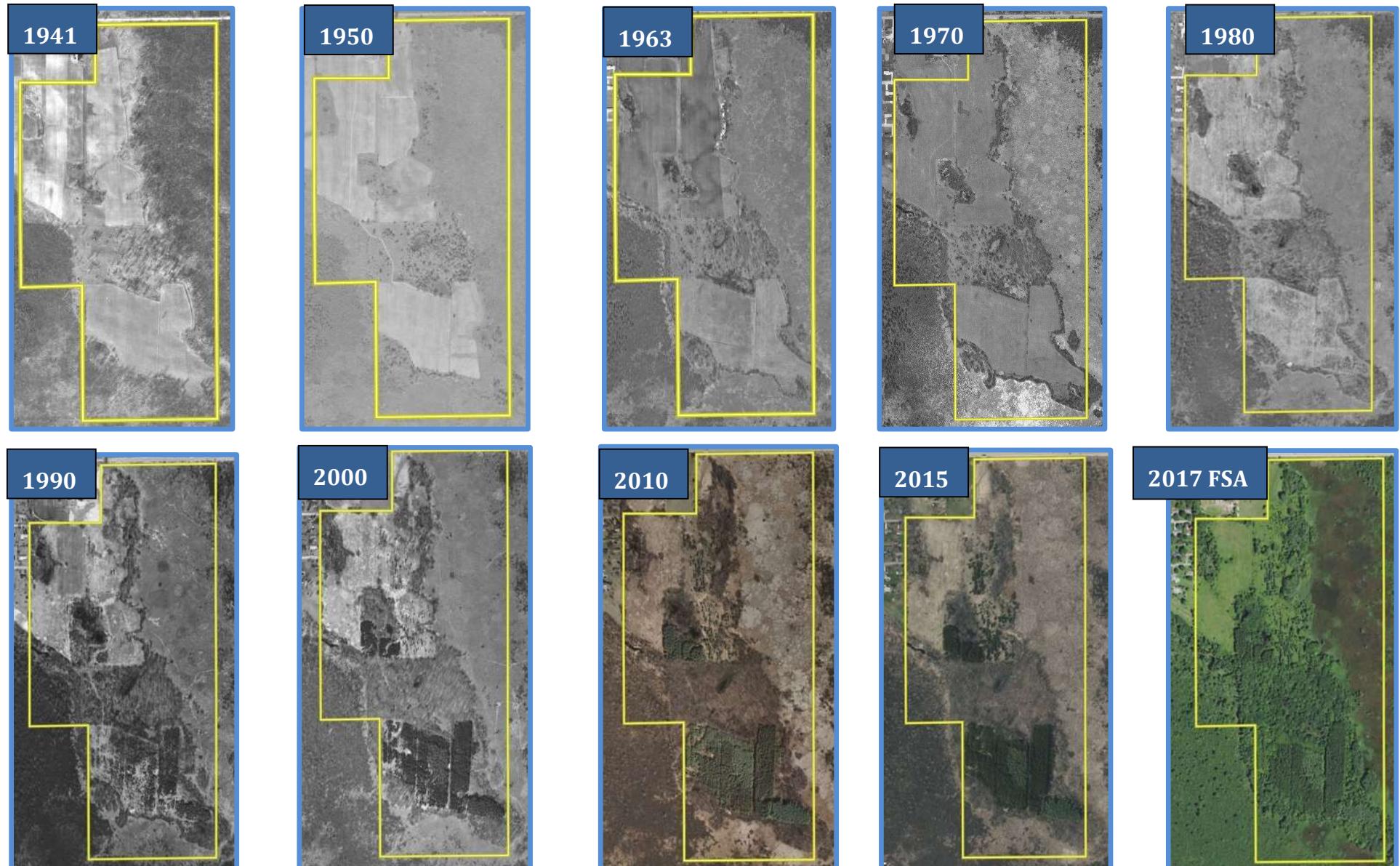


Figure 1. Location of Tamarack Preserve within Waukesha County.

HISTORY OF OWNERSHIP

Prior to 2004, the property was owned by the Kelling Family LTD Partnership. No other information is known about historical ownership.

Figure 2: Aerial Photographs



JUSTIFICATION FOR PROTECTION

Within the Southeast Glacial Plains Ecological Landscape, the 2015 Wisconsin Wildlife Action Plan has designated various natural communities as areas of management opportunity. Communities of major concern present on Tamarack include oak woodland and surrogate grassland. The most important component of the Tamarack property is its oak woodland habitat. Much of the southern two thirds of the state was dominated by oak community. Conversion to agricultural lands, development, fire suppression, and lack of public awareness have critically imperiled oak habitat.

The oak woodland is the best remnant landscape on the property. The unique ecology of the ephemeral ponds allows them to support a great diversity of plant life that in turn supports abundant amphibian and reptile species. The old agricultural fields have the potential to provide critical habitat for grassland birds, which are the fastest declining bird group in the state. This property is designated by SEWRPC as a NA-2 natural area and Class 1 wildlife habitat. Maintaining and restoring the natural communities on Tamarack will protect the rare natural communities on site and support diverse plant and animal life.

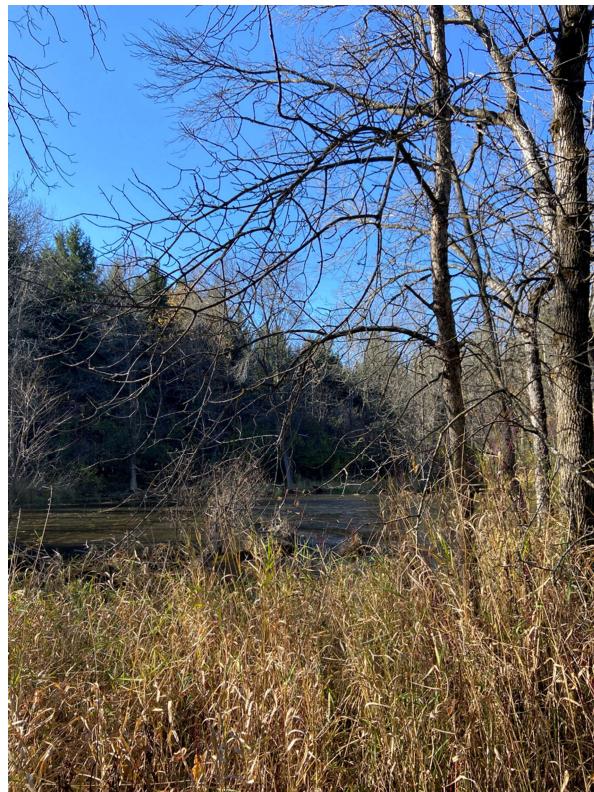


Figure 3. One of Four Ephemeral Ponds on the Tamarack Preserve.

PROPERTY DESCRIPTION

GRANTS, EASEMENTS, AND OTHER LAND USE AGREEMENTS

Tamarack was purchased with funding from a Stewardship Grant from the Wisconsin DNR. Since Theisen was acquired prior to certain 2010 DNR hunting regulations, the property is exempt from hunting. Hunting is not allowed by the Village of Menomonee Falls because of proximity to Aquinas Academy a local private school.

REGIONAL AND LOCAL LAND USE

REGIONAL LAND USE

The Tamarack Preserve is located in the Village of Menomonee Falls near the intersection of Pilgrim and Good Hope Road. The property is part of the larger Tamarack Swamplands which extend past the north and south of the Tamarack preserve property boundary. West of the property, in the neighboring Village of Lannon and Village of Sussex, are stone quarries. Nearby Tamarack is set in a rural and suburban landscape and is less than 16 miles from the heart of downtown Waukesha.

ADJACENT LAND USE AND IMPACTS

The 148-acre Tamarack Preserve includes 23.01 acres of fields and 13.6 acres of Oak woodland, 88.71 acres of wetland, and 22.68 acres of Old Norway Spruce Pine. The property is surrounded by similar landscapes that also play into the ecological attributes of this property. The east side of the property is a cattail marsh while the west side of the property is old historical farm fields. There is an oak woodland that lies in the south near one of the ephemeral ponds.

The land to the north of the property, across Good Hope Road, is an extension of the Tamarack Swamplands. The neighboring properties to the west include suburban homes owned by William Holz Jr., Brogli Trust, Frank Vlasis, William and Debra Leistko, Evelyn & Richard Frantl Trust, James Shipley, Monica Totsky, and Rick & Victoria Gunther. The properties bordering the east of the property belong to Aquinas Academy, and Douglas and Sarah Dettmers. The remaining bordering properties belong to the Village of Menomonee Falls.

The owners of the adjacent property should be contacted to discuss access to the property, including the possible installation of a parking space and trail for maintenance purposes on the Tamarack property. The landowners may also be able to provide further insight into the prior farming history of the property.

Invasive species along the neighbors' property borders pose an obstacle to management that should be considered.

PHYSICAL ENVIRONMENT AND SETTING

ECOLOGICAL LANDSCAPE SETTING

The Tamarack property is located within the Wisconsin Southeast Glacial Plains ecological landscape.



Figure 4. Wisconsin's southeast glacial plains ecological landscape.

CLIMATE

The climate of this region is typical of southern Wisconsin and is categorized as Dfa or Humid Continental with a mean growing season of 155 days, a mean annual temperature of 45.9 degrees, a mean annual precipitation of 33.6 inches, and a mean snowfall of 39.4 inches. This climate is suitable for agricultural row crops, small grains, and pastures to grow well, which explains why much of the surrounding landscape is dominated by farms.

WATER RESOURCES

WATERSHED

The Muskego-Wind Lakes Watershed is a small 41 square mile portion of the larger Fox River watershed (248 square miles) that encompasses portions of Village of Menomonee Falls and Village of Lannon. Portions of the Cities of Burlington, Muskego, New Berlin and Waukesha lie within the watershed, along with the Villages of Big Bend, Mukwonago, North Prairie, Rochester, Wales and Waterford. Land cover in the watershed is primarily rural: agriculture (41%), grasslands (18%), wetlands (14%) and forests (13%). Urban areas comprise nearly four percent of the land cover in the watershed. The entire stretch of the Fox River that runs through the watershed is listed as impaired from phosphorus deposition, sediment/total suspended solids and polychlorinated biphenyls (PCBs), which are a class of compounds used in a wide variety of manufacturing processes and in transformers. The Muskego-Wind Lakes watershed was considered a priority water shed in 1991.

WETLANDS

The boundaries of the property are located within a larger 830-acre wetland system. There are three wetlands that are located on the property which include emergent/wet meadow, forested, and scrub/shrub wetlands.

Management will aim to keep the area in the northwest location on the land as an open emergent/wet meadow community. This will be implemented through cutting and chemical treatment of non-native species and the use of prescribed burns to open up the remaining native species populations.

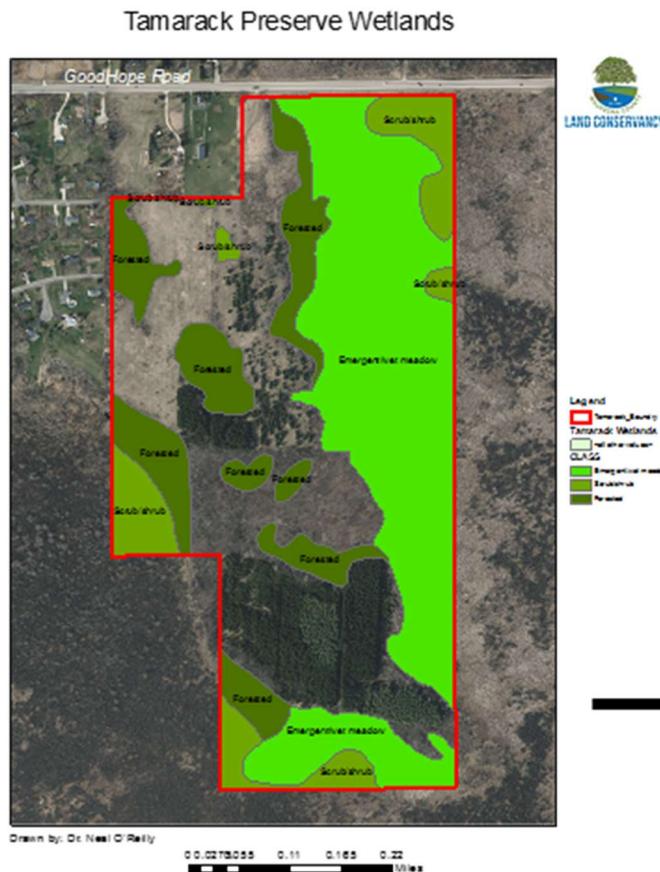


Figure 5: Present wetland communities located on the Tamarack Preserve

GEOLOGY AND HYDROLOGY

GEOLOGY

The dominant landforms are glacial till plains and moraines composed mostly of materials deposited during the Wisconsin Ice Age, but the southwestern part of the Ecological Landscape consists of older, pre-Wisconsin till and the topography is more dissected. Other glacial landforms, including drumlins, outwash plains, eskers, kames and kettles are also well-represented. The "Kettle Moraine" is an area of rough topography on the eastern side of the Southeast Glacial Plains that marks the areas of contact between the Green Bay and Lake Michigan glacial lobes. Numerous excellent examples of glacial features occur and are highly visible in the Kettle Moraine.

HYDROLOGY

The Southeast Glacial Plains has the highest aquatic productivity for plants, insects, other invertebrates, and fish of any ecological landscape in the state. Significant river systems include the Wolf, Bark, Rock, Fox, Milwaukee, Sugar, Mukwonago, and Sheboygan. Most riparian zones have been degraded. Several

clusters of large lakes exist, including the Yahara chain of lakes in and around Madison, and the Lake Winnebago Pool system. Kettle lakes occur within end moraines, in outwash channels, and in ancient riverbeds. This ecological landscape contains some huge marshes, as well as fens, sedge meadows, wet prairies, tamarack swamps, and floodplain forests. Many wetlands here have been affected by hydrologic modifications (ditching, diking, tiling), grazing, infestations of invasive plants, and excessive inputs of sediment- and nutrient-laden runoff from croplands.

TOPOGRAPHY AND ELEVATION

Elevation on the property is as low as 838 feet to as high as 856 feet. Highest elevation point is located toward the southern border of the property. Shown in the map below, varying elevations divide the property into different potential habitats for flora and fauna.

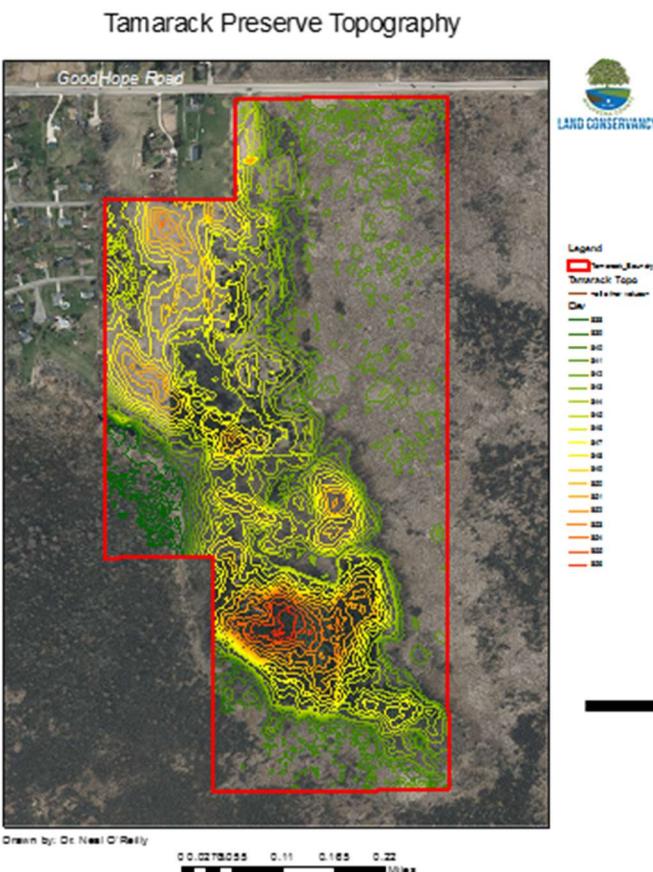


Figure 6: Topography Map of the Tamarack Preserve

SOILS

This property is comprised of seven soil types. Listed below are brief descriptions of the most relevant soils for this property. The soil survey map below shows where each type of soil is found on the property.



Figure 7: Soil survey composition map for the Tamarack Swamp Preserve

HOUGHTON MUCK

The Houghton muck (HtA) series consists of very poorly drained soils that are in depressions and comprised of herbaceous organic parent material. It occupies 104.7 acres on the property making 51.2% of the total soil composition. Slope ranges from 0 to 2 percent. They are located between 0 to 4 inches above the water table and have a very high available water capacity, about 23.9 inches. Mean annual precipitation is about 31 to 35 inches and mean annual air temperature is between 43 to 48 degrees F.

OZAUKEE SILT LOAM

Ozaukee silt loam series (OuB, OuB2) series are moderately well-drained soils in settings with a thin mantle of loess over silty and clayey till parent material. This series occupies 21.7% of the property, or 44.5 acres of the total soils. Slope range is between 2 to 6 percent. There is low available water capacity making them prime farmland soils. There is about 24 to 42 inches depth to the water table. Mean annual precipitation is 31 to 39 inches and mean annual air temperature is between 44 to 49 degrees F.

MEQUON SILT LOAM

The Mequon silt loam (MtA) series are somewhat poorly drained soils found in ground moraines and are comprised of loess over calcareous clayey till parent material. It occupies 28.8 acres within the property making it the third most abundant soil type at 14.1% of the total soil. Slope ranges from 1 to 3 percent. They are located between 12 to 36 inches above the water table and have a high available water capacity (about 10.5 inches). Mean annual precipitation is between 28 to 36 inches and has a mean annual air temperature between 37 to 55 degrees F.

PLANT COMMUNITIES

HISTORIC PLANT COMMUNITIES

Prior to European settlement, sections of deciduous oak, hickory, maple, and elm filled the narrow central swatch of the property, surrounded by sedges and reeds. The Preserve got its name from the thriving communities of Tamarack forest which once dominated the Northeast and Southwest corners of the property.

Tamarack Preserve Orginal Vegetation

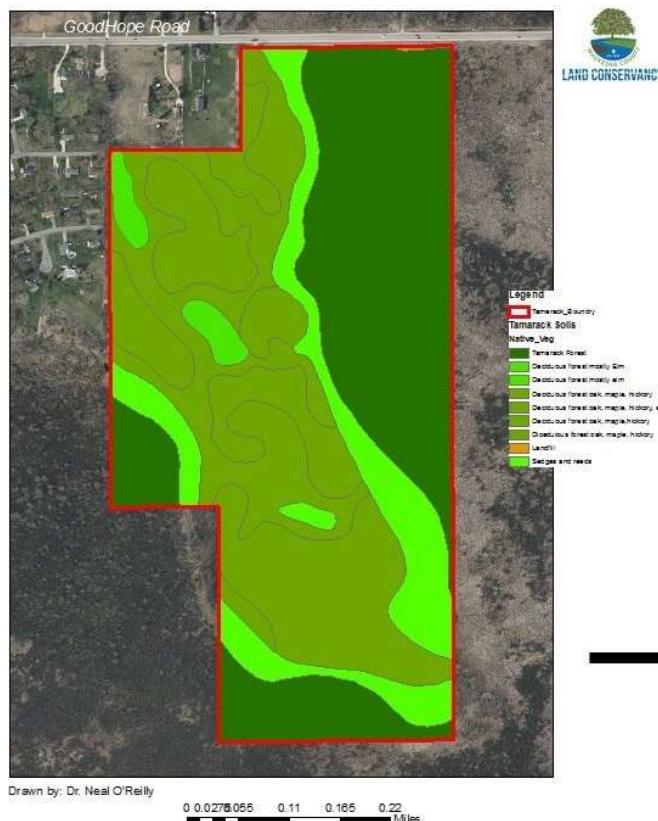


Figure 8. Historic plant communities present on the Tamarack Preserve prior to European settlement.

CURRENT PLANT COMMUNITIES

Tamarack has the following six community types that are listed as major opportunities areas within the Southeast Glacial Plains Ecological Landscape according to the 2015 Wisconsin Wildlife Action Plan.

- Oak woodland
- Oak opening
- Surrogate grasslands (old agricultural fields)
- Wet-mesic prairie
- Shrub-carr wetland
- Sedge meadow

NATIVE PLANT SPECIES

The following is a preliminary partial plant inventory (native and nonnative) in the oak woodland and wet prairie habitats that was conducted upon initial surveying of the property.

Oak and Lowland Woodland	Prairie Grassland
Honeysuckles	Miscellaneous
Buckthorns	unknown/undocumented
Shagbark hickory	Prairie and barnyard
	grass species exist on the property*
Black cherry	
Red oak	
Bur oak	
Box elder	
Green ash	
Autumn olive	
Red cedar	
Norway Spruce	
Prickly ash	
Red Osier Dogwood	
Big Toothed Aspen	

*Documentation of existent native Prairie Grassland species across the Tamarack Preserve is recommended during the first year of management

COMMUNITIES OF SPECIAL CONCERN

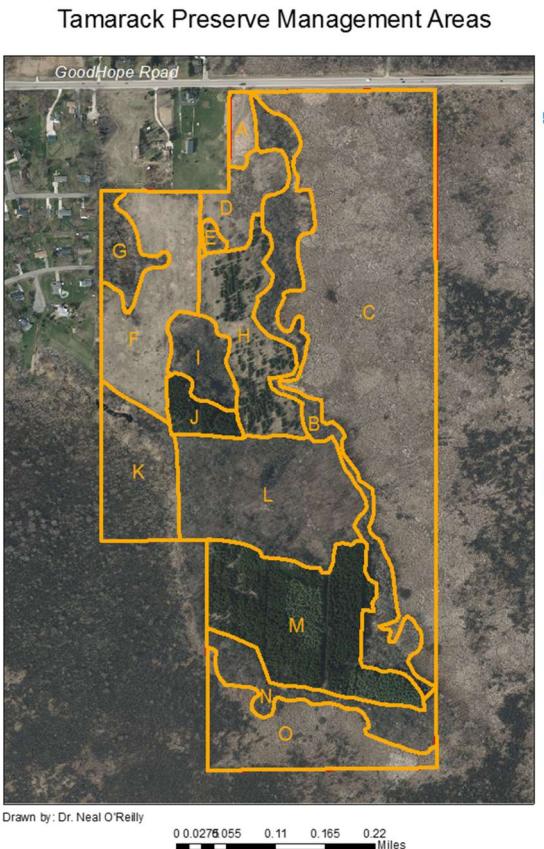


Figure 9. Aerial view of the Tamarack Preserve displaying Management Areas A-O.

The Tamarack property has many plant communities that need protection both in the State of Wisconsin and globally. The list that follows describes these plant communities and includes state and global rankings for their rarity. State (S) and global (G) rankings by number are as follows: 1 = critically imperiled, 2 = imperiled, 3 = vulnerable, 4 = apparently secure. A question mark following the number signifies uncertainty regarding the status. GNR means global rank not yet assessed.

- Oak opening: S1, G1
- Oak woodland: S1, GNR
- Southern sedge meadow: S3, G4
- Wet-mesic prairie: S2, G2
- Surrogate grasslands**

**Surrogate grasslands have not been assigned a specific global or state ranking but are listed as a community of major opportunity nonetheless.

The following natural community descriptions are taken directly from the Wisconsin DNR's webpage and its Chapter 18 Southeast Glacial Plains Ecological Landscape document.

OAK OPENING

As defined by Curtis, this is an oak-dominated savanna community in which there is less than 50% tree canopy coverage and more than one tree per acre. Historically, Oak Openings were very abundant and occurred on wet-mesic to dry sites. Today, very few examples of this type exist. The few extant remnants are mostly on drier sites, with the mesic and wet-mesic oak openings almost totally destroyed by conversion to agricultural or residential uses, and by the encroachment of other woody plants due to fire suppression. Bur, white, and black oaks (*Quercus macrocarpa*, *Q. alba* and *Q. velutina*) are dominant in mature stands, typically as large, open-grown trees with distinctive limb architecture. Shagbark hickory (*Carya ovata*) is sometimes present. American hazelnut (*Corylus americana*) is a common understory shrub. The herb layer is similar to those found in oak forests and prairies, with many of the same grasses and forbs present. There are some plants (e.g., kitten-tails (*Besseyea bullii*)) and animals (e.g., red-headed woodpecker, orchard oriole, eastern bluebird) that reach their optimal abundance in the openings.

Oak savannas, especially the now globally imperiled Oak Opening community, were abundant in the Southeast Glacial Plains prior to Euro-American settlement. Open-grown bur oaks, which exhibited distinctive limb architecture and had the capability of growing to great size and age, were especially characteristic of sites on the edges of the extensive prairies that formed the dominant cover over fire-prone portions of the ecological landscape. Following Euro-American settlement, the oak openings were quickly converted to cropland or pasture. The widespread implementation of fire suppression policies has allowed deciduous shrubs and saplings to overwhelm and choke the understories beneath and between the canopy oaks.

OAK WOODLAND

The oak woodland community occupies a position on the vegetation continuum that is intermediate between the oak savannas (especially Oak Openings) and the oak forests (especially Southern Dry Forest). Oak woodland differs from oak savanna types in that they lack the wide-spreading crowns and thick boles associated with savannas, and they have greater crown closure, with an approximate range of 50% to as much as 95%. As presently understood, the latter attribute is not simply the result of the canopy closure that affected most savannas following the implementation of wildfire suppression policies earlier in the twentieth century. As soon as fire suppression policies were widely implemented in southern Wisconsin, the rapid proliferation of shrubs and saplings would have quickly altered stand structure, causing the open understories of the Oak Woodland communities to disappear. Describing the differences between woodland and forest is difficult because of the absence of intact reference stands, but the Oak Woodland was subjected to frequent (annual) wildfires of low intensity, lacked the dense woody understory that characterizes most dry oak forests, and often had relatively lower canopy closure than true forest.

Dominant trees included white oak (*Quercus alba*), bur oak (*Quercus macrocarpa*), and black oak (*Quercus velutina*), sometimes mixed with red oak (*Quercus rubra*) and shagbark hickory (*Carya ovata*). Under a characteristic fire regime, shrub and sapling representation in oak woodlands would be minimal. The herb layer is potentially diverse, including some members of the prairie, oak savanna, and oak forest communities, but also featuring grasses, legumes, composites and other forbs that are best adapted to light conditions of highly filtered shade. Representative herbs may include upland boneset (*Eupatorium sessilifolium*), violet bush-clover (*Lespedeza violacea*), Virginia bush-clover (*Lespedeza virginica*), Culver's-root (*Veronicastrum virginicum*), rough-leaved sunflower (*Helianthus strumosus*), eastern shooting-star (*Primula meadia*), Short's aster (*Symphyotrichum shortii*), yellow-pimpernel (*Smyrnium integrerrimum*), bottlebrush grass (*Elymus hystrich*), silky wild-rye (*Elymus villosus*), and bracted tick-trefoil (*Desmodium cuspidatum*).

Many of the same plants and animals that reach their optimal abundance in the oak openings also occur in oak woodland, including red-headed woodpecker, orchard oriole, eastern bluebird, and kitten-tails. Oak woodland can also support forest species, such as yellow-throated vireo, scarlet tanager, tufted titmouse, and blue-gray gnatcatcher, and in large stands, some species that are restricted to forest interior conditions, such as the cerulean warbler.

The geographic range historically occupied by oak woodland would be virtually the same as that of oak openings and prairies in southern Wisconsin. Oak woodland would have been most common on sites that experienced frequent, low-intensity ground fires. Moisture conditions would have included dry, dry-mesic, mesic, and, possibly, wet-mesic sites. Today oak woodland is most likely to occur in those parts of southern Wisconsin that continue to support relatively large areas of natural vegetation that include prairie and savanna remnants in proximity to oak-dominated forests.

The oak woodland of the southern central portion of the property contains the best remnant landscape with many of the original oak trees still intact. Priority will be given to conservation in this area.

SOUTHERN SEDGE MEADOW

Widespread in southern Wisconsin, this open wetland community is most typically dominated by tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis canadensis*). Common associates of relatively undisturbed sedge meadows are other sedges (e.g., *Carex diandra*, *C. sartwellii*), marsh bellflower (*Campanula aparinoides*), marsh wild-timothy (*Muhlenbergia glomerata*), American water horehound (*Lycopus americanus*), paniced aster (*Sympyotrichum lanceolatum*), swamp aster (*Sympyotrichum puniceum*), blue flag (*Iris versicolor*), spotted Joe-Pye weed (*Eutrochium maculatum*), marsh fern (*Thelypteris palustris*), and swamp milkweed (*Asclepias incarnata*). Reed canary grass (*Phalaris arundinacea*) may be dominant in grazed and/or ditched stands, sometimes to the exclusion of virtually all other species.

Sedge meadows are most common in glaciated landscapes, where they often border streams or drainage lakes. The southern sedge meadow community occurred with prairie, savanna, and hardwood forest communities, and many of them apparently burned periodically. In the absence of fire, shrubs and trees are able to readily encroach on the open wetlands; encroachment can be exacerbated when wetlands are drained. Many sedge meadows in southeastern Wisconsin are influenced by alkaline groundwater, and occur in complexes with emergent marsh, calcareous fen, wet prairie, wet-mesic prairie, and shrub-carr. Differentiating between these communities can be difficult, as they frequently intergrade.

WET-MESIC PRAIRIE

This herbaceous grassland community is dominated by tall grasses, including big bluestem (*Andropogon gerardii*), Canada bluejoint grass (*Calamagrostis canadensis*), cordgrass (*Spartina pectinata*), and Canada wild-rye (*Elymus canadensis*). The forb component is diverse and includes azure aster (*Aster oolentangiensis*), Eastern shooting-star (*Dodecatheon meadia*), saw-tooth sunflower (*Helianthus grosseserratus*), prairie blazing-star (*Liatris pycnostachya*), prairie phlox (*Phlox pilosa*), prairie coneflower (*Ratibida pinnata*), prairie docks (*Silphium integrifolium* and *S. terebinthinaceum*), late and stiff goldenrods (*Solidago gigantea* and *S. rigida*), and Culver's-root (*Veronicastrum virginicum*). This community type was common historically but now is rare. Well over 99% of our tallgrass prairies - including Wet-mesic Prairie - have been destroyed.

Wet-mesic Prairie sometimes occurred in large wetland complexes with Wet Prairie, Southern Sedge Meadow, Calcareous Fen, and Emergent Marsh communities. It was most abundant on level or gently rolling glacial moraine or outwash landforms where there were few natural barriers to wild fire, and where the upland vegetation was composed mostly of fire-dependent communities such as Mesic Prairie and Oak Opening.

SURROGATE GRASSLANDS

Of the 2.1 million acres in Wisconsin that were native prairie when Europeans arrived 150 years ago, less than 10,000 acres (<0.5% of the original acreage) of varying quality native prairie remains today. The midcontinental grassland biome has been greatly reduced and degraded throughout its range, generally from farming and grazing and conversion to woody vegetation with the cessation of fires, but also from urban and suburban development. Tallgrass prairie and related oak savanna are now the most diminished and threatened plant communities in the Midwest and among the most altered in the world. As a result, an estimated 15-20% of the state's original grassland flora is now considered rare. Grassland mammals and birds have fared somewhat better, using surrogate grasslands such as hayfields and pastures for their survival needs. However, with conversion from pastures and hayfields to more row crop agriculture, some grassland birds and mammals have also been dramatically declining over the last 30 years. For example, grassland birds as a group are the fastest declining bird group in the state.

Surrogate grasslands now represent the vast majority of grassland habitat in the state. Surrogate grasslands are similar in structure to the former prairies that occurred in Wisconsin. Surrogate grasslands include agricultural habitats such as hayfields, small grains (oats, wheat, and barley), row crops (corn, soybeans, and potatoes), fallow fields, old fields, pastures, and set-aside fields (e.g. CRP) planted to non-native cool-season grasses (such as smooth brome (*Bromus inermis*)), timothy (*Phleum pratense*), redtop (*Agrostis gigantea*), orchard-grass (*Dactylis glomerata*), bluegrass (*Poa pratensis* and *P. compressa*), and quack-grass (*Elymus repens*)) or native warm-season grasses (such as big bluestem (*Andropogon gerardii*)), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), switch grass (*Panicum virgatum*), and side-oats grama (*Bouteloua curtipendula*)). Examples of other surrogate prairie grasslands include young conifer plantations, orchards, parks, golf courses, airports, roadsides, cut-over or burned-over forests, and mossed bogs (bogs from which sphagnum moss has been removed commercially). Surrogate grasslands also include other idle grasslands, such as those on public or private lands managed for wildlife. Usually, idle grasslands are composed of non-native grasses and forbs, but they also can be plantings of one or several native prairie species, but fall far short of the rich species diversity of the original prairie.

Surrogate grasslands occur in every ecological landscape in Wisconsin. The Southeast Glacial Plains Ecological Landscape contains one of the highest concentrations of surrogate grasslands in the state. It is estimated that roughly 3 million acres of agricultural land currently provide surrogate grassland habitat.

INVASIVE PLANT SPECIES

- Invasive Herbaceous Plants
 - Common Teasel (*Dipsacus fullonum*)
 - Birdsfoot trefoil (*Lotus corniculatus*)
 - Reed canary grass (*Phalaris arundinacea*)
- Invasive Shrubs:

- Common reed grass (*Phragmites australis*)
- Buckthorn (*Rhamnus*)
- Common Buckthorn (*Rhamnus cathartica*)
- Glossy Buckthorn (*Rhamnus frangula*)
- Bell's honeysuckle (*Lonicera x bella*)
- Autumn Olive (*Elaeagnus umbellata*)
- Japanese barberry (*Berberis thunbergii*)
- Multiflora rose (*Rosa multiflora*)

Tamarack Preserve Invasive Shrubs
Mapped with Collector App



Figure 10. Invasive Shrub species observed on the Tamarack Preserve during the Fall of 2020.

WILDLIFE

Oak habitat supports a broad diversity of wildlife. Species seen during site visits include bird species of *Cyanocitta cristata* (blue jays), *Scolopax minor* (American woodcock), *Branta canadensis* (Canadian geese), *Melanerpes erythrocephalus* (red-headed woodpecker), *Anas platyrhynchos* (mallard), and *Poecile atricapillus* (black-capped chickadees). Amphibian species of *Lithobates sylvaticus* (wood frog), *Pseudacris* (chorus frogs), *Acris crepitans* (cricket frog), *Lithobates pipiens* (leopard frogs), *Anaxyrus americanus* (American toad), and *ambystoma laterale* (blue-spotted salamander). Mammal species of *Odocoileus virginianus* (white-tailed deer) and *Vulpes vulpes* (red fox). Lastly, reptile species of *Thamnophis* (garter snake), and an Invertebrate of *Procambarus steigmani* (prairie crayfish). The habitat should be managed with the eventual return or reintroduction of certain wildlife species in mind.

Conducting a wildlife inventory is a current priority for the property due to the presence of wood frogs and woodcock. Amphibians are currently being monitored through the Waukesha County Parks Conservation in the Parks citizen science program.

Below is a list of bird species of concern that may be present on site or have the potential of occurring on site. Many have been reported via eBird at the nearby Tamarack preserve. The species have been ranked according to their association with oak habitat: 3 designates a strong association, 2 moderate, and 1 minimal.

Table 1. Birds species of special concern expected in oak habitat of Wisconsin.

Bird species	Scientific name	Oak woodland	Oak opening
American bittern	<i>Botaurus lentiginosus</i>		3
American woodcock*	<i>Scolopax minor</i>	3	3
Black Tern	<i>Chlidonias niger</i>		3
Black-Crowned Night-Heron	<i>Nycticorax nycticorax</i>	3	3
Bobolink	<i>Dolichonyx oryzivorus</i>		3
Cerulean warbler	<i>Setophaga cerulea</i>	3	
Common Tern	<i>Sterna hirundo</i>		3
Dickcissel	<i>Spiza americana</i>		3
Eastern meadowlark	<i>Sturnella magna</i>		3
Forster's Tern	<i>Sterna forsteri</i>		3
Grasshopper sparrow	<i>Ammodramus savannarum</i>		3
Henslow's sparrow	<i>Ammodramus henslowii</i>		3
Hooded warbler	<i>Setophaga citrina</i>	3	
King Rail	<i>Rallus elegans</i>	3	
Least Bittern	<i>Ixobrychus exilis</i>		3

Bird species	Scientific name	Oak woodland	Oak opening
Least flycatcher	<i>Empidonax minimus</i>	3	
Prothonotary Warbler	<i>Protonotaria citrea</i>	3	
Purple martin	<i>Progne subis</i>	3	3
Red-headed woodpecker*	<i>Melanerpes erythrocephalus</i>	3	3
Red-necked grebe	<i>Podiceps grisegena</i>		3
Rusty Blackbird	<i>Euphagus carolinus</i>	3	
Short-eared Owl	<i>Asio flammeus</i>		3
Vesper sparrow	<i>Pooecetes gramineus</i>		3
Western Meadowlark	<i>Sturnella neglecta</i>		3
Whooping Crane	<i>Grus americana</i>		3
Yellow-breasted Chat	<i>Icteria virens</i>		3
Yellow-headed Blackbird	<i>Zanthocephalus xanthocephalus</i>		3
Black-capped Chickadees*	<i>Poecile atricapillus</i>	3	3
Acadian Flycatcher	<i>Empidonax virescens</i>	2	
Bell's Vireo	<i>Vireo bellii</i>		2
Common Nighthawk	<i>Chordeiles minor</i>		2
Eastern Whip-poor-will	<i>Anostostomus vociferus</i>	2	
Golden-winged Warbler	<i>Vermivora chrysoptera</i>		2
Lark Sparrow	<i>Chondestes grammacus</i>		2
Loggerhead shrike	<i>Lanius ludovicianus</i>		2

Bird species	Scientific name	Oak woodland	Oak opening
Northern bobwhite	<i>Colinus virginianus</i>	2	2
Red-shouldered Hawk	<i>Buteo lieatus</i>	2	2
Upland Sandpiper	<i>Bartamia longicauda</i>		2
Wilson's Phalarope	<i>Phalaropus tricolor</i>		2
Yellow-crowned Nightheron	<i>Nyctanassa violacea</i>		2
Canadian Geese*	<i>Branta canadensis</i>		2
American Black Duck	<i>Anas rubripes</i>		1
Black-necked Stilt	<i>Himantopus mexicanus</i>	1	1
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>		1
Long-eared Owl	<i>Asio otus</i>	1	
Worm-eating warbler	<i>Helmintheros vermivorum</i>	1	
Yellow-throated Warbler	<i>Setophaga dominica</i>	1	1
Mallards*	<i>Anas platyrhynchos</i>		1

*= Species sighted at Tamarack Preserve



Figure 11: White-Tailed Deer captured on the trail camera at Tamarack Preserve.

ODOCOILEUS VIRGINIANUS (WHITE-TAILED DEER)

White-tailed deer have been a major part of Wisconsin's landscapes and culture. In Southern Wisconsin areas, white-tailed deer are essential for recreation that can have an influence on vegetation, shift in forest composition, structure, and productivity.

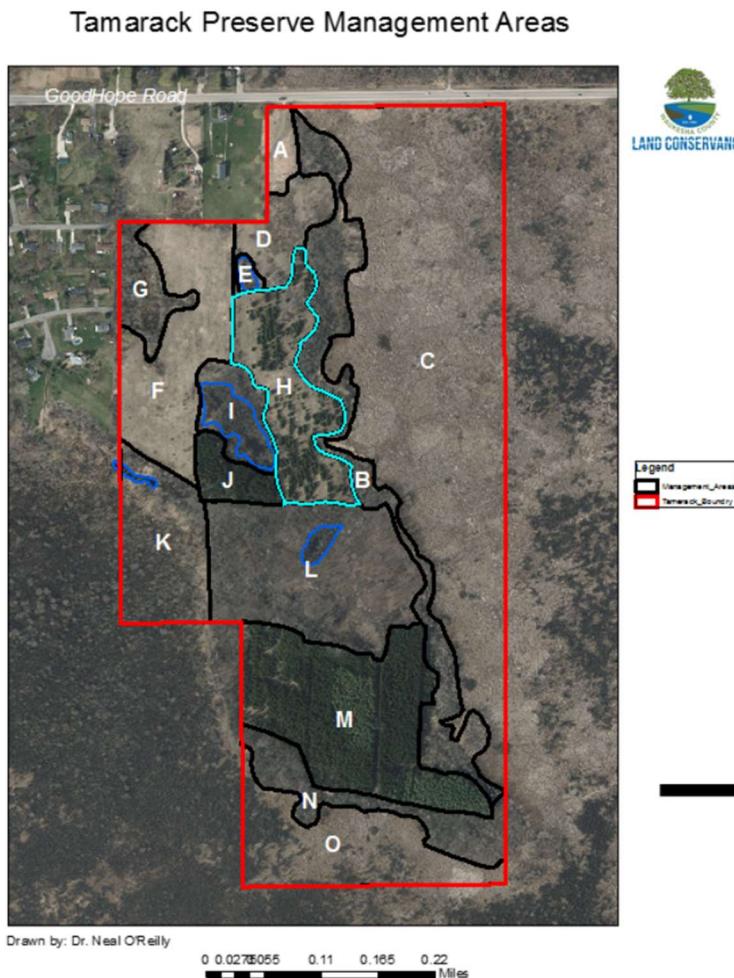


Figure 12: Management area H is shaded (teal) shows the potential White-Tailed Deer observed. Not an exhaustive survey.



Figure 13: Red Fox captured on the trail camera at Tamarack Preserve.

VULPES VULPES (RED FOX)

Red foxes are adaptable and opportunistic mammals that can be seen in suburban, urban areas, and rural areas. In Wisconsin, there are restricted trapping seasons for red foxes, but you are required to have a permit to do so. Red foxes can be threatened by diseases caused by domestic dogs, run-ins with cars, and global climate change.



Figure 14: Wood Frog Tadpoles Caught on the Tamarack Preserve (observed in April 2020).

LITHOBATES SYLVATICUS (WOOD FROG)

The wood frogs in Wisconsin are a common species that make noise calls just like a quacking duck. Wood frogs recommend living in an environment where the forest is moist and areas of large woods. Wood frogs have the shortest breeding phase among all Wisconsin frogs. These frogs breed in ephemeral ponds during the spring season.

Tamarack Preserve Management Areas

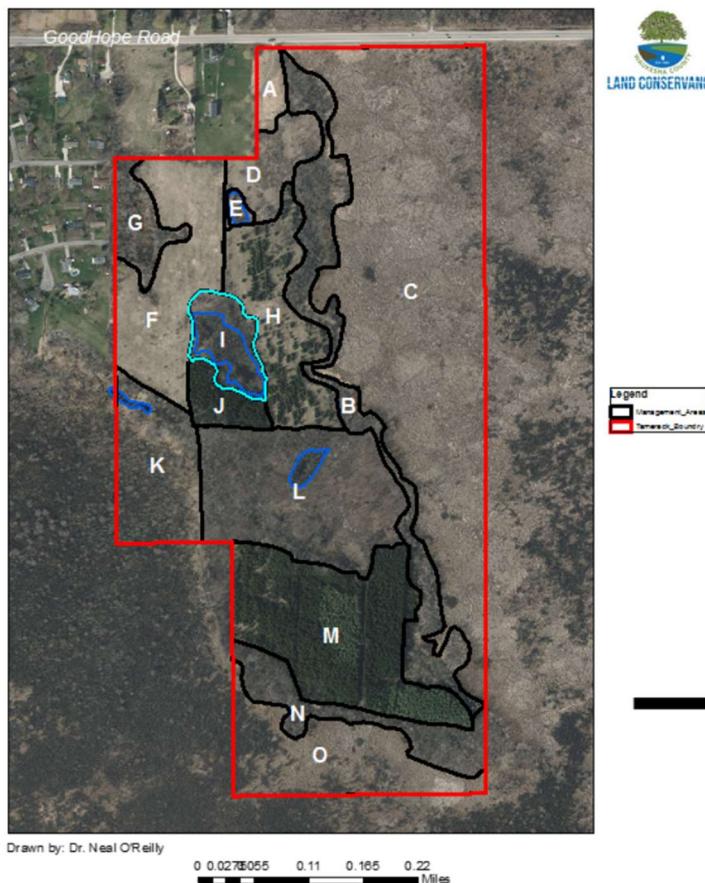


Figure 15: Management area I is shaded (teal) to show the potential Red Foxes and Wood Frogs observed. Not an exhaustive survey.

SPECIES OF GREATEST CONSERVATION NEED

The Wisconsin DNR classifies Species of Greatest Conservation Need (SGCN) as those with low and/or declining populations that require conservation action. While no resident species matching this description have been documented on Tamarack preserve, the American woodcock and the red-headed woodpecker are two species listed as SGCN for which Tamarack preserve provides suitable habitat.

AMERICAN WOODCOCK (SCOLOPAX MINOR)



American woodcocks are a bird species in decline in the U.S. The Tamarack property has multiple habitats used by the American woodcock, including oak opening and woodland, shrub-carr, surrogate grassland and (potentially) calcareous fen. Typical woodcock habitat includes shrubby fields, forest edges, and wet meadows. Woodcocks nest on the ground often in open woods or overgrown fields. Tamarack preserve provides not only for stopover territory but also potential breeding territory.

Figure 16. American woodcock.



Figure 17. Red-headed woodpecker.

RED-HEADED WOODPECKER (*MELANERPES ERYTHROCEPHALUS*)

Red-headed woodpeckers are declining in Wisconsin. Red-headed woodpeckers are significantly associated with oak opening and woodland habitat. Although no red-headed woodpeckers have been found breeding on site. Red-headed woodpeckers are known to occur on restored oak savanna sites in Wisconsin. With the necessary habitat improvements, it is likely that the red-headed woodpecker may become a part of the Tamarack preserve. Land management practices favorable to red-headed woodpeckers include conducting controlled burns, preserving oak savanna, and maintaining snags of dead trees or tree limbs, especially those that are clustered together.

PUBLIC ACCESS

CURRENT PUBLIC USES AND RESTRICTIONS

Public uses on the Tamarack property include hiking, walking, nature study, bird watching, research and environmental education. Since there is no open water on site, there is no canoeing, fishing or swimming. The property is open to the public; however, parking is limited to the shoulder of heavily trafficked Good Hope Road.

Prohibited uses of the property include, but are not limited to, hunting, bicycling, mountain biking, camping, horseback riding and picnicking.

FACILITIES AND TRAILS

There are no facilities or formally established trails on site.

MANAGEMENT OPPORTUNITIES ASSESSMENT

Dense woody vegetation and lack of trails pose challenges to public access. Accordingly, a service trail and single parking spot for maintenance vehicles should be constructed to allow for reliable access to the site without inconveniencing the adjacent property owners.

The village of Menomonee Falls Department of Public Works may be willing to provide labor for the project to lower project costs. Gravel could be donated by a private company such as Halquist Stone, located just minutes away in Lannon, WI. Another potential gravel donor may be Johnson Sand & Gravel Inc. In New Berlin.

PROPERTY MANAGEMENT PLAN

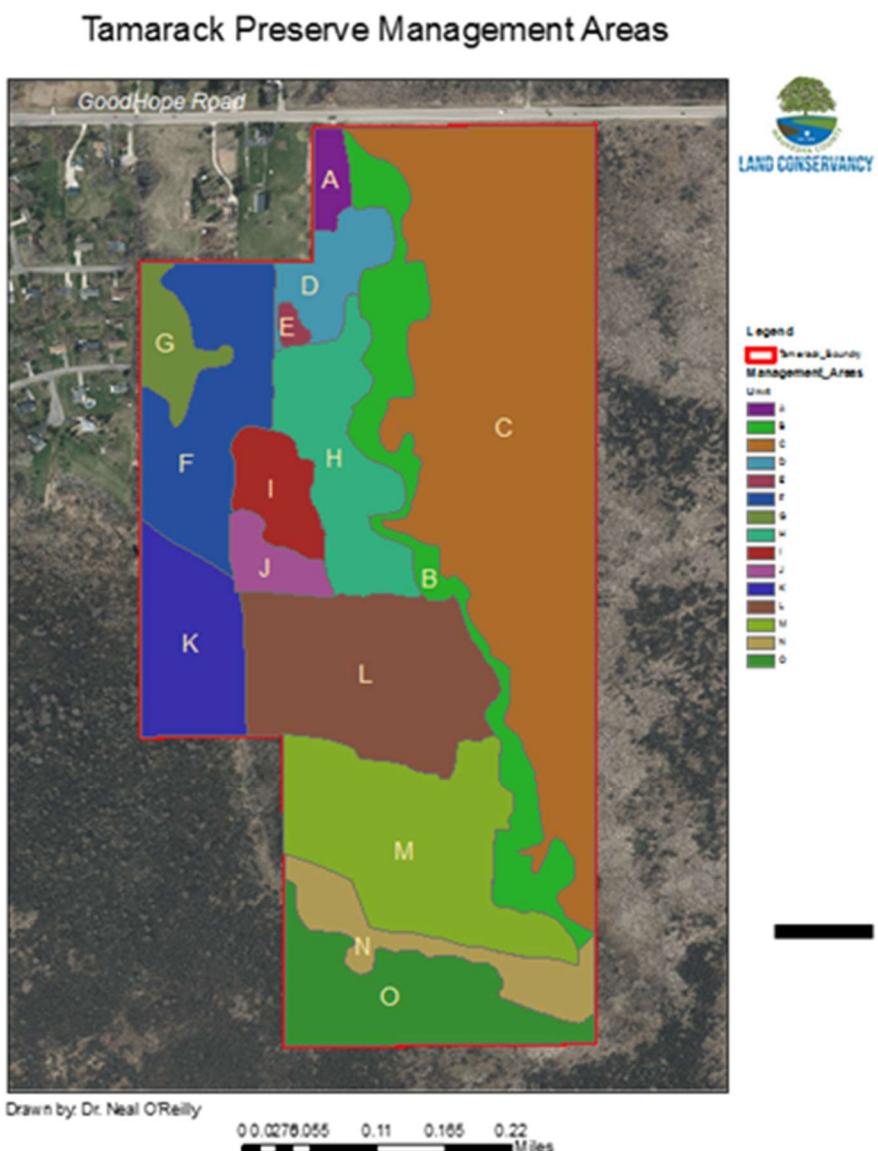


Figure 18: Tamarack Preserve Management Areas

MANAGEMENT GOALS AND OBJECTIVES

The immediate short-term focus will be on maintaining the project areas in which work has already begun, namely control of invasive species.

This land management plan outlines four broad goals for the Tamarack property.

Goal #1: Protect the existing ephemeral pond wetlands at the Tamarack Preserve, thereby supporting Wood Frog and other amphibian populations

Goal #2: Effectively manage invasive flora populations on the preserve, thereby enhancing biodiversity and growth of native plant and animal species

Goal #3: Transform appropriate sections of the property into a healthy prairie or oak savannah

Goal #4: Create an accessible nature preserve for the Menomonee Falls Community with programs centered around hands-on environmental education

GOAL #1: PROTECT THE NATIVE BIODIVERSITY OF WETLAND HABITATS INCLUDING THE EPHEMERAL PONDS WHICH PROVIDE BREEDING GROUNDS AND HELP SUPPORT WOOD FROG POPULATIONS AT THE TAMARACK PRESERVE.

The focal point of proper wetland management at the Tamarack Preserve is the control and management of invasive species encroaching on the property. The Management Areas E, G, and I are uniquely important sections of the preserve, as they are the three distinct locations of ephemeral (or vernal) ponds. These ponds provide integral breeding grounds and habitats for target amphibians like Wood, Leopard, Chorus, and Cricket frogs, Blue-Spotted Salamanders, and invertebrate species like the Prairie Crayfish. By curbing populations of invasive flora species, the management plan intends to preserve and protect the wetlands; thereby protecting the animals which call them home.

At Management Area I, there exists a notable Green Ash population decline left in the wake of invasive Emerald Ash Borer beetles. To effectively confront the issue of resulting canopy decline, an expert should be brought in to stress Big-Toothed Aspen clones at Area I, encouraging rapid growth of new Aspen shoots to uptake the niche of the dying Ash trees and therefore helping to restore the receding canopy.

OBJECTIVES:

- Remove existing invasive flora species in all three Management Areas by method of hand cutting before the winter of 2021.
- Establishing a buffer of native Aspen trees around the ephemeral ponds at Management Area I to increase the groundcover for amphibians before the winter of 2021.
- Treat resprouts and weed the Management Areas E, G, and I annually to effectively remove all persisting invasive plant species by the winter of 2025.
- At Management Area I, plant additional native, wetland-tolerant trees and shrubs by the winter of 2025.

PAST MANAGEMENT:

There has not been any record of prior management at Management Areas E, G or I. One potential reason for this lack of historical disturbance is that each of these areas are wetlands, and would have been difficult and expensive to convert into arable land.

YEAR 1: INVASIVE FLORA REMOVAL & STRESSING ASPEN

During year one, the main goal for Management Areas E, G, and I is the hand-cutting and removal of invasive plant species which are directly threatening these wetland communities. This process is relatively inexpensive but imperative to the health of the ephemeral pond wetlands.

At Management Area I, an additional year-one activity is the stressing of multiple healthy Big-toothed Aspen clones. The intent is to essentially deceive the healthy Aspen, encouraging the tree to send out multiple new emergency shoots to ensure the survival of the plant- a useful defense mechanism of the species.

YEARS 2-5: WEEDING, TREATMENT OF INVASIVES & PLANT COMMUNITY MANAGEMENT

In Management Areas E, G, and I, the main focus will be the treatment and weeding of invasive flora resprouts. This proves vital to the management of the ephemeral pond plant communities, as many invasive species survive initial hand-cutting and will persistently reappear onsite if ignored.

At Management Area I, the Aspen-stressing will continue through year two of management, followed by the planting of additional native wetland-tolerant trees and shrubs to help restore and protect healthy plant communities in this ephemeral pond habitat..

MONITORING AND ALTERNATIVE ACTION

To understand the efficacy of management at Areas E, G, and I, it is imperative to monitor and remove any invasive flora species which have the potential to return at any time. Just as well, the monitoring of existing amphibian and invertebrate populations in these ephemeral pond wetlands can be a key indicator of ecosystem health.

Due to the impact of proper ephemeral pond management on the overall health of target amphibian populations, there is no alternative action plan for the Management Areas E G, and I.

GOAL #2: EFFECTIVELY MANAGE INVASIVE FLORA POPULATIONS ON THE PRESERVE, THEREBY ENHANCING BIODIVERSITY AND GROWTH OF NATIVE PLANT AND ANIMAL SPECIES

Invasive species pose an overwhelming threat to native flora. They thrive and outcompete native species due to the lack of natural predation. Most of the preserve has invasive species present, some areas more than others. The vegetative cover around the property's ephemeral ponds has been degraded and some of the older oak trees at the entrance of the property have been surrounded by buckthorn and honeysuckle.

Tamarack hosts a variety of nonnative invasives species, but the most pressing management concern is buckthorn and honeysuckle. Emphasis should be given to removing large seed-producing female plants. As the seeds remain viable in the seedbank for up to eight years, management should be continued for at least this length of time and periodically monitored in the future. As the invasive plant species become better mapped on the property and the threat of buckthorn is less concerning, more focus will be given to

invasive herbaceous species. A full inventory of plant species will be needed to identify all invasive species that exist on the property.

OBJECTIVES:

- De-stress the larger Oak trees on the property by forest mowing at least a 1-meter buffer in the first year.
- Use pre-existing plant species, like Red Dogwood and Aspen trees, to replace the dying Ash trees and the buckthorn/honeysuckle invaded areas.
- Reduce the total area occupied on the property by invasive species by at least 30% in the first year.

YEAR 1: DE-STRESSING OAKS

Forest mowing directly around the base of the Oak trees will remove the buckthorn and honeysuckle that have started to affect the Oak's health. This will be a temporary effect that will prevent immediate harm. It should be followed up with herbicide treatments to prevent re-sprouts from appearing.

YEARS 2-5: NATIVE REPOPULATION

There are a number of native species on the property that may be used to repopulate the areas overrun by invasives and replace the dying ash trees. An expert will have to be brought in to discuss the feasibility of temporarily stressing the aspen trees to produce clones that may be replanted.

MONITORING AND ALTERNATIVE ACTION

Objectives will be used to track progress. All recommendations have an assigned priority level. The spruce/pine plantation, although not native to the area, has no management strategy because of its potential to create and house new fauna species. Invasives could be allowed to continue their growth. This could be detrimental to the native flora and fauna that exist but may also make way for new species to utilize the area. If herbicides are not available/viable, hand pulling of invasive species would have to occur more often either by professionals or volunteers.

GOAL #3: TRANSFORMING SECTIONS OF THE PROPERTY TO A HEALTHY PRAIRIE OR OAK SAVANNAH.

OBJECTIVES:

- Prescribed burns in the first year to eliminate dense invasive species populations in specific management areas.
- Plant native species between years 2-5 in burned areas to restore the land to either a prairie or oak savannah habitat.

PAST MANAGEMENT:

Previous management in the areas for intended prairie and oak savannah restoration have been relatively non-existent. The areas where prescribed burns will be needed have been highly disturbed in the past, and with the lack of previous management, they are overrun with invasive species, specifically reed canary and barnyard grasses.

YEAR 1:

In the first-year management area F, where a restoration target of an oak savannah is the intended, should begin with controlled burns.

YEAR 3-5:

Between years 3-5 controlled burns should be performed in management areas A and D to bring restoration to a prairie environment in those areas.

In management area F, reseeding and planting of Bur oaks should take place in order to return the burned area to an oak savannah.

GOAL #4: CREATE AN ACCESSIBLE NATURE PRESERVE FOR THE MENOMONEE FALLS COMMUNITY WITH PROGRAMS CENTERED AROUND HANDS-ON ENVIRONMENTAL EDUCATION

Tamarack preserve does not offer any trails, camping, sitting areas, parking lots, and facilities on the property. However, the preserve is open to the public for people to walk around where their different ponds located in sections E and I on the management areas. As well as several different species of animals and plants throughout the preserve. However, our fourth goal is to create a nature preserve that will have hands-on educational programs for all ages for the community of Menomonee Falls. The nature preserve will open doors for the public to come and gain more knowledge about our environment and the organisms that live within it. Lastly, understanding why Tamarack Preserve should be protected and preserved.

OBJECTIVES:

- Contacting local governments for grants and financing opportunities that are available to build an accessible nature preserve within the first year.
- Contacting universities in the area for sponsorships in return for work and internship opportunities for their students.
- Promoting educational workshops that will be offered at the preserve.

CONTACTING UNIVERSITIES

Contacting UW-Milwaukee, Marquette University, Milwaukee School of Engineering, Alverno College, Cardinal Stritch University, Wisconsin Lutheran College, Carroll University, and Concordia University etc. for potential sponsorships. In return for working at the new nature preserve by helping to educate the public, working in the gift shop, and taking people out on groups tours for wildlife watching. Internship opportunities to help manage the land at the Tamarack preserve by testing water quality of ponds and identify animal and plant species.

PROMOTING EDUCATIONAL WORKSHOPS

To promote educational workshops through social media platforms which include, Facebook, Twitter, Instagram, YouTube, and the website of Waukesha County Land Conservancy to help promote environmental education that will be offered at the new nature preserve in Menomonee Falls.

TIMELINE AND BUDGET

TABLE A1. DISTURBED ENTRANCE

Plant Community	Disturbed Entrance (A)					
Restoration Target	Prairie and potential park	Historical Condition: Oak, Hickory, Maple, Elm Forest				
Acres	1.39 acres	Topography: flat slopes (1 to 6%)				
Soils	Soil Map Unit: Ozaukee (OuB2) and Mequon (MTA) Silt Loam	Texture: Silt Loam	Drainage: Unknown			
Degradation Factors	Invasive and weedy (mesophytic) herbaceous species Historic logging					
2020 Condition	Dense population of reed canary grass. Common reed grass and teasle present					
2020 Dominant Species	<ul style="list-style-type: none"> • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) • Teasle (<i>Dipsacus spp.</i>) • Other unknown grasses and sedges 					
Notable Species	<ul style="list-style-type: none"> • Other unknown grasses and sedges 					
2020 Notable Aggressives 1 = Few (<5% cover) 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) • Teasle (<i>Dipsacus spp.</i>) 					

TABLE A2. DISTURBED ENTRANCE SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year						
					Year 1		Year 2	Years 3 - 5	Subtotals		
	A1	0.07 acres	<ul style="list-style-type: none"> • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) • Teasle (<i>Dipsacus spp.</i>) 	High	Foliar spraying	Hand cutting	Foliar spraying	Foliar spraying	\$3,900-\$4,100		
					\$1200	\$300-\$500	\$1200	\$1200			
	A2	1.32 acres	<ul style="list-style-type: none"> • Reed Canary Grass (<i>Phalaris arundinacea</i>) 	Med				Prairie burn			
								\$300-\$500	\$300-\$500		
Subtotals		1.39 acres									
										EST. 5-YR TOTAL \$4,200-\$4,600	

TABLE B1. FORESTED WETLAND

Plant Community	Forested Wetland (B)		
Restoration Target	Forested Wetland	Historical Condition: Oak, Hickory, Maple, Elm Forest	
Acres	11.5 acres	Topography: flat slopes (0 to 2%)	
Soils	Soil Map Unit: Palms Muck (Pa)	Texture: Silt Loam	Drainage: Unknown
Degradation Factors	Invasive shrub species Historic logging		
2020 Condition	Dying ash trees, Abundant buckthorn and honeysuckle, some old Oak trees, Big tooth Aspen clones, some areas of reed canary grass, as well as some willow		
2020 Dominant Species	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) • Bur Oak (<i>Quercus Macrocarpa</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Willow (<i>Salix alba</i>) • Aspen (<i>Populus tremuloides</i>) • Other unknown grasses and sedges 		
Notable Species	<ul style="list-style-type: none"> • Bur Oak (<i>Quercus macrocarpa</i>) 		
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) 3 • Honeysuckle (<i>Lonicera periclymenum</i>) 3 • Reed Canary Grass (<i>Phalaris arundinacea</i>) 2 		

TABLE B2. FORESTED WETLAND SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year				
					Year 1	Year 2	Years 3 - 5	Subtotals	
Management Sub-Unit(s)	B1	5.6 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Bur Oak (<i>Quercus Macrocarpa</i>) 	High	Release Oaks	Forest Mowing	Foliar spraying		
					\$1,200	\$8,960 - \$11,200	\$13,440	\$23,600 - \$25,840	
	B2	0.5 acres	<ul style="list-style-type: none"> • Reed Canary Grass (<i>Phalaris arundinacea</i>) 	Med			Prairie burn \$150 - \$250	\$150 - \$250	
Subtotals		6.1 acres						\$23,750 - \$26,090	
EST. 5-YR TOTAL								\$23,750 - \$26,090	\$23,750 - \$26,090

TABLE C1. EMERGENT WET MEADOW COMMUNITY ATTRIBUTES

Plant Community	Emergent Wet Meadow Community Management Area C		
Restoration Target	Emergent wet meadow (E2H)	Historical Condition: Tamarack forest	
Acres	46.6 acres	Topography: flat slopes (0 to 1%)	
Soils	Soil Map Unit: Houghton muck (HtA)	Texture: Muck	Drainage: Somewhat drained
Degradation Factors	Invasive and weedy (mesophytic) herbaceous species		
	Invasive and weedy native shrubs		Historic logging
2020 Condition	Dense population of cattail. Invasion with phragmites. Some willow shrubs.		
2020 Dominant Species	<ul style="list-style-type: none"> • Cattail (<i>Typha spp.</i>) • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) • Willows (<i>Salix spp.</i>) 		
Notable Species			
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) (1) 		

TABLE C2. EMERGENT WET MEADOW MANAGEMENT SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year								
					Year 1		Year 2	Years 3 - 5			Subtotals		
					Foliar spray	Mowing	Foliar spray	Foliar spray	Foliar spray	Foliar spray			
	C1	0.26 acres	Common Reed Grass (<i>Phragmites australis</i>)	High	\$312	\$416 - \$520	\$312	\$312	\$312	\$1,664 - \$1,768			
Subtotals		0.26 acres											
EST. 5-YR TOTAL												\$1,664 - \$1,768	

TABLE D1. BOTTOMLAND HARDWOODS

Plant Community	Bottomland Hardwoods (D)						
Restoration Target	Bottomland Hardwoods		Historical Condition: Ash and Aspen trees				
Acres	3.8 acres		Topography: flat slopes (0 to 2%)				
Soils	Soil Map Unit: Mequon Silt Loam (MtA) and Ozaukee Silt Loam (OuB2)		Texture: Silt Loam	Drainage: Well drained to moderately well drained			
Degradation Factors	Invasive shrub species Historic logging			Historic Farming			
2020 Condition	Dying ash trees, Abundant buckthorn and honeysuckle, some areas of reed canary grass, and red osier dogwood						
2020 Dominant Species	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Red Osier Dogwood (<i>Cornus sericea</i>) • Other unknown grasses and sedges 						
Notable Species	None						
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) 2 • Honeysuckle (<i>Lonicera periclymenum</i>) 3 • Reed Canary Grass (<i>Phalaris arundinacea</i>) 3 • Teasel (<i>Dipsacus fullonum</i>) 1 						

TABLE D2. BOTTOMLAND HARDWOODS SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority							
					Year 1	Year 2	Years 3 - 5		Subtotals		
	D1	2.4 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) 	High	Forest Mowing	Resprout Herbicide Treatment	Seeding	General Weeding			
					\$4,000 – 4,800 (Machine)	\$2,880	\$3,600	\$12,960	\$23,440 – 24,240		
	D2	1.4 acres	<ul style="list-style-type: none"> • Reed Canary Grass (<i>Phalaris arundinacea</i>) 	Med			Prairie burn				
							\$420 - 700		\$420 - 700		
Subtotals		3.8 acres							\$23,860 – 24,940		
EST. 5-YR TOTAL									\$23,860 – 24,940		

TABLE E1. EPHEMERAL POND

Plant Community	Ephemeral Pond (E)		
Restoration Target	Ephemeral Pond	Historical Condition: Oak, Hickory, Maple, Elm Forest	
Acres	0.4 acres	Topography: flat slopes (0 to 2%)	
Soils	Soil Map Unit: Mequon silt loam (MtA)		Texture: Silt Loam Drainage: Somewhat poorly drained
Degradation Factors	Invasive shrub species Historic logging		
2020 Condition	Dying ash trees, some buckthorn and honeysuckle, some areas of reed canary grass, as well as some willow		
2020 Dominant Species	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Willow (<i>Salix alba</i>) • Other unknown grasses and sedges 		
Notable Species	<ul style="list-style-type: none"> • Cricket Frogs (<i>Acris crepitans</i>) • Wood Frogs (<i>Lithobates sylvaticus</i>) 		
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) 1 • Honeysuckle (<i>Lonicera periclymenum</i>) 1 • Reed Canary Grass (<i>Phalaris arundinacea</i>) 3 		

TABLE E2. EPHEMERAL POND SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year						
					Year 1	Year 2	Years 3 - 5	Subtotals			
	E1	0.4 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) 	High	Hand Cutting	Treating Resprouts and Weeding	Treating Resprouts and Weeding				
					\$300	\$500	\$1,500	\$2,300			
Subtotals		0.4 acres						\$2,300			
EST. 5-YR TOTAL								\$2,300			

TABLE F1. OLD FIELD

Plant Community	Old Field (F)		
Restoration Target	Prairie		Historical Condition: Oak, Hickory, Maple, Elm Forest
Acres	11.1 acres		Topography: flat slopes (0 to 2%)
Soils	Soil Map Unit: Ozaukee silt loam (OuB2) and Mequon silt loam (MtA)		Texture: Silt Loam Drainage: Somewhat to poorly drained
Degradation Factors	Invasive shrub species Historic logging		Historic Farming
2020 Condition	Dominated by barnyard grasses, some honeysuckle and buckthorn, some teasel, some old Oak trees, some areas of reed canary grass		
2020 Dominant Species	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Teasel (<i>Dipsacus fullonum</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Willow (<i>Salix alba</i>) • Other unknown grasses and sedges 		
Notable Species	<ul style="list-style-type: none"> • None 		
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) 1 • Honeysuckle (<i>Lonicera periclymenum</i>) 1 • Reed Canary Grass (<i>Phalaris arundinacea</i>) 3 		

TABLE F2. OLD FIELD SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year						
					Year 1	Year 2	Years 3 - 5	Subtotals			
	F1	11.1 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Bur Oak (<i>Quercus Macrocarpa</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Teasel (<i>Dipsacus spp.</i>) 	High	Prairie Burn	Seeding \$1,200	Plant Bur Oaks (in a savannah arrangement)				
					\$3,300 – 5,550	\$1,200	\$500				
Subtotals		11.1 acres						\$5,000 – 7,250			
								EST. 5-YR TOTAL	\$5,000 – 7,250		

TABLE G1. FORESTED WETLAND

Plant Community	Forested Wetland (G)		
Restoration Target	Forested Wetland	Historical Condition: Oak, Hickory, Maple, Elm Forest	
Acres	2.97 acres	Topography: flat slopes (0 to 2%)	
Soils	Soil Map Unit: Mequon Silt Loam (MtA) and Ashkum Silty Clay (AsA)		Texture: Silt Loam Drainage: Poorly drained
Degradation Factors		Invasive shrub species Historic logging	
2020 Condition		Dying ash trees, some buckthorn and honeysuckle, some areas of reed canary grass, as well as some willow	
2020 Dominant Species		<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Willow (<i>Salix alba</i>) • Other unknown grasses and sedges 	
Notable Species			
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)		<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) 3 • Honeysuckle (<i>Lonicera periclymenum</i>) 3 • Reed Canary Grass (<i>Phalaris arundinacea</i>) 3 	

TABLE G2. FORESTED WETLAND SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year						
					Year 1	Year 2	Years 3 - 5	Subtotals			
	G1	2.97 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) 	Low	Hand Cutting	Treating Resprouts and Weeding	Treating Resprouts and Weeding				
					\$600	\$1,000	\$3,000	\$4,600			
Subtotals		2.97 acres						\$4,600			
									EST. 5-YR TOTAL \$4,600		

TABLE H1. OLD NORWAY SPRUCE PLANTATION

Plant Community	Old Norway Spruce Plantation and Open Field (H)		
Restoration Target	Aggressive Invasive Species Control		Historical Condition: Oak, Hickory, Maple Forest
Acres	9.06 acres		Topography: flat slopes (0 to 2%)
Soils	Soil Map Unit: Ozaukee Silt Loam (OuB), Mequon Silt Loam (MtA), and Ozaukee Silt Loam-eroded (OuB2)	Texture: Silt Loam	Drainage: Unknown
Degradation Factors	Invasive shrub species Historic logging and farming		
2020 Condition	Dying ash trees, Abundant buckthorn and honeysuckle, some areas of reed canary grass		
2020 Dominant Species	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Norway Spruce (<i>Picea abies</i>) • Other unknown grasses and sedges 		
Notable Species	<ul style="list-style-type: none"> • Red Fox (<i>Vulpes vulpes</i>) • White-tailed Deer (<i>Odocoileus virginianus</i>) 		
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) 		

TABLE H2. FORESTED WETLAND SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year						
					Year 1	Year 2	Years 3 - 5	Subtotals			
H1	H1	9.06 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) 	Low	Hand Cutting	Treating Resprouts and Weeding	Treating Resprouts and Weeding	\$13,750-22,750	\$13,750-22,750		
					\$2,750 – 4,550	\$2,750- 4,550	\$8,250 – 13,650				
Subtotals		9.06 acres						\$13,750-22,750			
								EST. 5-YR TOTAL	\$13,750-22,750		

TABLE I1. Ephemeral Pond

Plant Community	Ephemeral Pond (I)			
Restoration Target	Ephemeral Pond	Historical Condition: Oak, Hickory, Maple, Elm Forest		
Acres	3.58 acres	Topography: flat slopes (0 to 2%)		
Soils	Soil Map Unit: Mequon Silt Loam (MtA) and Ashkum Silty Clay (AsA)		Texture: Silt Loam	Drainage: Unknown
Degradation Factors	Invasive shrub species Historic logging			
2020 Condition	Dying ash trees, Abundant buckthorn and honeysuckle, Big tooth Aspen clones, some areas of reed canary grass, as well as some willow			
2020 Dominant Species	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Green Ash (<i>Fraxinus pennsylvanica</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) • Willow (<i>Salix alba</i>) • Aspen (<i>Populus tremuloides</i>) • Other unknown grasses and sedges 			
Notable Species	<ul style="list-style-type: none"> • Chorus Frogs (<i>Pseudacris spp.</i>) • Wood Frogs (<i>Lithobates sylvaticus</i>) • Blue-Spotted Salamanders (<i>Ambystoma laterale</i>) 		<ul style="list-style-type: none"> • Prairie Crayfish (<i>Procambarus gracilis</i>) • Leopard Frogs (<i>Lithobates pipiens</i>) 	
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) 			

TABLE I2. Ephemeral Pond Sub-Units and Estimated 5-Year Costs

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year				
					Year 1	Year 2	Years 3 - 5	Subtotals	
	I1	1.78 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Honeysuckle (<i>Lonicera periclymenum</i>) • <i>pennsylvanica</i>) • Reed Canary Grass (<i>Phalaris arundinacea</i>) 	High	Hand Cutting	Treating Resprouts and Weeding	Treating Resprouts and Weeding	\$2,750 - 4500	
					\$550 - 900	\$550 - 900	\$1,650 - 2,700		
	I2	1.80 acres	<ul style="list-style-type: none"> • Green Ash (<i>Fraxinus pennsylvanica</i>) • Aspen (<i>Populus tremuloides</i>) 	Med	Stress Aspen	Stress Aspen	Plant Additional Native Wetland Tolerant Trees and Shrubs	\$2500	
					\$500	\$500	\$1,500		
Subtotals		3.58 acres						\$5,250 - 7,000	
								EST. 5-YR TOTAL	\$5,250 - 7,000

TABLE J1. SPRUCE PLANTATION

Plant Community	Spruce Plantation (J)			
Restoration Target	None at this time		Historical Condition: Oak, Hickory, Maple, Elm Forest	
Acres	2.27 acres			Topography: flat slopes (0 to 2%)
Soils	Soil Map Unit: Mequon Silt Loam (MtA), Ozaukee Silt Loam (OuB), and Ozaukee Silt Loam-Eroded (OuB2)		Texture: Silt Loam	Drainage: Unknown
Degradation Factors	Historic logging Historic farming			
2020 Condition	Dense monoculture of Norway Spruce Trees			
2020 Dominant Species	<ul style="list-style-type: none"> • Norway Spruce (<i>Picea abies</i>) 			
Notable Species				
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	None			

TABLE J2. PINE FARM SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year						
					Year 1	Year 2	Years 3 - 5	Subtotals			
Management Sub-Unit(s)	J1	2.27 acres	<ul style="list-style-type: none"> • Norway Spruce (<i>Picea abies</i>) 	Low	No Recommended Management	No Recommended Management		No Recommended Management			
					N/A	N/A	N/A	N/A			
Subtotals		2.27 acres									
									EST. 5-YR TOTAL N/A		

TABLE K1. FORESTED WETLAND

Plant Community	Forested Wetland (K)		
Restoration Target	Forested Wetland	Historical Condition: Tamarack	
Acres	8.04 acres	Topography: flat slopes (0 to 2%)	
Soils	Soil Map Unit: Palms Muck (Pa), Houghton Muck (HtA), and Mequon Silt Loam (MtA)	Texture: Silt Loam	Drainage: Unknown
Degradation Factors	Invasive shrub species		
	Historic logging		
2020 Condition	Unknown/Undocumented		
2020 Dominant Species	Unknown/Undocumented		
Notable Species	Unknown		
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	Unknown/Undocumented		

TABLE K2. FORESTED WETLAND SUB-UNITS AND ESTIMATED 5-YEAR COSTS

	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year				
					Year 1	Year 2	Years 3 - 5	Subtotals	
Management Sub-Unit(s)	K1	8.04 acres	Unknown/Undocumented	Low	N/A	N/A	Survey Management Area		
Subtotals		8.04 acres							
									EST. 5-YR TOTAL N/A

TABLE L1. OAK FOREST

Plant Community	Oak Forest (L)					
Restoration Target	Oak Forest		Historical Condition: Oak, Hickory, Maple, Forest			
Acres	15.6 acres		Topography: flat slopes (2 to 6%)			
Soils	Soil Map Unit: Palms Muck (Pa), Mequon Silt Loam (MtA), Ozaukee Silt Loam-Eroded (OuB2), Ozaukee Silt Loam (OuB)		Texture: Silt Loam	Drainage: None		
Degradation Factors	Invasive shrub species Historic logging		Historic Pasturing			
2020 Condition	Abundant buckthorn, some Bur Oak trees, maybe some Big tooth Aspen clones, as well as some willow					
2020 Dominant Species	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) • Bur Oak (<i>Quercus Macrocarpa</i>) • Willow (<i>Salix alba</i>) • Aspen (<i>Populus tremuloides</i>) • Other unknown grasses and sedges 					
Notable Species	<ul style="list-style-type: none"> • Bur Oak (<i>Quercus macrocarpa</i>) 					
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) 1 					

TABLE L2. OAK FOREST SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year					
					Year 1	Year 2	Years 3 - 5	Subtotals		
	L1	2 acres	<ul style="list-style-type: none"> • Common Buckthorn (<i>Rhamnus cathartica</i>) 	High	Forest Mowing	Controlled Burn	Hand Pulling or Spot Treatment with Herbicides			
					\$3,300 - 4,000	\$600 - 1,000	\$600 - 1,000	\$4,500 - 6,000		
	L2	13.6 acres	<ul style="list-style-type: none"> • Bur Oak (<i>Quercus Macrocarpa</i>) • Common Buckthorn (<i>Rhamnus cathartica</i>) 	Med	Hand Cutting	Controlled Burn	Hand Pulling or Spot Treatment with Herbicides			
					\$4,100 - 6,800	\$4,100 - 6,800	\$4,100 - 6,800	\$12,300 - 20,400		
Subtotals		15.6 acres								
								EST. 5-YR TOTAL	\$16,800 - 26,400	

TABLE M1. SPRUCE AND PINE PLANTATION

Plant Community	Spruce and Pine Plantation (M)		
Restoration Target	Spruce and Pine Farm	Historical Condition: Oak, Hickory, Maple, Elm Forest	
Acres	16.2 acres	Topography: flat slopes (0 to 2%)	
Soils	Soil Map Unit: Mequon Silt Loam (MtA) and Ozaukee Silt Loam (OuB2)	Texture: Silt Loam	Drainage: Unknown
Degradation Factors	Historic Farming		
	Historic logging		
2020 Condition	Mix of Spruce and Pine		
2020 Dominant Species	<ul style="list-style-type: none"> • Norway Spruce (<i>Picea abies</i>) • White Pine (<i>Pinus strobus</i>) 		
Notable Species			
2020 Notable Aggressives 1 = Few (<5% cover) 5 = Abundant (>50% cover)	None		

TABLE M2. SPRUCE AND PINE PLANTATION SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year				
					Year 1	Year 2	Years 3 - 5	Subtotals	
	M1	16.2 acres	<ul style="list-style-type: none"> • Norway Spruce (<i>Picea abies</i>) • White Pine (<i>Pinus strobus</i>) 	Low	No Recommended Management (at this time)	No Recommended Management (at this time)	No Recommended Management (at this time)		
					N/A	N/A	N/A	N/A	
Subtotals		16.2 acres							EST. 5-YR TOTAL N/A

TABLE N1. FORESTED WETLAND

Plant Community	Forested Wetland (N)		
Restoration Target	Forested Wetland	Historical Condition: Tamarack	
Acres	5.47 acres	Topography: flat slopes (0 to 2%)	
Soils	Soil Map Unit: Palms Muck (Pa), Houghton Muck (HtA), Mequon Silt Loam (MtA), and Ozaukee Silt Loam-Erosion (OuB2)	Texture: Silt Loam	Drainage: Unknown
Degradation Factors	Invasive shrub species		
	Historic logging		
2020 Condition	Unknown/Undocumented		
2020 Dominant Species	Unknown/Undocumented		
Notable Species	Unknown/Undocumented		
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	Unknown/Undocumented		

TABLE N2. FORESTED WETLAND SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year				
					Year 1	Year 2	Years 3 - 5	Subtotals	
	B1	5.47 acres	Unknown/Undocumented	Low	N/A	N/A	Survey Management Area		
Subtotals		5.47 acres							
EST. 5-YR TOTAL								N/A	

TABLE O1. DISTURBED WETLAND

Plant Community	Disturbed Wetland (O)						
Restoration Target	Disturbed wetland		Historical Condition: Oak, Hickory, Maple, Elm Forest				
Acres	1.4 acres		Topography: flat slopes (1 to 6%)				
Soils	Soil Map Unit: Ozaukee (OuB2) and Mequon (Mta) Silt Loam		Texture: Silt Loam	Drainage: Unknown			
Degradation Factors	Invasive and weedy (mesophytic) herbaceous species						
	Historic logging						
2020 Condition	Dense population of reed canary grass. Common reed grass and teasle present						
2020 Dominant Species	<ul style="list-style-type: none"> • <i>Reed Canary Grass (Phalaris arundinacea)</i> • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) • Teasle (<i>Dipsacus spp.</i>) • Other unknown grasses and sedges 						
Notable Species	<ul style="list-style-type: none"> • Other unknown grasses and sedges 						
2020 Notable Aggressives 1 = Few (<5% cover) to 5 = Abundant (>50% cover)	<ul style="list-style-type: none"> • <i>Reed Canary Grass (Phalaris arundinacea)</i> • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) • Teasle (<i>Dipsacus spp.</i>) 						

TABLE O2. DISTURBED WETLAND SUB-UNITS AND ESTIMATED 5-YEAR COSTS

Management Sub-Unit(s)	Sub-Unit	Acres	Distinguishing Attribute(s)	Priority	Activity and Estimated Costs by Year						
					Year 1		Year 2	Years 3 - 5	Subtotals		
Management Sub-Unit(s)	A1	0.07 acres	<ul style="list-style-type: none"> • Common Reed Grass (<i>Phragmites australis</i> subsp. <i>australis</i>) • Teasle (<i>Dipsacus spp.</i>) 	High	Foliar spraying	Hand cutting	Foliar spraying	Foliar spraying			
					\$1200	\$300-\$500	\$1200	\$1200	\$3,900-\$4,100		
	A2	1.33 acres	<ul style="list-style-type: none"> • <i>Reed Canary Grass (Phalaris arundinacea)</i> 	Med				Prairie burn			
								\$300-\$500	\$300-\$500		
Subtotals		1.4 acres									
EST. 5-YR TOTAL									\$4,200-\$4,600		

MANAGEMENT COSTS & FUNDING OPPORTUNITIES

UNIT AREA COST OF MANAGEMENT

Table 2. Unit Area Cost of Management for Each Intended Activity.

Management Activity	Cost (\$/acre/year)
Hand Cutting	\$300 - 500
Treating Resprouts, and Weeding	\$300 - 500
Machine Cutting and Mowing	\$1,600 - 2,000
Prairie Burn	\$300 - 500
Foliar Spray	\$1,200
Stressing Aspen	\$500
Releasing Oaks	\$200

*Raw Pricing data obtained from Meghan Wersel of the Waukesha County Land Conservancy

TOTAL ESTIMATED COST OF MANAGEMENT

Calculated Total Cost = The sum of all expected activity costs in Areas A-O throughout years 1-5

Total Est. Cost of Management = \$101,174 – 127,698

*Total Cost above does not include pricing for Management Areas J, K, M, and N

*Cost of establishing trails and constructing facilities not included in calculation

FUNDING OPPORTUNITIES

To fund the budget displayed above, the following grants should be considered:

1. John C. Bock Foundation:
 - a. Purpose: Preserve woodlands and old growth forests in the state of Wisconsin.
 - b. Amount: Request (\$15,000 has been awarded in the past)
 - c. Deadline: May 31st
2. C.D. Besadny Conservation Grant Program:
 - a. Purpose: Funds projects at conservation organizations that promote the responsible stewardship of Wisconsin's natural resources at the local level.
 - b. Amount: \$500 - \$1,000 (must match amount)
 - c. Deadline: September 1st
3. American Transmission Co. Community Planting Program

- a. Purpose: encourages and supports communities to plant trees and vegetation that will enhance the aesthetics of communities in a manner that is consistent with their safety and maintenance standards.
- b. Amount: \$100 - \$5,000
- c. Deadline: September 30th
- 4. Acorn Foundation
 - a. Purpose: preserve and restores habitats supporting biological diversity and wildlife.
 - b. Amount: \$5,000 - \$10,000
 - c. Deadline: January 15th or June 15th (alternating deadlines)
- 5. Patagonia Corporate Grants
 - a. Purpose: help local groups that work to protect local habitats and frontline communities.
 - b. Amount: \$10,000 - \$20,000
 - c. Deadline: April 30th or August 31st
- 6. Landowners Incentive Program (LIP)
 - a. Purpose: help private landowners create and manage habitat for species that are rare or declining
 - b. Amount: Reimburse up to 75% of cost (must match amount)
 - c. Deadline: Open year round

GLOSSARY

Adaptive Management. A systematic process that guides management decisions, focusing on learning from management outcomes and adapting in the face of uncertainty.

Best Management Practices. Those practices determined to be the most practical and effective means of achieving the desired goal while optimizing organizational resources.

Collector App. Mapping software developed by Esri that allows users to collect spatial data in the field. Useful in mapping boundaries and tracking land management practices, such as invasive species control.

Conservation easement. Legal agreement between a landowner and a land trust or government agency that sets aside the land in perpetuity, limiting uses and preventing development.

Herbaceous. Characteristic of plants that do not develop woody tissue.

Oak savanna. Natural community dominated by oak trees and an herbaceous understory that is intermediate between oak woodland and prairie landscapes with canopy cover between 5% and 50%. Open-grown bur oaks are the characteristic feature of this landscape.

Oak woodland. Natural community intermediate between oak savannas and oak forests that exhibit between 50% and 95% canopy cover.

Open-grown oak. An oak tree with sufficient space, nutrients, and sunlight to grow to great size and age and develop characteristic wide-spreading limbs.

Natural community. An assemblage of plants and animals that occur within a specific habitat.

Primary Environmental Corridor. Includes concentrations of important natural resources as identified by SEWRPC, including wildlife habitat areas, wetlands, prairies, woodlands, rivers, etc.

SEWRPC. Southeastern Wisconsin Regional Planning Commission.

Species of Greatest Conservation Need. Species that have low or declining populations that require conservation action.

Species of Special Concern. Species that are suspected to have problems with abundance and distribution but for which there is inadequate research at the moment.

Wisconsin Wildlife Action Plan (WWAP). A plan for all of Wisconsin to help Species of Greatest Conservation Need and the places they live.

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Trail cameras: Dr. Neal O'Reilley

Drone footage and photography: Nathaniel Kinney

APPENDICES

APPENDIX A. "QUICK REFERENCE GUIDE: PHENOLOGY AND CONTROL OF COMMON INVASIVE PLANT SPECIES FOUND IN SOUTHEASTERN WISCONSIN."

APPENDIX B. "WISCONSIN NATIVE PLANTS: RECOMMENDATIONS FOR LANDSCAPING AND NATURAL COMMUNITY RESTORATION"

Native Plant Species of Savannas:

Savannas on Sandy Soils - Core Species		
Genus species	Common name(s)	Type
<i>Anemone cylindrica</i>	Thimbleweed, long-headed anemone	Perennial forb
<i>Aquilegia canadensis</i>	Wild columbine, Canadian columbine, red columbine	Perennial forb
<i>Asclepias tuberosa</i>	Butterfly milkweed	Perennial forb
<i>Carex brevior</i>	Fescue sedge, plains oval sedge	Perennial sedge
<i>Carex tonsa*</i>	Shaved sedge	Perennial sedge
<i>Comandra umbellata*</i>	Bastard toadflax, false toadflax	Perennial forb
<i>Coreopsis palmata</i>	Prairie coreopsis, finger tickseed	Perennial forb
<i>Galium boreale</i>	Northern bedstraw	Perennial forb
<i>Koeleria macrantha</i>	Junegrass, prairie Junegrass	Perennial grass
<i>Lespedeza capitata</i>	Round-headed bush-clover	Perennial forb
<i>Liatris aspera</i>	Rough blazing-star	Perennial forb
<i>Lupinus perennis</i>	Wild lupine	Perennial forb
<i>Maianthemum canadense</i> <i>(Smilacina canadensis)</i>	False Solomon's seal, false spikenard, Solomon's plume	Perennial forb
<i>Maianthemum stellatum</i> <i>(Smilacina stellata)</i>	Starry false Solomon's seal, little false Solomon's seal, starflower Solomon's seal	Perennial forb

<i>Monarda fistulosa</i>	Bee balm, wild bergamot	Perennial forb
<i>Polygonatum biflorum</i>	Giant Solomon's seal, king Solomon's seal, smooth Solomon's seal, Solomon's seal	Perennial forb
<i>Rudbeckia hirta</i>	Black-eyed Susan	Biennial/Perennial forb
<i>Schizachyrium scoparium</i>	Little bluestem, broom beard grass, prairie beard grass	Perennial grass
<i>Tephrosia virginiana</i>	Goat's rue, rabbit pea	Perennial forb
<i>Tradescantia ohiensis</i>	Common spiderwort, blue-jacket	Perennial forb

Savannas on Sandy Soils- Tree Species		
Genus species	Common name(s)	Type
<i>Pinus banksiana</i> *	Jack pine	Coniferous tree
<i>Quercus alba</i>	White oak	Deciduous tree
<i>Quercus ellipsoidalis</i> *	Northern pin oak, Hill's oak	Deciduous tree
<i>Quercus macrocarpa</i>	Bur oak	Deciduous tree
<i>Quercus rubra</i> <i>(minor component)</i>	Northern red oak	Deciduous tree
<i>Quercus velutina</i> *	Black oak	Deciduous tree

*limited commercial availability

Savannas on Sandy Soils- Satellite Species		

Genus species	Common name(s)	Type
<i>Andropogon gerardii</i>	Big bluestem, turkey foot	Perennial grass
<i>Asclepias syriaca</i>	Common milkweed	Perennial forb
<i>Asclepias verticillata</i>	Whorled milkweed	Perennial forb
<i>Danthonia spicata</i>	Poverty oats, poverty grass, poverty danthonia	Perennial grass
<i>Eragrostis spectabilis</i>	Purple love grass, tumble grass	Perennial grass
<i>Euphorbia corollata</i>	Flowering spurge	Perennial forb
<i>Fragaria virginiana</i>	Wild strawberry, Virginia strawberry	Perennial forb
<i>Helianthus occidentalis</i>	Western sunflower, naked-stemmed sunflower	Perennial forb
<i>Monarda punctata</i>	Dotted horsemint	Annual/Biennial/Perennial forb
<i>Oenothera biennis</i>	Common evening primrose	Biennial/Perennial forb
<i>Panicum virgatum</i>	Switch grass	Perennial grass
<i>Penstemon grandiflorus</i>	Large-flowered beard-tongue, large penstemon, shell-leaved penstemon	Biennial/Perennial forb
<i>Pseudognaphalium obtusifolium</i> (<i>Gnaphalium</i>)	Sweet everlasting, fragrant cudweed, rabbit tobacco	Annual forb
<i>Symphyotrichum oolentangiense</i> (<i>Aster oolentangiensis</i> , <i>Aster azureus</i>)	Sky-blue aster, azure aster	Perennial forb
<i>Viola pedata</i> *	Bird's-foot violet	Perennial forb

Savannas on Sandy Soils- Shrub and Additional Satellite Species		
Genus species	Common name(s)	Type
<i>Amorpha canescens</i>	Leadplant	Perennial shrub
<i>Ceanothus herbaceous</i> (<i>C. ovatus</i>)	Prairie red root, inland New Jersey tea, Jersey tea	Perennial shrub
<i>Comptonia peregrina</i>	Sweet fern	Perennial shrub
<i>Corylus americana</i>	American hazelnut	Perennial shrub
<i>Gaylussacia baccata</i>	Huckleberry	Perennial shrub
<i>Vaccinium angustifolium</i>	Early low blueberry, low sweet blueberry, low-bush blueberry	Perennial shrub

Native Plant Species of Prairies – Sandy Soils:

Prairies on Sandy Soils - Core Species		
Genus species	Common name(s)	Type
<i>Andropogon gerardii</i>	Big bluestem, turkey foot	Perennial grass
<i>Anemone cylindrica</i>	Thimbleweed, long-headed anemone	Perennial forb
<i>Aquilegia canadensis</i>	Wild columbine, Canadian columbine, red columbine	Perennial forb
<i>Asclepias tuberosa</i>	Butterfly milkweed	Perennial forb
<i>Carex brevior</i>	Fescue sedge, plains oval sedge	Perennial sedge
<i>Carex muehlenbergii</i>	Muhlenberg's bracted sedge, Muhlenberg's sedge, sand bracted sedge, sand sedge	Perennial sedge
<i>Coreopsis palmata</i>	Prairie coreopsis, finger tickseed	Perennial forb

<i>Cyperus schweinitzii*</i>	Great Plains sand sedge, Schweinitz's cyperus, Schweinitz's flat sedge	Perennial sedge
<i>Koeleria macrantha</i>	Junegrass, prairie Junegrass	Perennial grass
<i>Lespedeza capitata</i>	Round-headed bush-clover	Perennial forb
<i>Liatris aspera</i>	Rough blazing-star	Perennial forb
<i>Lupinus perennis</i>	Wild lupine	Perennial forb
<i>Maianthemum canadense</i> <i>(Smilacina racemosa)</i>	False Solomon's seal, false spikenard, Solomon's plume	Perennial forb
<i>Maianthemum stellatum</i> <i>(Smilacina stellata)</i>	Starry false Solomon's seal, little false Solomon's seal, starflower Solomon's seal	Perennial forb
<i>Monarda fistulosa</i>	Bee balm, wild bergamot	Perennial forb
<i>Panicum virgatum</i>	Switch grass	Perennial grass
<i>Rudbeckia hirta</i>	Black-eyed Susan	Biennial/Perennial forb
<i>Schizachyrium scoparium</i>	Little bluestem, broom beard grass, prairie beard grass	Perennial grass
<i>Solidago speciosa</i>	Showy goldenrod	Perennial forb
<i>Tephrosia virginiana</i>	Goat's rue, rabbit pea	Perennial forb
<i>Tradescantia ohiensis</i>	Common spiderwort, blue-jacket	Perennial forb

Prairies on Sandy Soils – Satellite Species		
Genus species	Common name(s)	Type
<i>Anemone patens</i>	American pasque-flower	Perennial forb

<i>Artemisia campestris</i>	Beach wormwood, field sagewort	Biennial/Perennial forb
<i>Asclepias syriaca</i>	Common milkweed	Perennial forb
<i>Asclepias verticillata</i>	Whorled milkweed	Perennial forb
<i>Baptisia leucophaea</i> <i>(B. bracteata)</i>	Cream wild indigo	Perennial forb
<i>Bouteloua curtipendula</i>	Side-oats grama	Perennial grass
<i>Danthonia spicata</i>	Poverty oats, poverty grass, poverty danthonia	Perennial grass
<i>Eragrostis spectabilis</i>	Purple love grass, tumble grass	Perennial grass
<i>Euphorbia corollata</i>	Flowering spurge	Perennial forb
<i>Fragaria virginiana</i>	Wild strawberry, Virginia strawberry	Perennial forb
<i>Geum triflorum</i>	Prairie smoke, old man's whiskers	Perennial forb
<i>Helianthus occidentalis</i>	Western sunflower, naked-stemmed sunflower	Perennial forb
<i>Monarda punctata</i>	Dotted horsemint	Annual/Biennial/Perennial forb
<i>Oenothera biennis</i>	Common evening primrose	Biennial/Perennial forb
<i>Penstemon grandiflorus</i>	Large-flowered beard-tongue, large penstemon, shell-leaved penstemon	Biennial/Perennial forb
<i>Pseudognaphalium obtusifolium</i> <i>(Gnaphalium)</i>	Sweet everlasting, fragrant cudweed, rabbit tobacco	Annual forb
<i>Sporobolus heterolepis</i>	Prairie dropseed, northern dropseed	Perennial grass
<i>Symphyotrichum oolentangiense</i> <i>(Aster oolentangiensis,</i>	Sky-blue aster, azure aster	Perennial forb

<i>Aster azureus)</i>		
<i>Viola pedata*</i>	Bird's-foot violet	Perennial forb

Prairies on Sandy Soils - Shrub and Additional Satellite Species		
Genus species	Common name(s)	Type
<i>Amorpha canescens</i>	Leadplant	Perennial shrub
<i>Ceanothus herbaceous</i> (<i>C. ovatus</i>)	Prairie red root, inland New Jersey tea, Jersey tea	Perennial shrub
<i>Comptonia peregrina</i>	Sweet fern	Perennial shrub
<i>Corylus americana</i>	American hazelnut	Perennial shrub
<i>Gaylussacia baccata</i>	Huckleberry	Perennial shrub
<i>Opuntia macrorhiza</i> (<i>O. Humifusa</i>)	Plains prickly-pear cactus	Perennial shrub
<i>Vaccinium angustifolium</i>	Early low blueberry, low sweet blueberry, low-bush blueberry	Perennial shrub

For complete document visit:

<http://dnr.wi.gov/files/pdf/pubs/nh/nh0936.pdf>

APPENDIX C. CUSTOM SOIL RESOURCE REPORT

*See separate PDF file.

APPENDIX D. ARCGIS MAP PROJECTIONS