Waukesha County Land Conservancy

Aquatic Invasive Species Planning, Prevention, and Education Project

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Introduction and Purpose

The Waukesha County Land Conservancy (WCLC) owns 27 environmentally-significant properties totaling more than 2,900 acres in Waukesha County. Most of these properties contain ecologically valuable wetlands and waterways with rare plant and wildlife species.

The primary goal of the project was to develop a comprehensive aquatic invasive species (AIS) plan that prioritizes AIS control and management activities on 17 ecologically significant properties in Waukesha County. This project inventoried 10 currently managed properties and 7 additional properties that WCLC owns. This plan has since expanded to include other non-aquatic invasive species (non-AIS) to better educate and utilize interns and to gain a better understanding of the totality of the invasive species present on WCLC properties. AIS that were inventoried include: phragmites (*Phragmites australis*), Japanese knotweed (*Fallopia japonica*), purple loosestrife (*Lythrum salicaria*), glossy buckthorn (*Rhamnus frangula*), yellow flag iris (*Iris pseudacorus*), and java water dropwort (*Oenanthe javanica*). Nonaquatic invasive species inventoried include: common buckthorn (*Rhamnus cathartica*), garlic mustard *(Alliaria petiolata*), wild parsnip (*Pastinaca sativa*), honeysuckle sp. (*Lonicera* sp.), dame's rocket (*Hesperis matronalis*), crown vetch (*Coronilla varia*), common teasel (*Dipsacus fullonum*), cut-leaved teasel (*Dipsacus laciniatus*), white sweet clover (*Melilotus albus*), yellow sweet clover (*Melilotus officinalis*), Canada thistle (*Cirsium arvense*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), nodding thistle (*Carduus nutans*), and Japanese hedgeparsley (*Torilis japonica*).

Current aerials were reviewed to identify large patches of phragmites on these properties. GPS and GIS phone applications were used to survey areas. A lead biologist made site visits to wetlands, to make a qualitative assessment/sight survey and determine if further exploration is needed. If invasive species were present or suspected, a second survey was developed by the biologist based on the size of the wetland. Survey teams consisted of three surveyors. A common approach for managing invasive species is to prevent the spread into new habitats by targeting the margins of a population. Where there are a large number of reports, population density analyses can indicate where additional reconnaissance should occur. Areas that have high estimated density but have few corresponding reports suggest the need to conduct additional surveys.

These invasive species surveys were completed with the help of seven interns. These interns started the survey in the beginning of June 2017 and completed in August 2017. All interns received training from the Conservation Manager at WCLC before stepping out into the field. They received information on the properties they would be surveying along with identification materials for the invasive species they would be looking for. Field protocol, boot cleaning, and learning how to use the ArcCollector app was also included in this training. After the interns were trained on the proper protocols, they were out in the field every Tuesday and Thursday to survey the properties. To locate invasive species the interns focused on heavier traffic areas, trail systems, utility easements, known locations of invasives, and deer trails on the property.

They also focused on targeted areas identified during the in the office review by either using aerial photos or searching past property monitoring surveys.

After the data was collected, it was uploaded onto ArcGIS online using the ArcCollector app for maps to be made. The invasive species data was also uploaded onto the DNR's Surface Water Integrated Monitoring System (SWIMS) database. Before the data was uploaded, the DNR had to update their system to allow for our data to be uploaded. The SWIMS database had focused on aquatic species, while WCLC's AIS monitoring looked at a set of different species in different natural communities (not all were aquatic).

To determine the highest priority properties and the highest priority invasive species, each were given a number (tier) between 1 and 4, with 1 being the highest priority. For invasive species, this tier number was given based on the overall population size and density located in the field. Species like common buckthorn, for example, were found on every property and in high abundance, and was therefore given a tier 1 priority. This species is also controlled annually by WCLC and will continue to be for the foreseeable future. Additionally, species that have a potential for harming humans, such as wild parsnip, were given a higher tier. Property tiers were determined based on the ecological significance of the parcel or the area. For instance, if the property is classified as a State Natural Area, then it receives a higher priority tier than one that is not. Separating the properties and species into tiers helps WCLC target the properties and species that merit the greatest attention for management practices. Although these tiers were created, they are only a guideline and do not mean that the lower priority tiers will be ignored. Each property and each invasive will be monitored every year, and most species will be treated if they are considered a high priority for removal.

The outcome of this project provides WCLC with a well-constructed plan that shapes how the organization continues to monitor and manage properties for years to come. This plan will be used to help make decisions and prioritize the monitoring, treatment, management and control of AIS. This will also provide WCLC with the information needed to request contractor bids and to apply for AIS implementation grants.

WCLC will share the report, procedural documents, and training materials in a meeting with other conservation organizations such as the Ozaukee Washington Land Trust, Tall Pines Conservancy, Southeast Wisconsin Invasive Species Consortium, Friends of the Vernon Marsh, Friends of the Mukwonago River and other regional non-profit conservation organizations.

Overview of Ecological Significance

Waukesha County Land Conservancy (WCLC) owns 35 environmentally-significant properties totaling over 2,900 acres in Waukesha County. Most of these properties contain ecologically valuable wetlands and waterways with rare plant and wildlife species, which include:

Significant Animal Species

WCLC will be creating a wildlife monitoring plan for each property to better understand and manage each site. Staff and interns have already started monitoring for herptiles in ephemeral ponds, and birds are monitored by individuals or groups on a few properties.

State Threatened Species

There are a few State threatened species found on WCLC's properties which include the Blanding's turtle (*Emydoidea blandingii*), ellipse mussel (*Venustaconcha ellipsiformis*), slippershell mussel (*Alasmidonta viridis*), and the longear sunfish (*Lepomis megalotis*).

Species of Special Concern:

Some species of special concern found on WCLC's properties include the Butler's garter snake (Thamnophis butleri), pickerel frog (Lithobates palustris), four-toed salamander (Hemidactylium scutatum), elktoe (Alasmidonta marginata), round pigtoe (Pleurobema sintoxia), lake chub sucker (Erimyzon sucetta), American eel (Anguilla rostrata), least darter (Etheostoma microperca), prairie crayfish (Procambarus steigmani), digger crayfish (Fallicambarus fodiens), mudpuppy (Necturus maculosus), American bittern (Botaurus lentiginosus), and the American woodcock (Scolopax minor).

Significant Plant Species

Over the past 26 years, WCLC has focused on acquiring land to preserve, and now has shifted its focus to creating management plans and wildlife surveys to get an idea of what is important on each property. WCLC will be focusing on mapping and monitoring: rare plant species to ensure that they are healthy and thriving, invasive species for rapid response control, and wildlife for data and management techniques.

Identification of Aquatic and Nonaquatic Invasive Species That Pose a Threat to WCLC's Properties

Tier 1

Common Buckthorn

The most common invasive species found on properties was glossy and common buckthorn with the latter being the most commonly found out of the two. Common buckthorn (*Rhamnus cathartica*) is a tall understory shrub or small tree with a spreading crown that often has several stems arising from the base. It has gray to brown bark with prominent light-colored lenticels. Buckthorn has a broad environmental tolerance and as such invades many ecosystems and often chokes out native species. They tend to clump together and create dense shade, which eliminates the regeneration of tree seedlings and understory species. The easiest way to identify common buckthorn is by looking at its leaves, which are opposite and ovate or elliptic in shape with prominent veins curving toward the tip. These veins are alternative to each other (WDNR). This plant is found on the majority of WCLC properties and across the county.

Glossy Buckthorn

Glossy buckthorn (*Rhamnus frangula*) is similar to common buckthorn. It is also a tall understory shrub or small tree that often has several stems arising from the base. The veins on the leaves are opposite to each other (WDNR). Leaves are often brighter and more vibrant than common buckthorn. The distinctive difference between the two is that glossy buckthorn prefers wetlands while common buckthorn is an upland species. For this reason, WCLC considers glossy buckthorn an aquatic invasive species. Glossy buckthorn is found at Frog Hollow, Ottawa Wildlife Refuge, Geigner Preserve, Tamarack Swamp Preserve, and Hartland Marsh Preserve.

Garlic Mustard

Garlic mustard (*Alliaria petiolata*) is an herbaceous biennial. The first-year plants form a basal rosette that remains green through the winter, second year plants produce one to several flowering stems. It invades high quality upland and floodplain forests and savannas. This plant most often grows in areas with some shade and does not do well in acidic soils. Native herbaceous cover declines at sites where garlic mustard is present. The flowers of the plant are small, white, 4-petaled, abundant, and bloom throughout the spring. Seed pods are long slender capsules green in color and drying to pale brown. Inside, the seeds are small, shiny, and black. Seeds remain viable in the soil for at least 7 years (WDNR). Garlic mustard was found at the following properties: Frog Hollow, Ottawa Wildlife Refuge, Geigner Preserve, Martin's Woods, Tamarack Swamp Preserve, Weiland Preserve, Hartland Marsh Preserve, Nelson's Woods, and Marsh Hawk Preserve.

Purple Loosestrife

Purple loosestrife (*Lythrum salicaria*) is an AIS and is a wetland perennial that can grow to 3-7 feet with stems that are topped with purple flower spikes. The flowers are attached to the stem with 5-6 pink rose colored petals. Seed capsules burst when mature in July-September and spread seeds that are viable for at least 7 years. A single stem can produce 100,000-300,000 seeds per year. They prefer moist soils and shallow waters where it competes with native wetland plants. It was introduced and widely used as an ornamental plant where it escaped to nearby water ways (WDNR). Purple loosestrife was found at the following properties: Frog Hollow, Ottawa Wildlife Refuge, Hartland Marsh Preserve, Nelson's Woods, and Nagawicka Kettle Bog.

Wild Parsnip

Wild parsnip (*Pastinaca sativa*) is an herbaceous monocarpic perennial that grows as a rosette with upright leaves, persisting for at least one year. It invades prairies, oak savannas, and fens as well as roadsides, old fields, and pastures. This plant has a broad habitat tolerance and grows in dry mesic or wet habitats but does not grow in shaded areas. When sap contacts skin in presence of sunlight, it can cause severe rashes, blisters and discoloration of the skin. The flowers of this plant resemble the native golden alexander (*Zizia aurea*). They are numerous, small, 5-petaled, yellow flowers in umbels 2-6" wide at tops of stems. The flowers bloom in the late spring to midsummer and seeds remain viable in soil for 4 years (WDNR). Wild parsnip was found at Tamarack Swamp Preserve and Weiland.

Phragmites

Non-native phragmites or common reed (*Phragmites australis*) is an AIS and is a perennial wetland grass that grows 3-20' tall with dull, very slightly ridged, stiff, and hollow stems. The flowers on this plant are bushy, light brown to purple plumes that are composed of spikelets. The flowers bloom in July through September. It creates dense clones where canes remain visible in winter. This plant invades moist habitats including lake shores, river banks and roadways. It is common in disturbed areas and can tolerate brackish waters, dry conditions, and alkaline to acidic conditions. It can quickly become established with extensive rhizomes taking over underground. Phragmites alters the hydrology and wildlife habitat, increases fire potential, and shades native species. This plant spreads through root fragmentation making it difficult to control (WDNR). Phragmites was found at Martin's Woods, Minor's Homestead, Summit Bog, Nagawicka Kettle Bog, Tamarack Swamp Preserve, and Carter Family Fen.

Tier 2

Honeysuckle

Honeysuckle (*Lonicera* sp.) is native to Asia and Southern Russia. It was introduced into North America as ornamentals due to their showy flowers and fruits. It was also used for wildlife food and cover and soil erosion control. This plant invades woodlands, grazed or disturbed lands, lakeshores, forest edges, abandoned fields, pastures, roadsides, and other open upland habitats. It rapidly forms dense shrub layers in the forest understory and produces large numbers of fruit that are highly attractive to birds. It is responsible for crowding and shading out many native species and may compete for pollinators (WDNR). Honeysuckle was found at Ottawa Wildlife Refuge, Martin's Woods, Weiland Preserve, and Lakewood Farms Preserve.

Dame's Rocket

Dame's rocket (*Hesperis matronalis*) is a showy, short lived perennial or biennial. This plant invades moist and mesic woodlands, woodland edges, and along roadsides and open areas. Leaves form a basal rosette that overwinters. The flowering stalk emerges in spring with flowers that are 4-petaled that come in white, pink, or purple and bloom in spring. Abundant fruits and seeds are produced in long narrow seed pods that are constricted between seeds and break apart lengthwise at maturity (WDNR). Dame's rocket was found at Martin's Woods and Weiland Preserve.

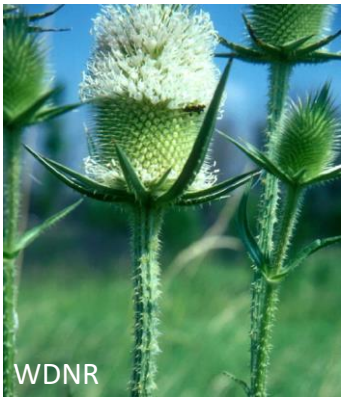
Crown Vetch

Crown vetch (*Coronilla varia*) is an herbaceous perennial in the legume family, has creeping stems that form dense colonies, and grows 2-6' long. Flowers are pea-like, range in color from pinkish to lavender to white, and are held in clusters of flat-topped umbels of 14-20 flowers. Leaves are pinnately compound, alternate, and has 11-25 elliptical hairless leaflets occurring in an odd number. Seed pods contain 3-7 narrow seeds. It is difficult to control and rapidly reproduces via rhizomes that can grow up to 10 feet per year. The seeds remain viable in the soil for more than 15 years. It prefers sunny, open areas, but also has a broad environmental tolerance and can grow in full to partial sun, is drought tolerant, and colonizes a wide range of soil types. The plant invades prairies, grasslands, dunes, floodplains, forest edges, gravel bars in waterways, agricultural lands, and roadsides. It alters native ecosystems through nitrogen fixation but has also been known to enhance soil fertility. It has been planted for erosion control and is widely distributed throughout the state (WDNR). Crown vetch was found at Marsh Hawk Preserve.

Common Teasel

Common teasel (*Dipsacus fullonum*) is an herbaceous, monocarpic perennial that grows as a basal rosette for its first year. It then forms a prickly, angled flowering stalk typically in the second or third year. It has a main bulb with hundreds of small flowers clustered around it. Common teasel has purple flowers, bracts longer than the flower heads, and has unlobed leaves. It invades open areas, prairies, savannas, and sedge meadows, as well as roadsides and disturbed areas (WDNR). Common teasel was found at Frog Hollow, Tamarack Swamp Preserve, Weiland Preserve, Nelson's Woods, and Marsh Hawk Preserve.

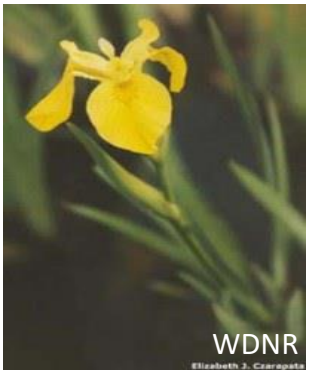
Tier 3



Cut-leaved Teasel

Cut-leaved teasel (*Dipsacus laciniatus*) is similar to common teasel with a white flower and deep-feathering leaf lobes being the main difference (WDNR). Cut-leaved teasel was only found at Frog Hollow.

Yellow Flag Iris



Yellow flag iris (*Iris pseudacorus*) is a showy perennial plant that grows in a range of conditions from drier upland sites, to wetlands, to floating aquatic mats and therefore is considered an aquatic invasive species by WCLC. A native plant of Eurasia, it can be an invasive garden escapee. It produces many seeds that can float from the parent plant, or plants can spread vegetatively via rhizome fragments. Once established it forms dense clumps or floating mats that can alter wildlife habitat and species diversity (WDNR). Yellow flag iris was found at Martin's Woods.

White Sweet Clover

White sweet clover (*Melilotus albus*) is an herbaceous biennial. First year plants do not bloom and second year plants grow into 3-5' high blooming bushes. It invades prairies, savannas, dunes, roadsides, and abandoned fields. Fire stimulates germination and therefore is not a recommended control method. First year leaves are alternate, oblong, and tri-lobed leaflets are finely toothed. Flowers are five parted, small, white, fragrant, pea-like, and closeted in dense racemes. They bloom in late spring through summer with up to 350,000 seeds per plant, and the seeds remain viable in soil up to 30 years (WDNR). White sweet clover was found at Ottawa Wildlife Refuge and Lakewood Farms Preserve.

Yellow Sweet Clover

Yellow sweet clover (*Melilotus officinalis*) is similar to its white counterpart. Its flowers bloom in the second year where they are five parted, small, yellow, fragrant, pea-like, clustered, dense racemes. The difference between yellow and white sweet clover is seen in its flowers. Yellow sweet clover is usually shorter than white sweet clover and the flowers bloom earlier than white sweet clover (WDNR). Yellow sweet clover was found in conjunction as white sweet clover on the properties of Ottawa Wildlife Refuge and Lakewood Farms Preserve.

Canada Thistle

Canada thistle (*Cirsium arvense*) is an herbaceous perennial with grooved stems that branch near the top of plant. It invades croplands, pastures, lawns, gardens, roadsides, ditches, and waste sites. Once established, it spreads quickly forming monocultures. The flowers on this plant are numerous, small and purple to pink in color. The flowers bloom from June to September and seeds shortly after blooming. The seeds are easily spread by wind dispersal. This plant invades undisturbed areas such as prairies, savannas, glades, dunes, streambanks, sedge meadows, and forest openings (WDNR). Canada thistle was found at Nelson's Woods, Lakewood Farms Preserve, and Marsh Hawk Preserve.

Tier 4

Autumn Olive

Autumn olive (*Elaeagnus umbellata*) is native to China, Japan, and Korea. This shrub can grow up to 20'. It was introduced in the US in the 1950s as it was thought to provide wildlife habitat and erosion control in environmentally disturbed areas. Autumn olive invades open and forested natural areas, as well as roadsides, agricultural fields, and other disturbed areas. It creates dense shade that reduces light availability for native plant species and alters the soil composition by adding nitrogen. This plant can be identified by its leaves that are oval and gray-green in hue with a silver-gray color on the underside. The flowers of this plant bloom in late spring and are creamy white to yellow in color and are bell-shaped. This shrub produces berries that are pink to red, and the seeds are easily dispersed by birds that eat the berries (WDNR). Autumn olive was found at Ottawa Wildlife Refuge.

Multiflora Rose

Multiflora rose (*Rosa multiflora*) was introduced from Japan as rootstock for cultivated roses. It was widely planted to curb soil erosion, as a living fence, and as food and cover for wildlife. This plant is a thorny thicket-forming shrub with wide arching or climbing canes and stiff curved thorns. Typically, this plant is more spreading than erect. They are extremely prolific and can form impenetrable thickets that exclude native plants. The leaves of this plant are alternate with 5-11 small sharply-toothed oval leaflets that are nearly smooth on upper surface and paler with short hairs on the underside. The flowers of this plant are showy white to slightly pink in color and bloom in mid to late spring. It invades open woodlands, forest edges, old fields, roadsides, savannas, and prairies. They are tolerant to a wide range of soil and environmental conditions and full or partial sun. It does best on well-drained soils (WDNR). Multiflora rose was found at Ottawa Wildlife Refuge.

Nodding Thistle

Nodding thistle (*Carduus nutans*), or musk thistle, is an herbaceous biennial. First year plants overwinter as rosettes and fully bloom in the second year. Flowering plants are 1-7' tall with multi-branched stems and invades areas like pastures, old fields, roadsides, waste areas, ditch banks, and prairies. Flowers are large, red to purple, have solitary terminal flowerheads, are usually bent over or nodding, and bloom in May through August. A single flowerhead can produce up to 1,200 seeds that are viable for 10 years (WDNR). Nodding thistle was found at Ottawa Wildlife Refuge.

Japanese Hedgeparsley

Japanese hedgeparsley (*Torilis japonica*) is an herbaceous biennial in the carrot family, with white, umbellate, paisley-like flowers. Flowering plants are branched and grow 2-6 feet tall. First year plants have low-growing parsley-like rosettes that stay green until late fall. Second year plant leaves are alternate, compound, fern-like, slightly hairy, and are generally 2-5 inches long. Flowers are tiny, white, and grow in small, open, flat-topped umbels with 2 or more bracts. Blooms in July and August. The plant produces a small fruit that is covered in hooked hairs that attach to clothing and fur. It invades forests, grasslands, hedgerows, and roadsides. Part of the reason that Japanese hedgeparsley is a tier 4 species is due to the fact that WCLC has never managed it and is not sure how to do so. In the future, while managing Japanese hedgeparsley, WCLC will be reaching out to the DNR to determine best practices for managing Japanese hedgeparsley (WDNR). Japanese hedgeparsley was found at Minor's Homestead.

Java Water Dropwort

Java water dropwort (Oenanthe javanica) is an herbaceous perennial in the carrot family. It is often grown as a ground cover plant in wetlands or in riparian habitats. This plant has large, green, pinnate, parsley-like leaves and tiny white umbel flowers that bloom in late summer or early autumn. Seeds are small and ovular and form on top of the flowering stalks. Roots can form from stem fragments that contain nodes which contributes to its ease of spreading (WDNR). Java water dropwort was not found on any WCLC properties.

Japanese Knotweed

Japanese knotweed (*Fallopia japonica*) is an herbaceous perennial that poses the most significant threat to riparian areas where it prevents tree regeneration and increases erosion. Leaves are alternate, large in size, and are spade-shaped on mature shoots and heart-shaped on young shoots. The upper-surface is dark green while the lower surface is pale green. Flowers bloom in August through September and are creamy white to greenish, small, and form erect plumes from the stem. Roots have rhizomes which contributes to its ability to spread, as well as the plants ability to resprout from plant fragments as little as a couple of inches. This plant is similar to the invasive giant knotweed and is known to hybridize with it (WDNR). Japanese knotweed was not found on any WCLC properties.

Aquatic and Nonaquatic Plant Management Goals and Objectives

Goal: Develop an invasive species management program.

- **Objective**: Create an invasive species inventory for 17 properties by staff, contractor, interns, and volunteers.

These invasive species surveys were completed with the help of seven interns. These interns started the survey in the beginning of June 2017 and completed in August 2017. All interns received training from the Conservation Manager at WCLC before stepping out into the field. They received information on the properties they would be surveying along with identification materials for the invasive species they would be looking for. Field protocol, boot cleaning, and learning how to use the ArcCollector app was also included in this training. After the interns were trained on the proper protocols, they were out in the field every Tuesday and Thursday to survey the properties. To locate invasive species the interns focused on heavier traffic areas, trail systems, utility easements, known locations of invasives, and deer trails on the property. They also focused on targeted areas identified during the in the office review by either using aerial photos or searching past property monitoring surveys. The results of the survey can be seen in the updated maps with locations of invasive species marked via points or polygons, and it also tracked on our online GIS system.

- **Objective**: Enhance and update the current GIS system to inventory and monitor AIS.

The completed AIS survey by WCLC's interns and staff resulted in an updated GIS database through point and polygon data collection using the ArcCollector application. This data will serve as reference for comparing both previous and following years invasive species monitoring data to track changes in size of invasive species populations and ultimately make decisions for further management of those populations. The system was also enhanced to be more efficient, accessible, and user-friendly for staff and interns by creating a single map to input, export, and view all data. This system will continue to be used and improved to further track invasive species populations.

- **Objective**: Enhance and update inventory protocol and procedural documents for education/training of staff, interns, volunteers, and committee members.

WCLC's staff created training materials and training binders containing information about field protocol, proper monitoring strategies, using the ArcCollector app, identification keys for invasive species, and boot and equipment cleaning information. A presentation was also created that provided more information about the various invasive species as well as provided them with a field guide for invasive identification and pertinent property information. All of these materials and training sessions that have been held has helped to develop and improve a systematic training regimen for not only future AIS monitoring, but has served as reference for

training in other areas of the ever-expanding WCLC. Training materials and knowledge are undergoing continual improvements through WCLC's collaboration and gained knowledge from Land Management Committee Members, partnering land trusts and organizations, and by attending educational land management events. These materials will be available on WCLC's website in the future.

- **Objective**: Develop a comprehensive AIS and non-AIS management plan for WCLC properties

A comprehensive AIS plan has been created that includes the specifications outlined within WCLC's proposal. All properties and AIS have been classified as Tier 1-4 with descriptions and reasoning for their given tier. Maps showing locations of AIS have been generated using data collected in the field. Various control and treatment methods are described and contrasted in the Aquatic Plant Management Alternatives section. Cost estimates are outlined in the Project Cost Estimates section.

- **Objective**: Hold education workshop for partners and public

WCLC has attended the Wisconsin Wetlands Association conference and the Southeastern Wisconsin Invasive Species Consortium educational symposium where information about aquatic invasive species and the WCLC AIS Planning, Prevention and Education project were distributed. AIS interns were educated and were provided documents for identification of both aquatic and nonaquatic invasive species. They were also instructed on the function and use of data collection tools to monitor and map populations of invasive species. Overall, 7 volunteers were successfully recruited and 20+ individuals were educated. WCLC will be placing links to all educational materials, maps and documents of AIS inventories, owned and easement monitoring training packets, and the AIS management plan on the WCLC website.

Public Access and Use of WCLC Properties

Public access is allowed on a number of WCLC's properties including Martin's Woods, Nagawicka Kettle Bog, Nelson's Woods, Ottawa Wildlife Refuge, Summit Bog, Tamarack Preserve, Weiland, Wilson Wood Duck, and many others. These properties are open to light recreational use such as hiking, bird watching, environmental studies, nature appreciation, and fishing. Any use of the properties that degrade the land is not allowed. Below is a more detailed description of allowed use on each property.

Hunting

Hunting is allowed on Summit Bog, Genesee Lake Road Tamarack, Davis, the southern parcel of Ottawa, and Carter Family Fen. It is also allowed on Ottawa Wildlife Refuge and the Scuppernong Wetlands portion of Nelson's Woods through a permit lottery system. Hunters must follow all DNR and local laws and regulations for hunting. WCLC plans to improve access to properties for hunters where hunting is allowed.

Public Use

All WCLC owned properties are open to the public for hiking, nature study, and bird watching. Some properties are surrounded by neighborhoods and are used more often than those in rural areas of the county.

Property Characteristics

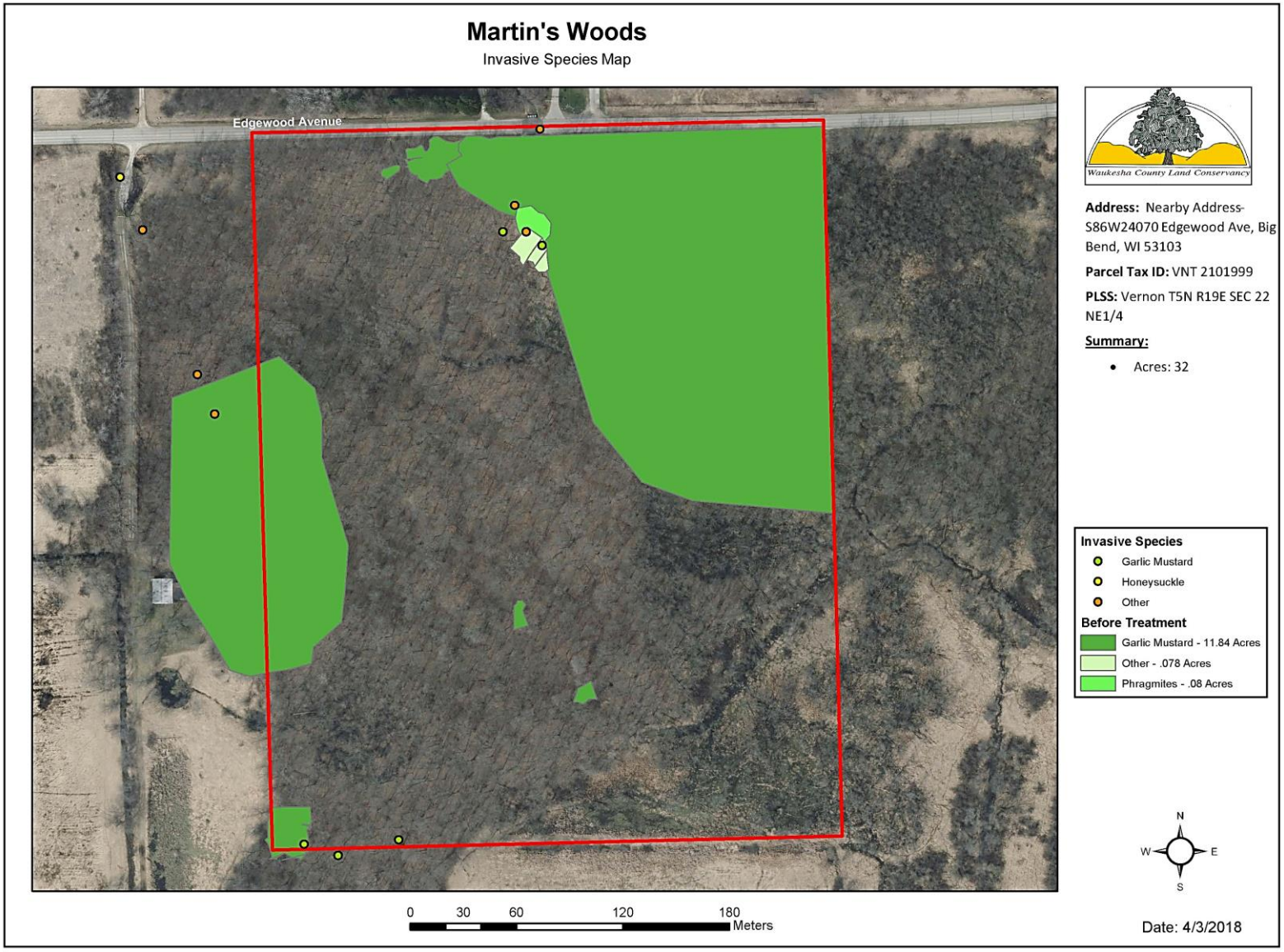
Currently Managed

Tier 1

1. *Martin's Woods*

Martin's Woods is in Big Bend, WI and was the first property protected by WCLC. As it is the only State Natural Area that WCLC owns, it is a high priority property to manage. Within the 32 acres, it is comprised of three types of wetlands, two threatened plants, nine special concern plants, and 20 uncommon plants. Native to the property are 249 species, including the beautiful prairie, nodding, and large-flowered trillium. Blue-spotted salamanders, snakes, and important bird species can also be found on the property.

The invasive species found on Martin's Woods are tier 1 species garlic mustard, common buckthorn, glossy buckthorn, and phragmites, tier 2 species honeysuckle and dame's rocket, and tier 3 species yellow flag iris. The phragmites on this property has already undergone two treatments, and the remaining 0.08 acres will possibly undergo a third treatment in 2019 if necessary for control. A total of 11.84 acres of garlic mustard were found and will be hand pulled by interns and volunteers, which was already started in spring 2018. Buckthorn species are scattered throughout the property and will also be pulled or cut by interns and volunteers. Although yellow flag iris is a lower priority species, it is located on high priority property, and will be treated next year. The tier 1 and 2 management strategies for these species can be found under the Aquatic Plant Management Alternatives section of the document, found on page 35.


Martin's Woods
Invasive Species Map
Edgewood Avenue
Waukesha County Land Conservancy
Address: Nearby Address- S86W24070 Edgewood Ave, Big Bend, WI 53103
Parcel Tax ID: VNT 2101999
PLSS: Vernon T5N R19E SEC 22 NE1/4
Summary:
Acres: 32
Invasive Species
Garlic Mustard
Honeysuckle
Other
Before Treatment
Garlic Mustard - 11.84 Acres
Other - .078 Acres
Phragmites - .08 Acres
N
W
E
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0 30 60 120 180
Meters
Date: 4/3/2018

Figure 1

2. Nelson's Woods

Covering 114 acres in the town of Ottawa, Nelson's Woods is the fourth property obtained by WCLC. The property includes Scuppernong Creek ranked as an AQ-1, several ponds, and wetlands, making this area an excellent habitat for herptiles, birds and other waterfowl, particularly the great blue heron. A variety of trees also decorate the property, including several species of Oak, Shagbark hickory, and Black cherry. Rarely seen this far south, the Yellow birch tree inhabits the forested area as well. Vegetation native to the land are dutchman's breeches, skunk cabbage, and marsh marigold. This site encompasses Nelson Oak Woods and Wetlands, a 91-acre NA-3 State Natural Area, which contains disturbed oak woods and adjacent lowlands containing sedge meadow and tamarack relict bordering the Bark River. This site contains ecologically significant dry mesic oak woods, ephemeral ponds, marsh, and the high-quality Scuppernong Creek.

The invasive species found on Nelson's Woods are common buckthorn, common teasel, garlic mustard, purple loosestrife, and Canada thistle. Every species is a tier 1 invasive except for Canada thistle which is a tier 3. As Nelson's Woods is a high priority property, all these invasive species will be treated. 21.74 acres of garlic mustard were found, which makes this area great for volunteer garlic mustard pulling work days. 16.044 acres of common buckthorn were found, along with 3.025 acres of Canada thistle which will all be treated in the coming years.

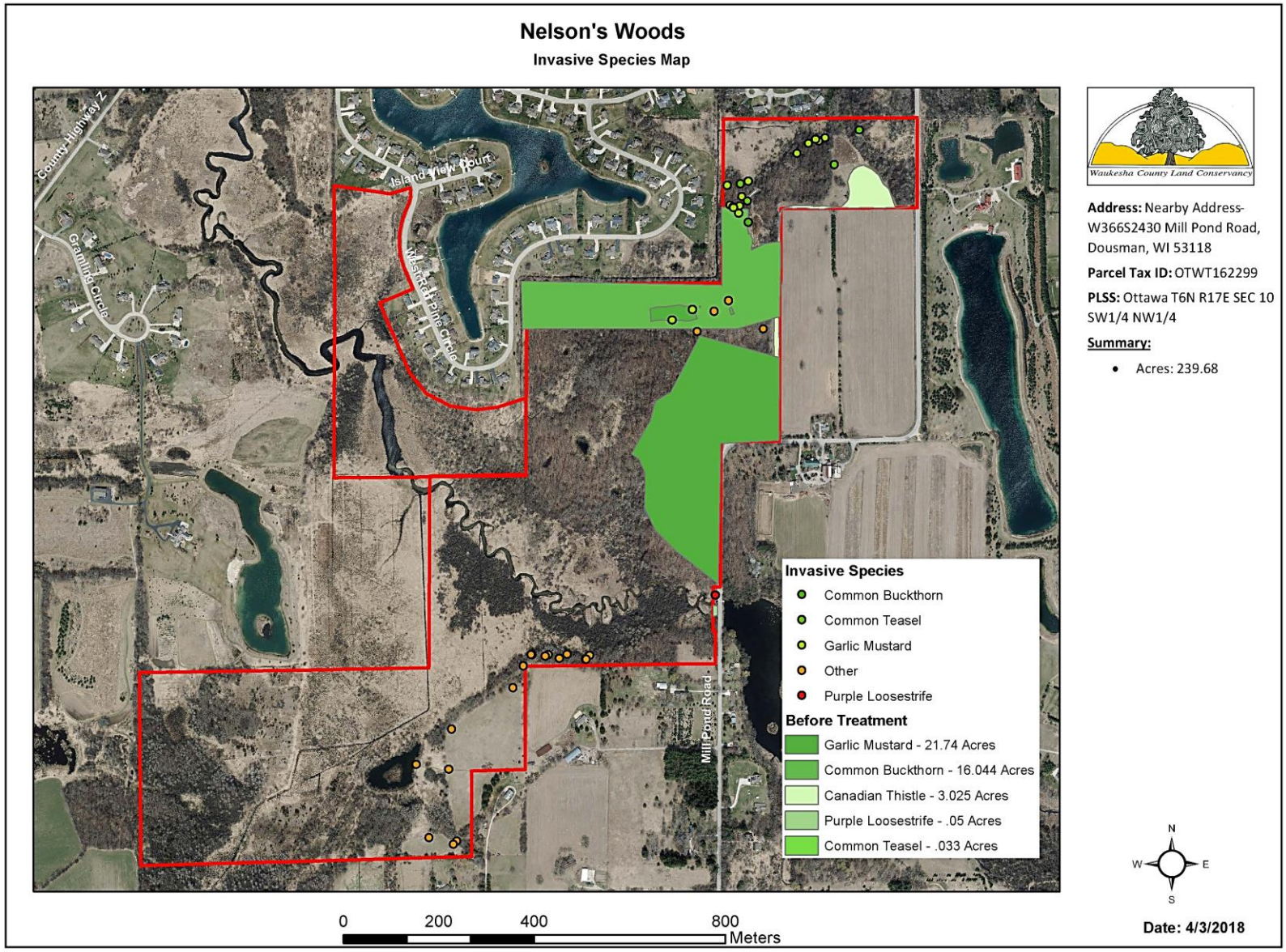

Nelson's Woods
Invasive Species Map
County Highway Z
Island View Court
Granlund Circle
Mill Pond Road
Waukesha County Land Conservancy
Address: Nearby Address- W366S2430 Mill Pond Road, Dousman, WI 53118
Parcel Tax ID: OTWT162299
PLSS: Ottawa T6N R17E SEC 10 SW1/4 NW1/4
Summary:
Acres: 239.68
Invasive Species
Common Buckthorn
Common Teasel
Garlic Mustard
Other
Purple Loosestrife
Before Treatment
Garlic Mustard - 21.74 Acres
Common Buckthorn - 16.044 Acres
Canadian Thistle - 3.025 Acres
Purple Loosestrife - .05 Acres
Common Teasel - .033 Acres
N
W
E
S
0
200
400
800
Meters
Date: 4/3/2018

Figure 2

3. Wilson Wood Duck

Located in the city of Oconomowoc, Wilson Wood Duck is a 60-acre wetland complex in the Bark River watershed. This property is composed of deep marshes, bogs, and sedge meadows with a 3.5-acre pond. On this pond is a floating mat that is dominated by moss, sedges and rushes. Present are typical southern Wisconsin bog plants, including leatherleaf, pitcher plant, roundleaf sundew, bog bean, wild cranberry and poison sumac. Cattails cover much of the mat. This property has been classified as a NA-3 and Class I Wildlife Habitat by SEWRPC.

The invasive species present at Wilson Wood Duck Sanctuary are tier 1 species common buckthorn and purple loosestrife and tier 2 species honeysuckle. As a tier 1 property with only high priority invasive species present, all invasive species will be managed. The common buckthorn and honeysuckle on the site previously underwent 21.85 acres of treatment and is being monitored for follow-up treatment. 0.96 acres of purple loosestrife is found on the property, and may be treated with the use of beetles.

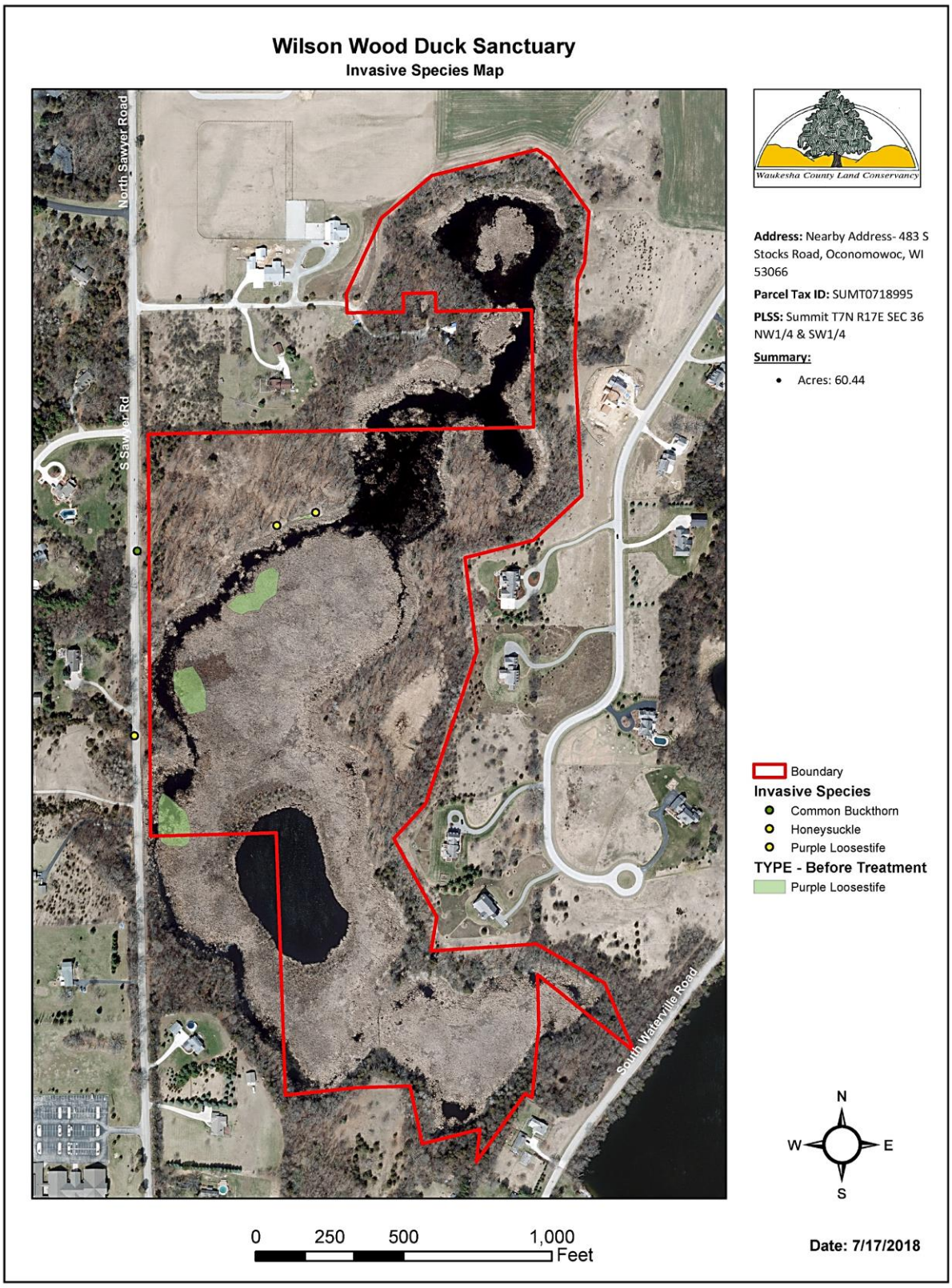

Wilson Wood Duck Sanctuary
Invasive Species Map
North Sawyer Road
S Sawyer Rd
South Waterville Road
Waukesha County Land Conservancy
Address: Nearby Address- 483 S Stocks Road, Oconomowoc, WI 53066
Parcel Tax ID: SUMT0718995
PLSS: Summit T7N R17E SEC 36 NW1/4 & SW1/4
Summary:
Acres: 60.44
Boundary
Invasive Species
Common Buckthorn
Honeysuckle
Purple Loosestife
TYPE - Before Treatment
Purple Loosestife
N
W
E
S
0
250
500
1,000
Feet
Date: 7/17/2018

Figure 3

4. Ottawa Wildlife Refuge

Designated as a Significant Natural Area, the 350-acre Ottawa Wildlife Refuge provides a critical link in the same corridor containing Scuppernong Creek Preserve and Nelson's Woods, and two other Waukesha County Land Conservancy sites. It provides feeding and nesting habitat for several uncommon woodland bird species including the veery, the Nashville warbler, the blue-gray gnatcatcher and northern water thrush. The refuge has numerous oval drumlin hills which contributes to the geological significance of the property. Over half of the preserve was once the bottom of a large shallow glacial lake but is now a thriving wetland. This property is difficult to navigate due to its size, the dense forests of buckthorn, and wetland areas.

The invasive species found are tier 1 species of common buckthorn, glossy buckthorn, garlic mustard, and purple loosestrife, tier 2 honeysuckle, tier 3 sweet clover, Canada thistle, and tier 4 nodding thistle, multiflora rose, and autumn olive. As this property is a tier 1 priority, all four tiers of invasive species will be treated. However, the tier 1 and 2 species will take priority over the 3-4 tier species. Common buckthorn has already undergone some treatment, leaving 23.75 acres to be treated again. Garlic mustard, honeysuckle, and Canada thistle were also mapped and will undergo treatment.

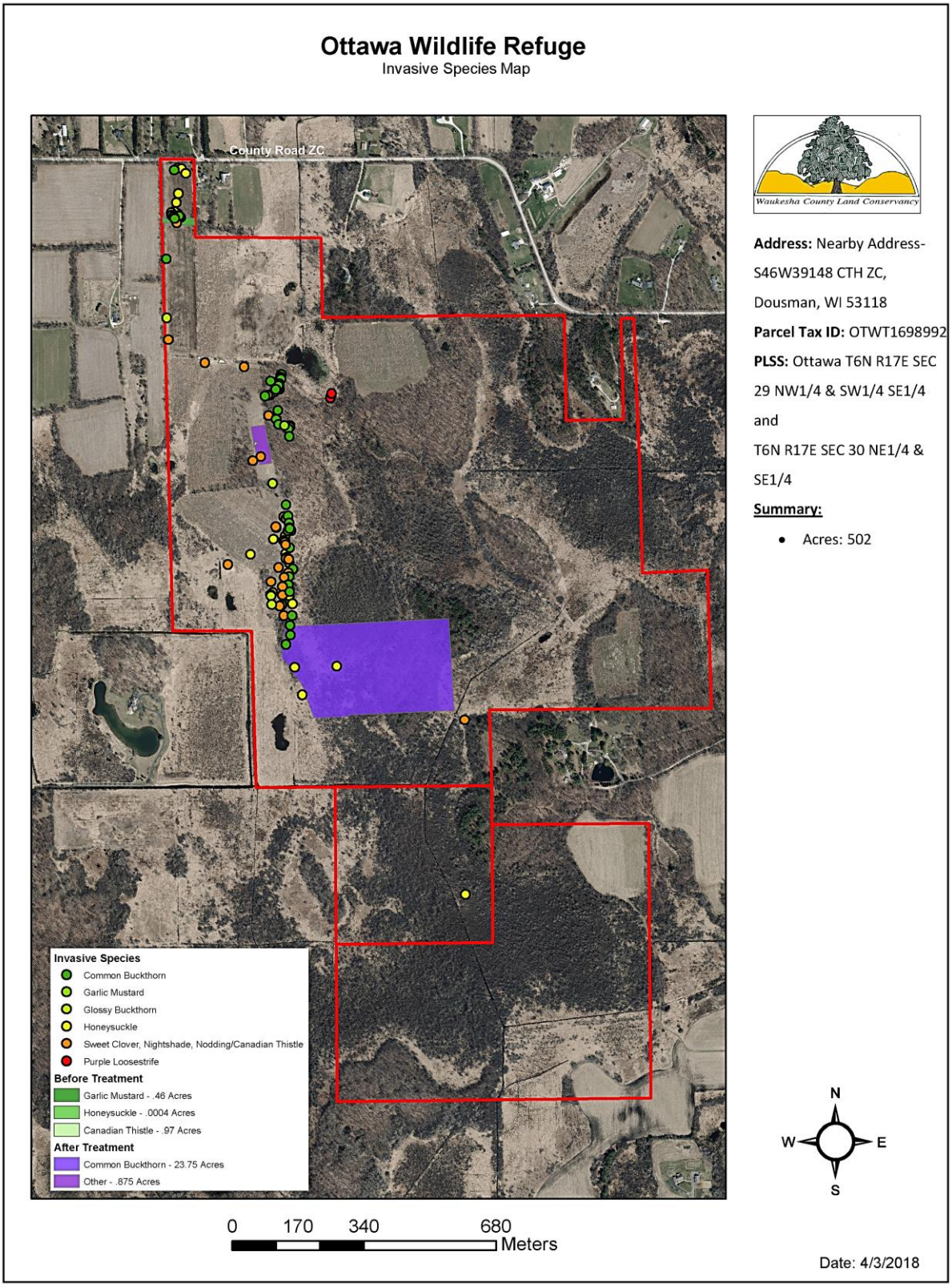

Ottawa Wildlife Refuge
Invasive Species Map
County Road ZC
Waukesha County Land Conservancy
Address: Nearby Address- S46W39148 CTH ZC, Dousman, WI 53118
Parcel Tax ID: OTWT1698992
PLSS: Ottawa T6N R17E SEC 29 NW1/4 & SW1/4 SE1/4 and T6N R17E SEC 30 NE1/4 & SE1/4
Summary:
Acres: 502
Invasive Species
Common Buckthorn
Garlic Mustard
Glossy Buckthorn
Honeysuckle
Sweet Clover, Nightshade, Nodding/Canadian Thistle
Purple Loosestrife
Before Treatment
Garlic Mustard - .46 Acres
Honeysuckle - .0004 Acres
Canadian Thistle - .97 Acres
After Treatment
Common Buckthorn - 23.75 Acres
Other - .875 Acres
N
W
E
S
0 170 340 680
Meters
Date: 4/3/2018

Figure 4

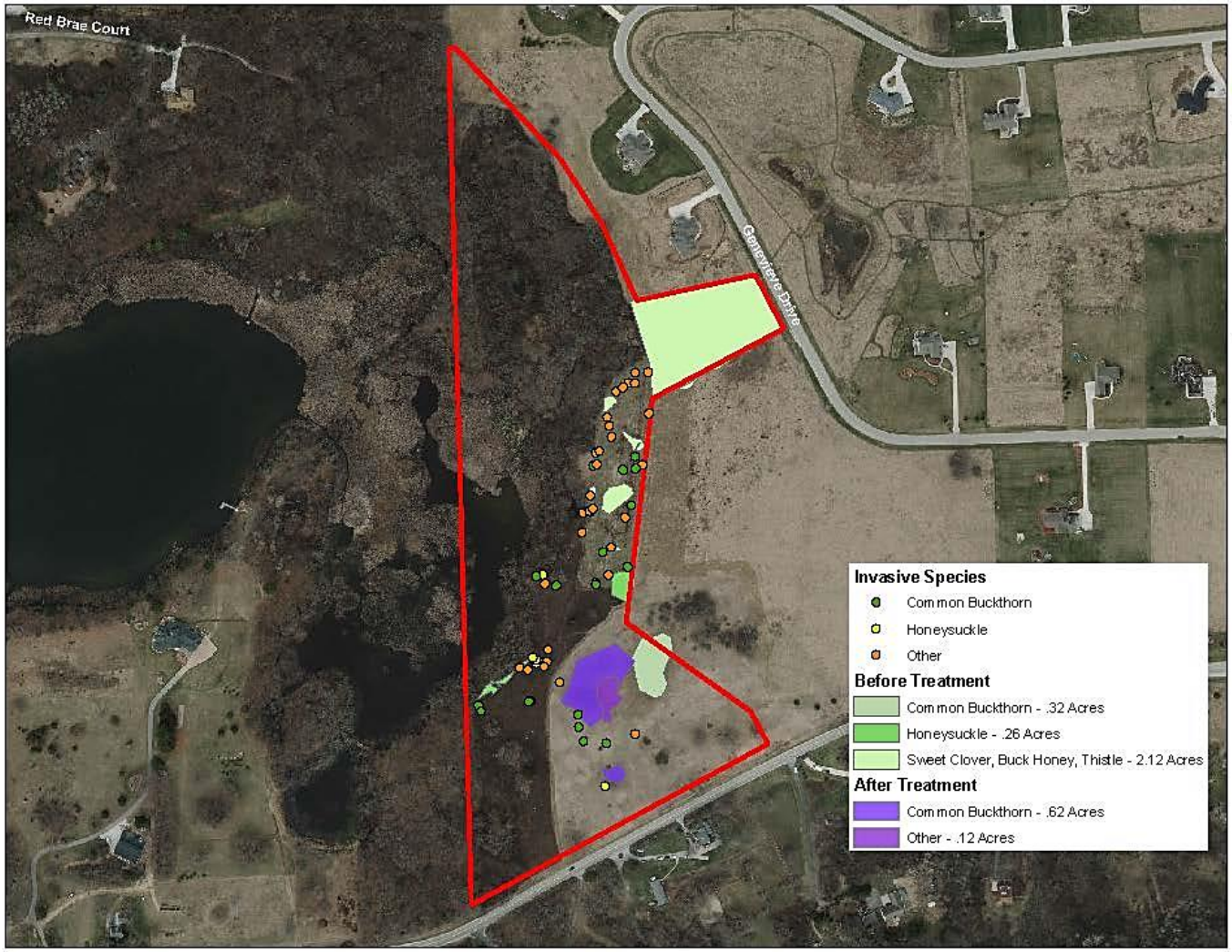
5. Lakewood Farms Preserve

In the town of Mukwonago, this parcel lies within the watershed of the pristine Mukwonago River. Its preservation will help to ensure the water quality of the river while also protecting wetlands and steep wooded slopes on the shore of a small lake plus a field that the Conservancy has begun to restore to an oak opening. Woodland birds that are uncommon to Waukesha County found here include the pileated woodpecker and orchard oriole. A mating pair of grasshopper sparrows, an uncommon prairie species, has also been seen here.

The invasive species found on Lakewood Farms Preserve include tier 1 species common buckthorn, tier 2 species honeysuckle, tier 3 species sweet clover and Canada thistle, and tier 4 species nodding thistle. Due to this property being a high priority, tier 1-4 plant species will be managed. The 0.62 acres of common buckthorn have already undergone a treatment, which will undergo another round of treatment along with the other 0.32 acres found. There was 0.26 acres of honeysuckle, and 2.12 acres combined of sweet clover, honeysuckle, and thistle mapped which will all be treated.

Lakewood Farms Preserve

Invasive Species Map



Waukesha County Land Conservancy

Address: Nearby Address: W33359955 Genevieve Drive, Mukwonago, WI 53149

Parcel Tax ID: MUKT1992034

PLSS: Mukwonago T5N R18E SEC 30 & SEC 29- NE1/4 & SE1/4 & SW1/4

Summary:

- Acres: 24.88

Date: 10/24/2017

Figure 5
26

6. Davis Nature Preserve

Located in the Town of Mukwonago, the Davis Nature Preserve is a 52-acre old agricultural field. On the property are upland habitats and former adjacent wetlands. The land is comprised of 5 acres of existing floodplain forest wetlands and 47 acres of former wetlands that were ditched and drained for agriculture in in the 1950s. WCLC was awarded an $886,000 In Lieu Fee grant from the Wisconsin Department of Natural Resources to restore the property back to a high-functioning wetland, with plant communities of wooded wetland, sedge meadow, wet/wet-mesic prairie, and mesic prairie. The restoration will allow for 10 years of strict monitoring and performance standards outlined by the US Army Corps of Engineers.

Large amounts of invasive species are present on the property with the most prevalent being glossy buckthorn. Due to the grant received for restoration of this property, present invasive species are under a strict regimen of various treatments. For this reason, AIS interns entered AIS other than glossy buckthorn as “other” to ease data collection.

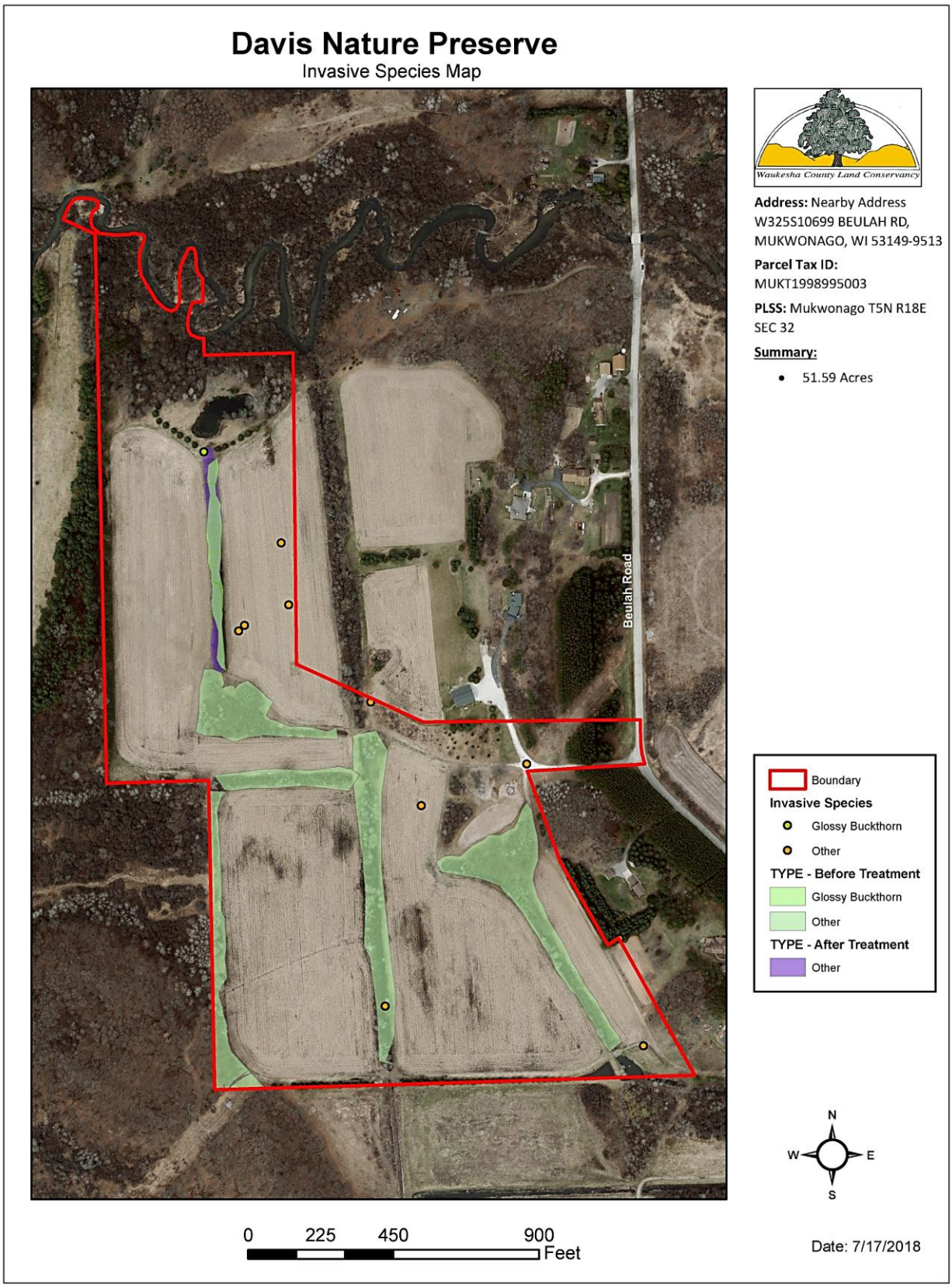

Davis Nature Preserve
Invasive Species Map
Waukesha County Land Conservancy
Address: Nearby Address
W325S10699 BEULAH RD,
MUKWONAGO, WI 53149-9513
Parcel Tax ID:
MUKT1998995003
PLSS: Mukwonago T5N R18E
SEC 32
Summary:
51.59 Acres
Beulah Road
Boundary
Invasive Species
Glossy Buckthorn
Other
TYPE - Before Treatment
Glossy Buckthorn
Other
TYPE - After Treatment
Other
N
W
E
S
0
225
450
900
Feet
Date: 7/17/2018

Figure 6

Tier 2

7. Tamarack Swamp Preserve

Located in the Village of Menomonee Falls, Tamarack Swamp Preserve is a 147-acre site acquired by WCLC in 2004. The property is described as a birders heaven, hosting a variety of species including woodcock, several types of hawks and sparrows, nesting woodpeckers, and flycatchers. Tamarack Swamp Preserve also protects beech trees, which are rare this far west, as well as ephemeral ponds and the threatened Butler's garter snake. SEWRPC ranked this property as an NA-2 and Class I Wildlife Habitat. It is an extensive wetland complex with only a few of the once-dominant tamaracks remaining. The site is comprised of lowland hardwoods, shrub-carr, alder thicket, sedge meadow, and shallow marsh. Creation of ditches and highway construction have resulted in altered water levels. Because of its large size, Tamarack Swamp Preserve remains a significant undeveloped natural area.

The invasive species found on the Tamarack Swamp property include tier 1 species glossy buckthorn, common buckthorn, garlic mustard, phragmites, and wild parsnip, and tier 2 species common teasel. Phragmites has been treated for multiple years in two locations on this property, and a few individuals were found that will undergo further treatment. This property is used by neighbors, so the 0.67 acres of wild parsnip will be treated in a timely manner due to the danger they pose to humans.

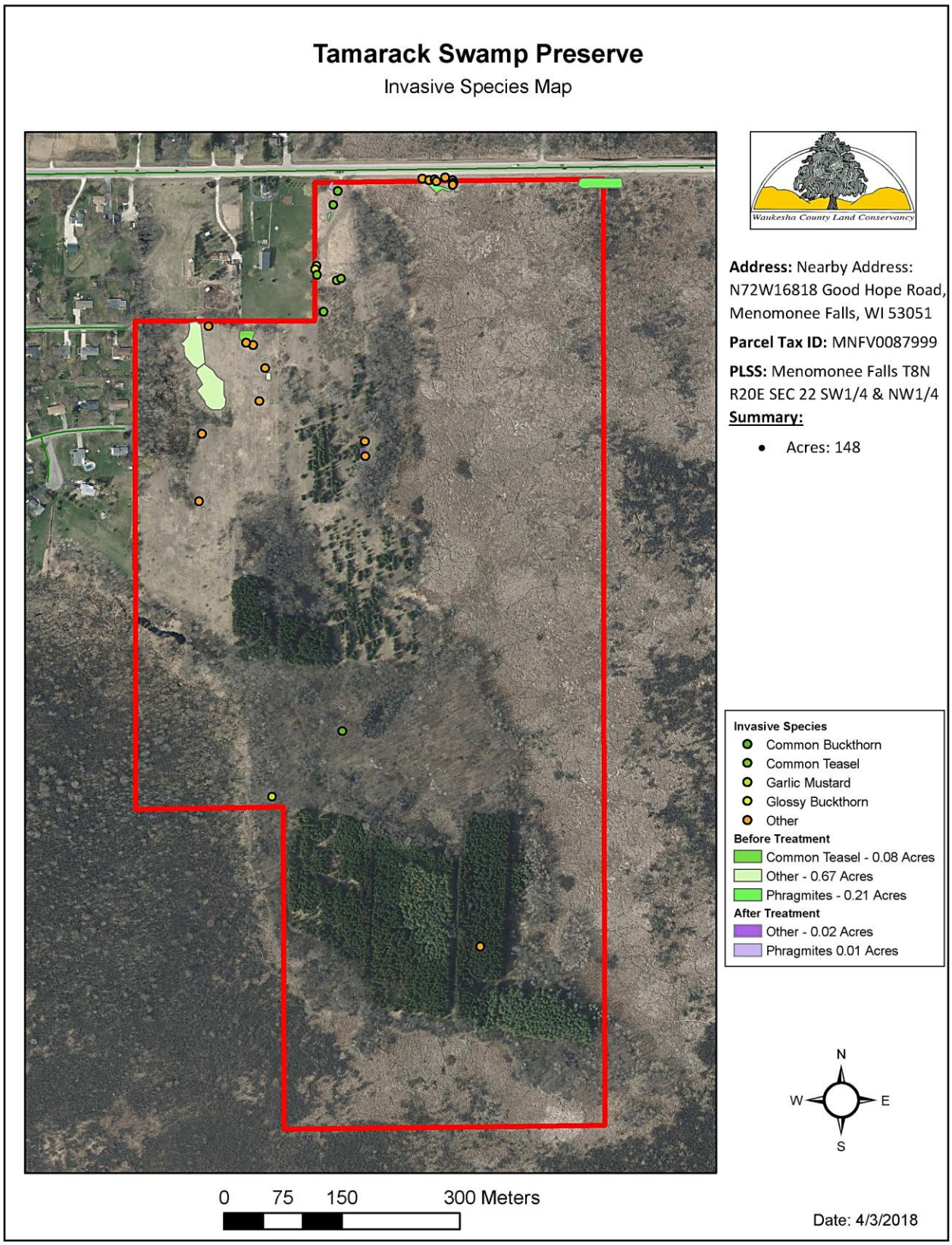

Tamarack Swamp Preserve
Invasive Species Map
Waukesha County Land Conservancy
Address: Nearby Address: N72W16818 Good Hope Road, Menomonee Falls, WI 53051
Parcel Tax ID: MNFV0087999
PLSS: Menomonee Falls T8N R20E SEC 22 SW1/4 & NW1/4
Summary:
Acres: 148
Invasive Species
Common Buckthorn
Common Teasel
Garlic Mustard
Glossy Buckthorn
Other
Before Treatment
Common Teasel - 0.08 Acres
Other - 0.67 Acres
Phragmites - 0.21 Acres
After Treatment
Other - 0.02 Acres
Phragmites 0.01 Acres
N
W
E
S
0 75 150 300 Meters
Date: 4/3/2018

Figure 7

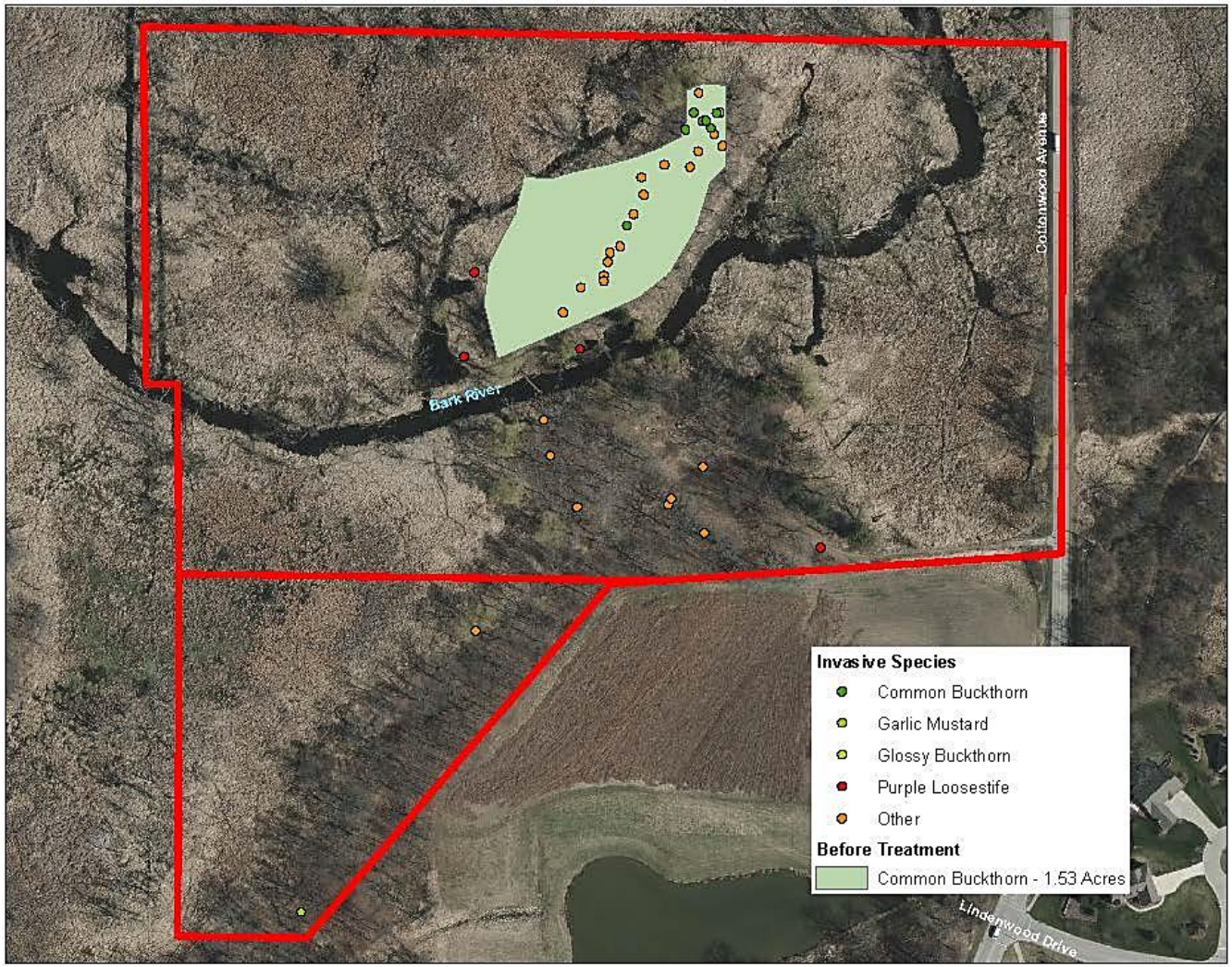
8. Hartland Marsh Preserve

Located in the Village of Hartland, the entire Hartland Marsh Preserve spreads across 180 acres which are protected by WCLC in partnership with the Ice Age Trail Alliance and the Village of Hartland. The Bark River meanders throughout the protected area. Ranked as a Class I Wildlife Habitat and an AQ-1 by SEWRPC, this local treasure preserves ancient bur oak trees and provides a vital habitat for birds and various woodland animals, including species of mink and turtles. The property is open for bird watching and nature study especially by local schools who use this location for educational experiences.

The invasive species found on the Hartland Marsh property are all tier 1 species: common buckthorn, glossy buckthorn, garlic mustard, and purple loosestrife. Only individual plants of purple loosestrife were found on WCLC's parcel which will be pulled in 2019. The Bark River has a history of Japanese knotweed, but none were found in WCLC's stretch of the river. Yearly monitoring will include surveying for any Japanese knotweed on this property.

Hartland Marsh Preserve

Invasive Species Map



Waukesha County Land Conservancy

Address: Nearby Address: 210 Cottonwood Avenue, Hartland, WI 53029

Parcel Tax ID: HAV 0757998 & HAV 0732994

PLSS: Delafield T7N R18E

Summary:

- Acres: 27.48

Date: 10/24/2017

Figure 8
32

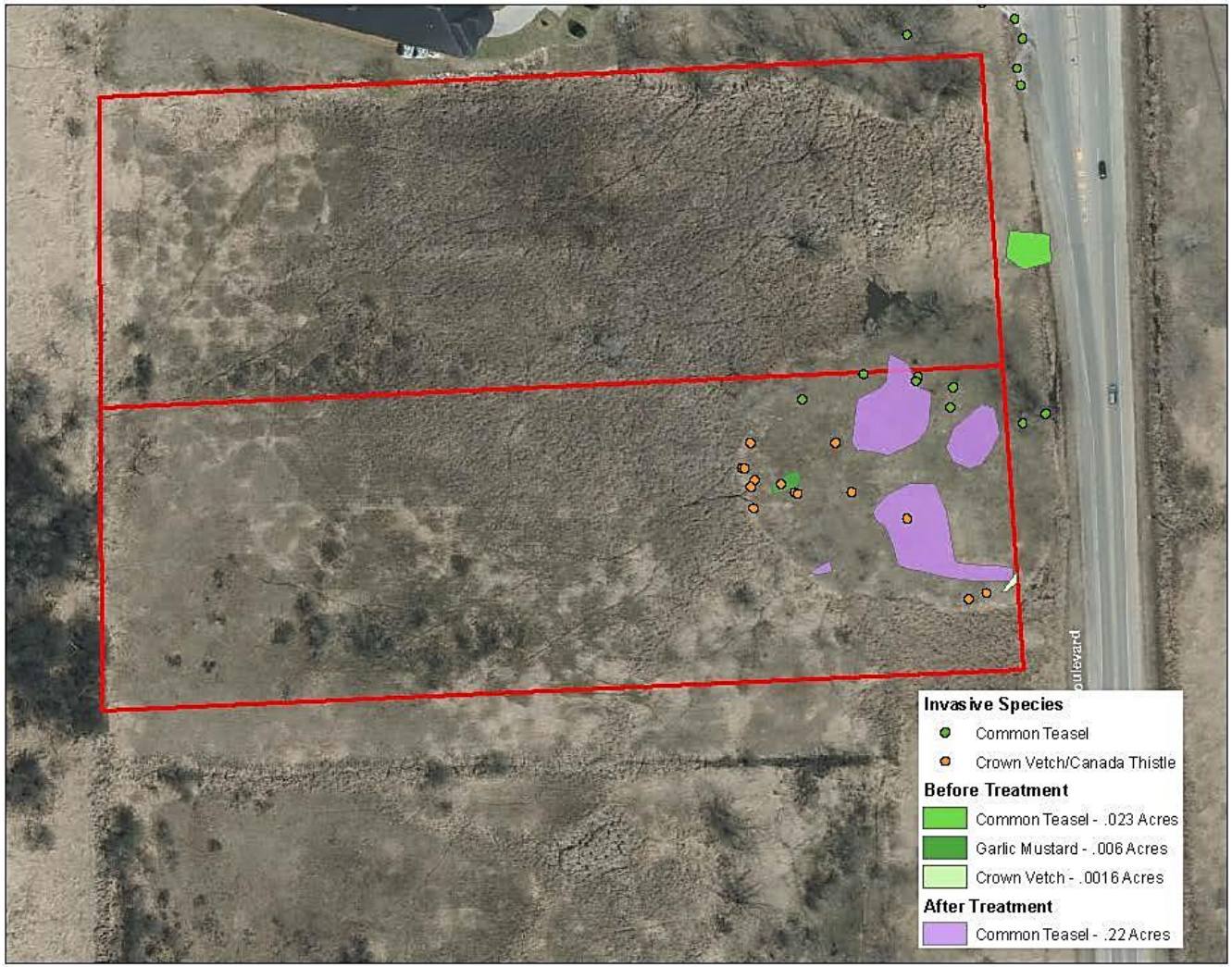
9. Marsh Hawk Preserve

Marsh Hawk Preserve is a 9-acre property in Pewaukee. This property is a Class I Wildlife Habitat that contains fresh wet meadow, shallow marsh, and shrub-carr natural communities. Historically, this property was agricultural land, but when the drainage system failed it was abandoned and succeeded to a wetland. Wildlife found on this property include waterfowl, marsh birds, fox, and coyotes.

The invasive species found on the Marsh Hawk property include tier 1 species garlic mustard, tier 2 species common teasel and crown vetch, and tier 3 species Canada thistle. 0.22 acres of common teasel has been treated once on this property and will be undergoing a second treatment, and 0.023 acres of recently discovered teasel will begin treatment. As a tier 2 property, all invasive species will be treated for.

Marsh Hawk Preserve

Invasive Species Map



Waukesha County Land Conservancy

Address: Nearby Address- 600 College Ave, Pewaukee, WI 53072

Parcel Tax ID: PWV0928981003 & PWV 0928981005

PLSS: Pewaukee T7N R19E SEC 16 SE1/4

Longitude: -88.253904

Latitude: 43.066742

Summary:

- Acres: 9

N
W E
S

Date: 10/24/2017

Figure 9

Tier 4

10. Weiland Preserve

This 14.62-acre property was donated to WCLC by MMSD. There are several species present on the property that are noteworthy including chorus frogs and wood frogs which are species of special concern. Weiland is home to a variety of beautiful bird species including the cedar waxwing, red-winged blackbird, red-tailed hawk, mallard, chickadees, nuthatches, and cardinals. Perhaps the most important aspect of this site is the presence of the rarest species of crayfish in Wisconsin, the Digger crayfish, in the ephemeral ponds.

The invasive species found at Weiland Preserve include tier 1 species common buckthorn, garlic mustard, and wild parsnip, and tier 2 species honeysuckle, dame's rocket, and common teasel. As a tier 2 property with only high priority invasive species present, all invasive species will be managed for either with volunteers or contractors.


Weiland Preserve
Invasive Species Map
White Oak Circle
St Regis Drive
Roosevelt Drive
St Francis Drive
Nearby Address: N91W17782 St Regis Dr. Menomonee Falls, WI 53051
Parcel Tax ID: MNFV0013988004
PLSS: Menomonee Falls T8N R20E SEC 4 E1/2
Longitude: -88.131713
Latitude: 43.184214
Summary:
Acres: 14.6
Invasive Species TYPE
Common Buckthorn
Common Teasel
Garlic Mustard
Honeysuckle
Other
Before Treatment
Other - 0.004
N
W
E
S
0 25 50 100 150
Meters
Date: 1/30/2018

Figure 10

Not Currently Managed

Tier 2

1. *Minor's Homestead*

Minor's Homestead is a 50.825-acre property in the Village of Mukwonago. It is a remnant parcel of primarily low-lying wetlands with areas of small ponds and a small, flowing stream. Significant numbers of water-loving species are present including red-osier dogwood, cattail, and others. Larger trees including some hardwoods are also present in higher elevated areas. The property is interrupted by the presence of a small single-family residence located in the southern portion of the property. The property is located within a larger primary environmental corridor.

The invasive species found on Minor's Homestead include the tier 1 species phragmites, and the tier 4 species Japanese hedgeparsley. The phragmites on this property is not yet managed, and treatment will need to be shared with the Home Owners Association of the surrounding neighborhood.

Minor's Homestead

Invasive Species Map

Waukesha County Land Conservancy

Address: Nearby Address: 770 Eagle Lake Avenue, Mukwonago, WI 53149

Parcel Tax ID:

MUKV1977088

PLSS: Mukwonago T5N R18E SEC 27 NE1/4 & NW1/4

Summary:

- Acres: 50

Invasive Species
- Japanese Hedge Parsely
- Phragmites

N
W E
S

0 50 100 200 300 Meters

Date: 1/30/2018

Figure 11

Tier 3

2. Frog Hollow

Frog Hollow is a 30-acre environmental corridor located in the City of Delafield next to the Lake Country Trail as it runs along the south end of Nagawicka Lake. Half of the Frog Hollow property is a spring-fed pond that allows high quality water to flow into the lake. The pond and surrounding marsh contain most of the species of fish found in the Nagawicka Lake and serve as a nursery for young panfish and as an important spawning site for northern pike. Shorebirds, ducks and song birds use Frog Hollow for feeding and nesting and as a stop-over site during fall and spring migrations. This property is surrounded by a residential area, and as Frog Hollow is open to the public, it sees considerable human usage. Due to this disturbance, the spread of invasive species is more prevalent on this property. To help stop the spread of invasive species, a pamphlet will be sent out to the neighbors explaining how to identify and stop the spread of invasive species.

The invasive species found on the Frog Hollow property include tier 1 species glossy buckthorn, garlic mustard, and purple loosestrife, tier 2 species common teasel, and tier 3 species cut-leaved teasel. As Frog Hollow is a tier 3 property, it will be considered for treatment of its invasive species depending on available funds. The glossy buckthorn is quite impenetrable throughout the property.

Frog Hollow

Invasive Species Map

Waukesha County Land Conservancy

Address: 106 Muir Valley Rd.

Parcel Tax ID: DELC0797944002

PLSS: Delafield T7N R18E SEC 21 NW1/4

Summary:

- Acres: 29.88

Invasive Species

- Common Teasel
- Cutleaf Teasel
- Garlic Mustard
- Glossy Buckthorn
- Purple Loosestrife
- Other

Before Treatment

- Garlic Mustard - .083 Acres
- Other - .063 Acres

N W E S

0 40 80 160 240 Meters

Date: 4/3/2018

Figure 12

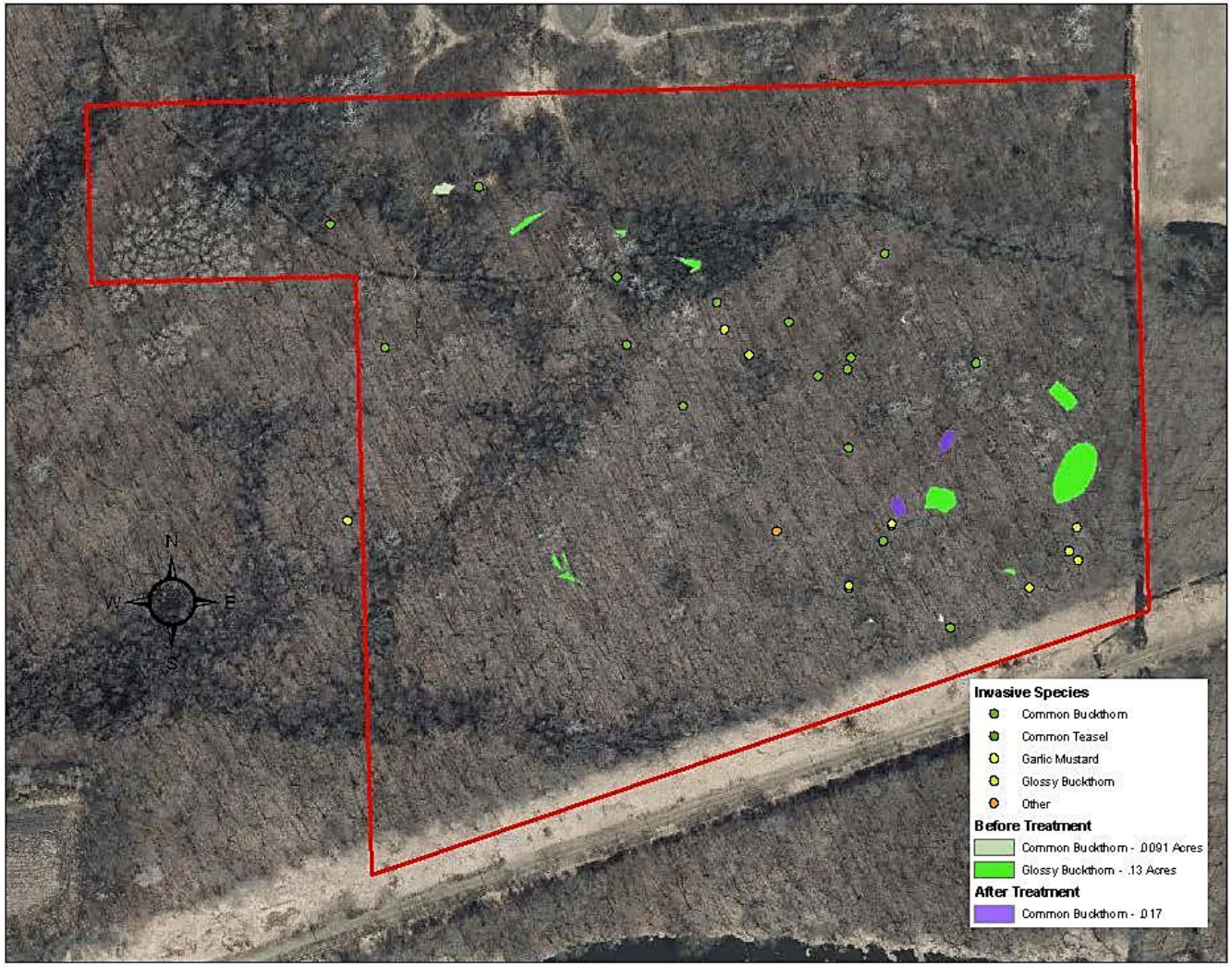
3. Geigner Preserve

Geigner Preserve is 20-acre property located in Big Bend, near our Martin's Woods property. It is also adjacent to Waukesha County owned land. The area can be described as a heavily wooded, low-lying level parcel of land. It contains a scattering of mature oak and maple trees along with younger ash, elm, and poplar trees. As the area is low-lying, it shows evidence of ephemeral ponds.

The invasive species found on the Geigner Preserve are the tier 1 priority species of glossy buckthorn, common buckthorn, and garlic mustard. As a tier 3 property, it will be considered for invasive species treatment depending on available funding. As this property is located adjacent to Waukesha County land, WCLC will seek partnership with the county for invasive species treatment.

Geigner Preserve

Invasive Species Map



Waukesha County Land Conservancy

Address: Nearby Address:

587W24485 Edgewood Ave, Big Bend, WI 53103

Parcel Tax ID: VNT 2104997

PLSS: Vernon T5N R19E SEC 22 NE1/4 & SE1/4

Summary:

- Acres: 20.11

Date: 10/24/2017

Figure 13
42

Tier 4

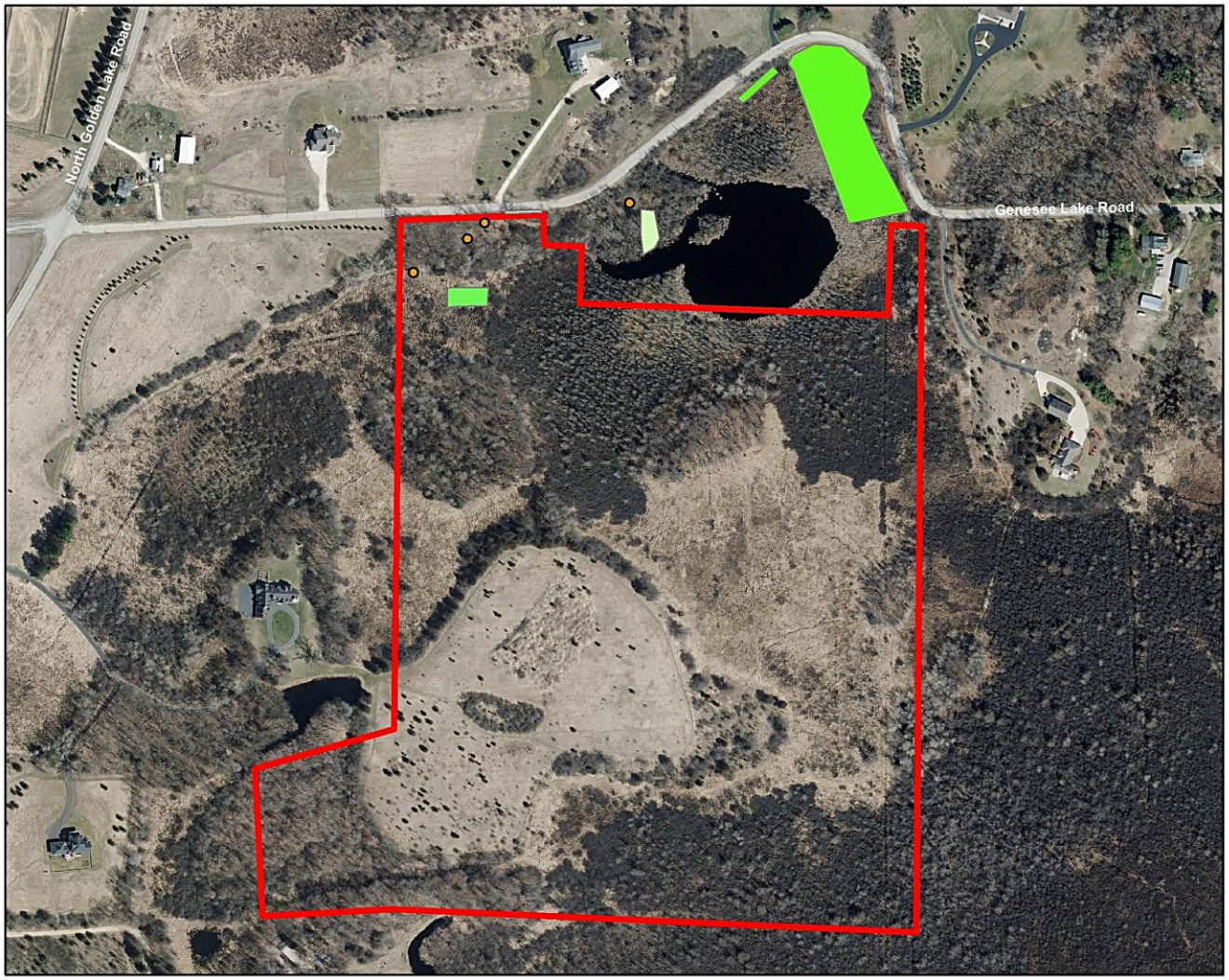
4. Summit Bog

Summit Bog is a 54-acre parcel located in the Village of Summit. The property is designated as a Class I Wildlife Habitat capable of supporting breeding populations of birds and other animals. The veery, northern waterthrush, and Canada warbler have used the area for nesting.

The invasive species found at Summit Bog are tier 1 phragmites and purple loosestrife. Buckthorn is not on the map, as it encompasses the entire property. As this is a tier 4 property, no immediate treatment will be done, but yearly monitoring of the species will be conducted. Treatment will be considered depending on available funding.

Summit Bog

Invasive Species Map



Waukesha County Land Conservancy

Address: Nearby Address- 38758 Genesee Lake Road, Oconomowoc, WI 53066

Parcel Tax ID: SUMT0690998002

PLSS: Summit T7N R17E SEC 29 & 30 NW1/4 NE1/4

Summary:

- Acres: 52

Invasive Species
- Other

Before Treatment
- Other - 0.110 Acres
- Phragmites - 0.108 Acres
- Purple Loosestife - 1.518 Acres

N
W E
S

0 55 110 220 330
Meters

Date: 4/3/2018

Figure 14
44

5. Genesee Lake Road Tamarack

Genesee Lake Road Tamarack is adjacent to the Summit Bog property, and has a very similar ecosystem as Summit Bog. It is a 111-acre critical species habitat with a tamarack and lowland hardwood swamp complex containing showy lady's slipper orchid (Cypripedium reginae), a state-designated Special Concern species. This property is difficult to get to due to the mass amounts of mature buckthorn (common in uplands and glossy in wetlands). Because of this, monitoring of this property will occur in mid-winter of 2018-19, when the ground is frozen and access may be easier.

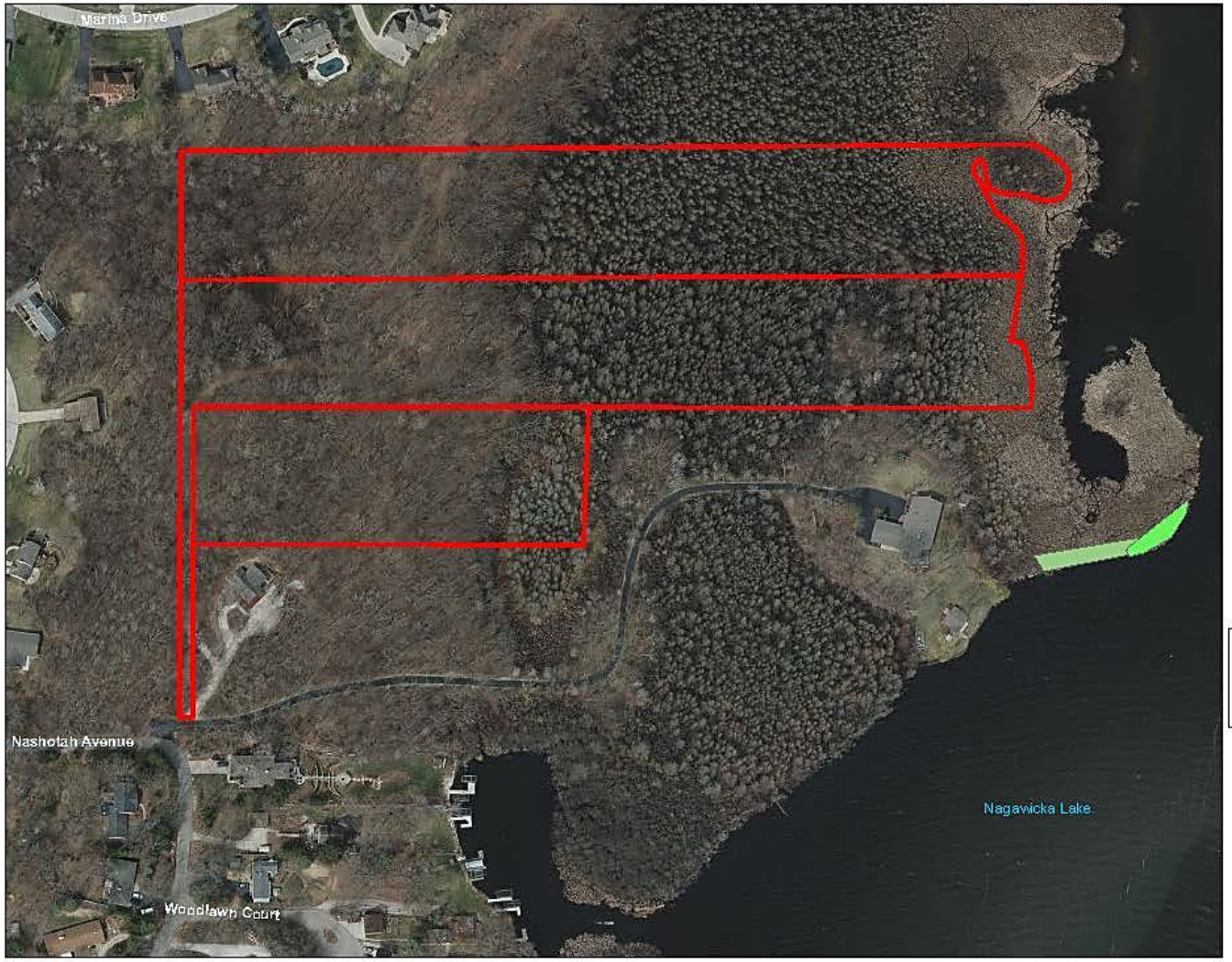
6. Nagawicka Kettle Bog

This property is a critical species habitat containing the 23-acre Nagawicka Lake. The wetlands bordering the lake provide habitat for a number of critical bird species, including worm-eating warbler, cerulean warbler, acadian flycatcher, Kentucky warbler, and black tern. The bog community is home to over one hundred different plant species and a multitude of animal species that may be on the decline. Notably threatened species such as the Blanding's turtle are native to this bog. Other previously identified rare species on this property include Butler's garter snake, ribbon snake, bull frog, cricket frog, 4-toed salamander, and three species of native orchids.

This property is loaded with buckthorn in the upland and wetland areas. Since access through the dense buckthorn uplands was difficult, AIS interns and staff kayaked to the property through Nagawicka Lake. Species found by this survey were 0.055 acres of phragmites and 0.093 acres of purple loosestrife. Due to the proximity of these invasive species to WCLC's property, there is a high likelihood of them occurring on the property. A possible way to manage for these species is by educating the property neighbors about the invasive species and their removal techniques.

Nagawicka Kettle Bog 1, 2 & 3

Invasive Species Map



Waukesha County Land Conservation

Address: Nearby Address: N40W32680 Nashotah Ave, Nashotah, WI 53058

Parcel Tax ID: NSHV0739985002 & SHV0739984004 & NSHV0739984003

PLSS: Delafield T7N R18E SEC 5 SE1/4

Summary:

- Acres: 14.83

Before Treatment

- Phragmites - .055 Acres
- Purple Loosestrife - .093 Acres

0 30 60 120 180 Meters

N W E S

Date: 1/30/2018

Figure 15
46

7. Carter Family Fen

Carter Family Fen is a 306-acre designated Natural Area wetland complex that is home to a number of rare species. This is a calcareous fen that is fed by carbonate-enriched groundwater, which is one of the rarest natural communities in the US. Most fens are small, covering no more than a few acres, which makes the Carter Family Fen even more significant due to its large acreage. This property is difficult to access as it is surrounded by private property and a train track that has no legal crossing. There is a 20-foot easement that allows access to the railroad tracks, on which phragmites has been found. This phragmites patch extends out into the neighboring properties, and letters have been sent out to the neighbors asking for permission for WCLC to access their land to map the total area of the phragmites patch. Due to the only legal access of the property being inaccessible because of massive, dense buckthorn and honeysuckle, AIS monitoring will need to be conducted in early spring of 2019. WCLC plans to contact neighboring residents about the ecological issues of phragmites and to gauge interest in assisting in volunteer removal of phragmites.

Invasive Species Management Alternatives

A successful aquatic plant management strategy must be tailored to the plants and properties in question and will typically utilize multiple control methods. A comprehensive review of aquatic plant management alternatives is as follows. While each of the alternatives may be beneficial in certain situations, not all are currently applicable to managing aquatic plants on WCLC's properties.

Future Action Depending on Funding

Immediate action for any aquatic invasive species is usually a difficult and expensive process that lasts multiple years. On tier 4 properties, plant species in tier 3 and 4 will be placed under the future action alternative for the time being, as WCLC must prioritize and focus on the most efficient ways to control the county wide invasive species problem. These species will instead be monitored throughout the years to make sure that they are contained. If spreading occurs, WCLC will work to remove or treat them to ensure further containment. On tier 1-3 properties, all or nearly all invasive species will be treated and managed. Most of these species have already been treated for in the past and will continue to be managed through the years.

Prescribed Burns

Fire is a very important part of the ecosystem. Using a prescribed burn can be an effective way to help ensure the health of many native plant communities in Wisconsin (WDNR).

Crown Vetch

- Management time: late spring
- Kills germinating seedlings and suppresses growth
- Other management techniques should be implemented in addition to burning to completely control the plant

Common and Glossy Buckthorn

- Management time: spring
- Kills germinating seedlings and suppresses growth
- Other management techniques should be implemented in addition to burning to completely control the plant
- 5-6 years of repeated burning should reduce seedbank

Garlic Mustard

- Management time: spring
    - After garlic mustard seedlings emerge but before native vegetation grows

- Survival of seedlings depends on intensity of the fire
- Intensive management of seedlings after the burn can dramatically reduce the seedbank

Common Teasel
- Management time: spring
- Kills germinating seedlings and suppresses growth
- Established plants will resprout and reinvade the area after the fire, so other management techniques must be used alongside the burn to control this plant

Dame's Rocket
- Management time: spring
- Kills germinating seedlings and suppresses growth
- Plant will resprout and reinvade the area after the fire, so other management techniques must be used alongside the burn to control this plant

Wild Parsnip
- Management time: spring
- Kills germinating seedlings and suppresses growth
- Plant will resprout and reinvade the area after the fire, so other management techniques must be used alongside the burn to control this plant

Honeysuckle
- Management time: early spring or fall
- Kills germinating seedlings
- Does not affect the growth of established plants as they will resprout
- A burn should be repeated every year to every two years to control the plant

Chemical Treatment

Some of the invasive species on our properties can be controlled through the use of chemical agents. When used properly, chemical agents can be effective and efficient at eradicating invasive species. However, if not handled properly, they can become detrimental to the ecosystem and a danger to the health of humans and wildlife.

Chemical treatment of aquatic plants in Wisconsin always requires a permit from the Wisconsin DNR. This is to ensure the proposed chemical treatment will use appropriate chemical(s) at the correct concentration and at the proper time of the year. In most situations, the person applying the herbicide must be licensed by the Wisconsin Department of Agriculture Trade and Consumer Protection (WDNR).
There are several herbicides approved for both aquatic and nonaquatic use in Wisconsin. There are contact herbicides that kill exposed plant material but leave the root system intact, and systemic herbicides which are transported to the roots and kill the entire plant. Systemic herbicides provide longer-term control but may act more slowly than contact herbicides.

Herbicides can also be split into two general groups. There are the “broad-spectrum” and “selective” herbicides. Broad-spectrum herbicides control a large variety of plants. Selective herbicides control fewer species while leaving many others unharmed.

The tier 1 and 2 invasive species are susceptible to multiple certified chemical treatments in Wisconsin. The main three chemicals that can be used are triclopyr, glyphosate, and imazapyr.

Common and Glossy Buckthorn

- Management time: late summer and fall
- Glyphosate or triclopyr
- Chemical sprayed directly onto cut stump
- Follow up spray each year until no more signs of re-sprouting
- Glyphosate should not be used on buckthorn if they are located around water

Common Teasel

- Management time: fall
- Glyphosate or triclopyr
- Triclopyr applied to the plant before it has bolted
- Glyphosate applied to the rosettes

Garlic Mustard

- Management time: early spring or late fall
- Glyphosate
- Best used as a foliar application where there is a large population of garlic mustard

Dame’s Rocket

- Management time: late fall
- Glyphosate or triclopyr
- Best used as a foliar application where there is a large population of dame’s rocket

Yellow Flag Iris

- Management time: fall
- Imazapyr
- Chemical treatment is not the preferred way to control this plant as it resides in the water and chemicals could contaminate the water
- Permits are required to apply chemical

Wild Parsnip

- Management time: mid-May to mid-June
- 2, 4-D metsulfuron methyl or glyphosate
- Chemical treatment is preferred method of control due to the hazard the plants pose to humans through mechanical control

Crown Vetch

- Management time: early spring
- Clopyralid, metsulfuron, or aminopyralid
- Previous year's growth should be removed to ensure herbicide contact with the growing plants
- Clopyralid has shown to be more effective than the other herbicides

Pulling

Pulling, or mechanical control, is often a time consuming and difficult way to control invasive species but can also be a cheaper alternative to using other methods especially as volunteers and school groups can be engaged. WCLC will be engaging volunteers to hand pull invasive species. This method should only be utilized when there is either a small population of the plant or in areas where chemical or other more efficient methods cannot be used. When hand pulling plants, it is imperative that the puller removes the entire root system of it otherwise the plant may readily regrow (WDNR).

Garlic Mustard

- Management time: early spring
- Pulled when plant is still green and the seeds have not yet set
- If flowering, place plants into plastic bags for trash disposal or burning to ensure no seed dispersal
- Hand pulling garlic mustard will be done with the help of interns and community volunteers
    - Garlic Mustard Pull-A-Thon event: the Garlic Mustard Pull-A-Thon happens annually as a fundraising event for SEWISC (Southeast Wisconsin Invasive Species Consortium). This is a competition to see which volunteer group can pull the most garlic mustard. WCLC can use this event to engage and educate volunteers.

Dame's Rocket

- Management time: early spring
- If flowering, place plants into plastic bags for trash disposal or burning to ensure no seed dispersal
- 2-5 years of continuous pulling will be needed to control the population
- Hand pulling dame's rocket will be done with the help of interns and community volunteers

Common Teasel

- Management time: spring
- Can be an effective individual plant control
- Rosettes should be pulled and the taproot will need to be removed as well
- If flowering, place plants into plastic bags for trash disposal or burning to ensure no seed dispersal

Yellow flag iris

- Management time: spring
- Feasible for small populations
- Care should be taken if hand-pulling as some people show skin sensitivity to plant sap and tissues
- All parts of the plant should be dug out to effectively control the population

Crown vetch

- Management time: spring
- Feasible for small populations
- Entire plant needs to be removed from the ground to prevent re-sprouting
- Repeated hand pulling will be necessary for a few years to completely control the population

Cutting

The method of cutting is another time-consuming and difficult way to control invasive species. This technique is best suited for locations that can be visited often. Oftentimes cutting will need to be done multiple times during the year to get rid of all life stages of the plants. WCLC will be using volunteers and interns to cut down invasive species.

Wild Parsnip

- Management time: spring
- Cut the entire taproot with a sharp shovel or spade 1-2” below the surface
- A brush cutter can also be used for large populations before seeds set
- If flowering, place plants into plastic bags for disposal or burning to ensure no seed dispersal
- Care must be taken as the sap of this plant is photoreactive on skin
- Repeated cutting multiple times a year for up to 5 years is required to completely suppress the population

Honeysuckle

- Management time: fall
- Cut at base 1-2” from the ground
- Should be used in conjunction with herbicides as stump can resprout
- Repeated pruning during the growing season may eventually weaken the plant

Common Teasel

- Management time: spring
- Cut the entire taproot with a sharp shovel or spade 1-2” below the surface
- If flowering, place plants into plastic bags for trash disposal or burning to ensure no seed dispersal

Mowing

Mowing is most useful in areas with large infestations where terrain does not create safety or equipment issues. Repeated mowing of invasive plants can weaken the population by depleting root reserves and preventing flowering, however mowing is typically most effective when used in conjunction with herbicide treatments. Mowing should occur several times during the growing season usually before the plants start to flower (WDNR).

Dame's Rocket

- Management time: late April to May
- Mowed after stems have elongated but before they have flowered
- Prevents plants from producing viable seeds
- 2-5 years of mowing to reduce the population

Garlic Mustard

- Management time: mid-April to early May
- Mowed prior to flowering
- Repeated mowing is necessary multiple years to completely suppress the population

Phragmites

- Management time: mid-May to late August
- Utilized along with chemical treatments
- Applied after the chemical treatment

Purple Loosestrife

- Management time: mid-May to late July
- Not recommended, as plant parts may re-sprout and seeds may be dispersed

Wild Parsnip

- Management time: late May to early July
- Mowed after flowering but before seeds develop
- Repeated mowing will be needed for 3-5 years to fully suppress the population

Crown Vetch

- Management time: late spring
- Mowed before plant flowers
- Repeated mowing will be needed for the next 2-3 years to fully suppress the population

Biological Plant Control

Biological control is part of the integrated pest management strategy. It typically utilizes bacteria, fungi, or insects to control unwanted plants. Biological control of exotic species often involves finding the natural control mechanism in the exotic plants country of origin and importing it to the US. Since there is always a risk that introducing a new organism may lead to unintended impacts to non-target species, a lot of study is required to approve the use of new biological control agents.

Purple loosestrife is an invasive species that was introduced from Europe and has invaded many wetlands in Wisconsin. Since 1994, the state of Wisconsin has introduced four insects from Europe that feed upon purple loosestrife in its native range. There has been research to show that these insects only prey on purple loosestrife and do not pose a threat to native species. This biocontrol is likely to be the best long-term control for purple loosestrife. There are two beetle species that are proven to be the most effective of the four insects, those being *Galerucella calmariensis* and *Galerucella pusilla*, shortened to the "Cella" species. The reason for being the most effective is because they feed on the plants leaves and shoots, limiting its ability to grow and spread seeds. Cellas monitored in the state and elsewhere have decreased the vigor, size and seed output of purple loosestrife, allowing native plants to more easily survive. The length of time required for effective biocontrol in any particular wetland typically ranges from one to several years, depending on factors such as site size and loosestrife density (WDNR).

Plant Management Recommendations

Recommendation #1: Phragmites chemical control

WCLC has been treating phragmites for years and will continue to do so until populations are controlled. Phragmites is most effectively controlled by chemical means. Management will be conducted yearly through contract with local professionals.

Recommendation #2: Purple loosestrife biocontrol

To limit use of chemicals on WCLC properties, biocontrol for purple loosestrife using *G. calmariensis* and *G. pusilla* beetles is the best option. WCLC is seeking partnership with local schools to raise beetles as well as grant funding to start this program. Best property opportunities in partnership for rearing beetles include Nelson's Woods and Hartland Marsh. Purple loosestrife populations at Nelson's Woods are located east of the Nelson's Woods property boundary at the dam on Scuppernong Creek which flows into the property, thus spreading the invasive species into Nelson's Woods. By working with the Town of Ottawa and Waukesha County, WCLC seeks to rear a population of beetles to control purple loosestrife along Scuppernong Creek in Nelson's Woods and on town owned land. WCLC also has a growing partnership with Arrowhead High School and seeks to build this relationship by rearing beetles with environmental education classes to control purple loosestrife at Hartland Marsh.

Recommendation #3: Glossy and common buckthorn forestry mowing, cut-stump, basal barking, pulling, and foliar spray

Glossy buckthorn is recommended to undergo yearly fall cut-stump treatment through contracted professionals, volunteers, and interns. Contracted professionals will likely use a forestry mower, cut-stump treatments, and follow-up foliar spraying for effective control. Volunteers will use cut stump and pulling control methods on accessible, high priority properties such as Nelson's Woods, Hartland Marsh, and Weiland Preserve. Glossy buckthorn management will be in accordance with other woody invasive species.

Recommendation #4: Yellow flag iris mechanical and chemical control

Yellow flag iris is found at one of WCLC's highest priority properties, Martin's Woods, and will be controlled mechanically. Individual plants growing along the banks of the creek will be mechanically controlled with shovels and other equipment to ensure the entire root system is removed.

Recommendation #5: Garlic mustard and dame's rocket management

Contracted professionals will be tasked to chemically treat first year garlic mustard, dame's rocket, and other herbaceous aquatic invasive species. Volunteers and interns will also pull dame's rocket and garlic mustard on accessible, high priority properties such as Martin's Woods, Nelson's Woods, Hartland Marsh Preserve, and Weiland Preserve.

Recommendation #6: Contracted chemical control of wild parsnip

Wild parsnip is present on Tamarack Swamp Preserve and Weiland Preserve which are used frequently by visitors. To limit the possibility of injuries due to this plant, they will be removed when possible through contracted professionals, or with equipment such as parsnip predators.

Recommendation #7: Woody invasive pulling, cut-stump, and follow-up foliar spray

Nonaquatic woody invasive species including common buckthorn, honeysuckle, and autumn olive are recommended to undergo yearly fall cut-stump treatment through contracted professionals, volunteers, and interns. Contracted professionals will likely use a forestry mower, cut-stump treatments, and follow-up foliar spraying for effective control. Volunteers will use cut stump and pulling control methods. Woody invasive species are one of the most widespread in the county and are one of the largest threats to WCLC properties.

Monitoring and Evaluation Plan

Recommendation #1: AIS and non-AIS surveying

Conduct annual (or bi-annual if annual is not possible) invasive species surveys to evaluate management effectiveness and track changes in invasive species communities. Surveying will be completed with highest priority properties and properties with recent management surveyed first.

WCLC has recently obtained a drone, which can be flown over large or hard to access properties for aerial surveys to locate invasive species populations. Using the drone will make monitoring faster and easier than on-foot monitoring. Summit Bog and the adjacent Genesee Lake Road Tamarack is one property that is likely to use the drone for monitoring as it is difficult to access due to buckthorn thickets surrounding the perimeter.

Recommendation #2: Consult WCLC Land Management Committee after surveys are completed

Results of invasive species surveys will be reported to the WCLC Land Management Committee to receive professional knowledge and input to further determine changes that must be made to management of properties. This knowledge is critical to leverage best management practices that reflect the mission of the organization.

Recommendation #3: Adjust property priorities accordingly as needed after surveys are completed

As surveys are completed, property priorities will be adjusted in accordance with changes in invasive species communities. This will ensure that significant plant and animal species are protected and that native natural communities are not deteriorated or completely lost.

Public Education Plan

Recommendation #1: Educate neighbors

WCLC staff and interns will create educational materials such as "Explore Beyond your Door" pamphlets that contain information about the unique and ecologically important features of each property, information about invasive species and other threats to the environment, and how to get involved. These materials will be distributed to neighbors of WCLC properties and at public events.

Recommendation #2: Engage volunteers

Educational invasive species removal workdays for volunteers will be advertised in educational pamphlets, fliers, and on social media and will be held at accessible, high priority properties such as Martin's Woods, Nelson's Woods, Hartland Marsh, and Weiland Preserve. These workdays will focus on invasive species identification and control.

Recommendation #3: Owned property monitoring program

WCLC will improve its owned property monitoring program to engage volunteers and interns to monitor properties for invasive species and update data within WCLC's ArcCollector app. This will serve to educate volunteers and interns about invasive species identification and GIS data collection methods for tracking invasive species and will establish a consistent volunteer base.

Invasive Species Prevention, Monitoring, and Rapid Response Plan

The best way to deal with invasive species is to be proactive and prevent their introduction. WCLC should adopt an aquatic invasive species monitoring plan to detect early invasions and a rapid response plan to deal with new invasive species if they are found.

Prevention

An effective prevention plan should focus on the most common routes of invasion.

Recommendation #1: Educate neighbors and the public

WCLC is working on educational materials for the website and social media to educate neighbors and the public on what invasive species are, how to identify them, and how they can help prevent their spread or control them on their own. Including this information on WCLC's website and Facebook can help ensure that a broader audience receives this information. Education and knowledge is vital to preventing spread of invasive species.

Recommendation #2: Educate hunters

WCLC's Hunting Program will get updated to educate hunters about invasive species and how to identify and prevent their spread. This will be done using similar documents that the AIS interns used for surveying in the summer.

Monitoring

Effective management of invasive species is much easier when the invader is detected early. In some cases, it may even be possible to eradicate an invasive species if it is discovered early enough.

Recommendation #1: Conduct yearly monitoring surveys

Conduct annual invasive species surveys with staff, interns and volunteers to evaluate management effectiveness and track changes in invasive species communities. Surveying will be completed with highest priority properties and properties with recent management surveyed first.

Recommendation #2: Intern and volunteer invasive species training

Interns and volunteers will be trained how to identify invasive species. Any intern or volunteer utilizing WCLC properties should have the knowledge of how and where to find invasive species and how to input the data into ArcCollector to have the most updated location and population information.

Rapid Response Plan

When a new invasive species is identified on a WCLC property, there is a need to act quickly. Depending on the species found, population density, and where the pioneer colony is found, there may be a possibility for eradication. The following steps should be followed:

Step #1 – Conduct a survey of the property to determine the extent of the infestation and map the population.

Step #2 – Notify neighbors of the discovery and WCLC's plan of action. Another possibility is to notify the public about the discovery and advise them of any measures they can take to prevent the species from spreading. Oftentimes the invasive species will have either started from or have spread onto a neighboring property. If this is the case, then the neighbor will be informed about the AIS rapid response grant the WDNR offers other cost-sharing ways to solve the problem.

Step #3 – Determine the proper management techniques by analyzing the location of the species, the type of species, the population size and density. Smaller populations will need to be treated aggressively to ensure no further spread. Large populations may need to be treated in phases or in management units.

Step #4 – Develop and implement an action and monitoring plan based on species and extent of invasion.

Project Cost Estimates

As the grant budget was proposed:

Match Source	Reason	Time (hr.)	Cash Cost	Time (hr.)	Donated Value	Subtotal
Salaries	GIS Setup	96	1,545.00			$1,545.00
Purchased Services	Training, inventory sites, and plan development	118	5,900.00			$5,900.00
Salaries	Inventory sites	175	2,987.00			$2,987.00
Donated Services	Inventory site, unpaid interns, and volunteers			200	2,400.00	$2,400.00
Supplies	Office supplies		500.00			$500.00
Subtotals			10,932		2,400.00	$13,332
					Total Project Cost Estimate	$13,332.00
					State Share Requested	$9,999.00

5-year Cost Estimates

Monitoring						
	Martin's Woods					
	In-kind Service					
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**Yearly Value ($)**
Vegetation Monitoring	2	5	5	50	$12.50	$625.00
Wildlife Monitoring	2	5	5	50	$12.50	$625.00
					Total	**$1,250.00**
					Year 1	$1,250.00
					Year 2	$1,250.00
					Year 3	$1,250.00
					Year 4	$1,250.00
					Year 5	$1,250.00
					5-Year Subtotal	**$6,250.00**
	Donated Professional Service					
Service	**# Professionals/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**Yearly Value ($)**
Property Monitoring	2	5	5	50	$75.00	$3,750.00
					Total	**$3,750.00**
					Year 1	$3,750.00
					Year 2	$3,750.00
					Year 3	$3,750.00
					Year 4	$3,750.00
					Year 5	$3,750.00
					5-Year Subtotal	**$18,750.00**
	Cash Cost					
Cost				**Hours/Year**	**Rate/Hour ($)**	**First Year Value (**
Staff Time - Conservation Manager - Monitoring				8	$35.00	$280.00
Staff Time - Conservation Manager - Program Development				60	$35.00	$2,100.00
					Total	**$2,380.00**
					Year 1	$2,380.00
					Year 2	$952.00
					Year 3	$952.00
					Year 4	$952.00
					Year 5	$952.00
					5-Year Subtotal	**$6,188.00**
					5-Year Total	**$31,188.00**

Yellow-flag Iris						
	Martin's Woods					
	In-kind Services					
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Cost ($**
Volunteers	2	2	4	16	$12.50	$200.00
					Year 1	$200.00
					Year 2	$50.00
					Year 3	$133.33
					Year 4	$33.33
					Year 5	$25.00
					5-Year Subtotal	**$441.67**
	Donated Professional Service					
Service	**# Professionals/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**Yearly Value ($)**
Consulting	1	2	4	8	$75.00	$600.00
					Total	**$600.00**
					Year 1	$600.00
					Year 2	$0.00
					Year 3	$0.00
					Year 4	$0.00
					Year 5	$0.00
					5-Year Subtotal	**$600.00**
	Cash Cost					
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
WCLC Staff - Meghan	1	2	4	8	$30.00	$240.00
WCLC Staff - Interns	2	2	4	16	$20.00	$320.00
Equipment						$500.00
Travel Expense						$100.00
					Total	**$1,160.00**
					Year 1	$1,160.00
					Year 2	$290.00
					Year 3	$773.33
					Year 4	$193.33
					Year 5	$145.00
					5-Year Subtotal	**$2,561.67**
					5-Year Total	**$3,603.33**

Woody Invasives						
Martin's Woods						
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Value ($)**
Volunteers	5	5	4	100	$12.50	$1,250.00
					Year 1	$1,250.00
					Year 2	$1,250.00
					Year 3	$1,250.00
					Year 4	$1,000.00
					Year 5	$1,000.00
					5-Year Subtotal	**$5,750.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
WCLC Staff	2	5	4	40	$30.00	$1,200.00
Equipment & Supplies						$500.00
Herbicide						$100.00
Travel Expense						$200.00
					Total	**$2,000.00**
					Year 1	$2,000.00
					Year 2	$2,000.00
					Year 3	$2,000.00
					Year 4	$1,600.00
					Year 5	$1,600.00
					5-Year Subtotal	**$9,200.00**
Hartland Marsh						
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Value ($)**
Volunteers	5	6	4	120	$12.50	$1,500.00
					Year 1	$1,500.00
					Year 2	$1,500.00
					Year 3	$1,500.00
					Year 4	$1,200.00
					Year 5	$1,200.00
					5-Year Subtotal	**$6,900.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
Contracted - Crew Lead	1			64	$63.20	$4,044.80
Contracted - Crew Members	1			67	$52.80	$3,537.60
Contractor Equipment						$1,800.00
Contractor Chemicals						$412.70
Contractor Transportation						$194.40
WCLC Staff	2	6	4	48	$30.00	$1,440.00
WCLC Equipment & Supplies						$500.00
Herbicide						$100.00
Travel Expense						$250.00
					Total	**$12,279.50**
					Year 1	$12,279.50
					Year 2	$12,279.50
					Year 3	$8,186.33
					Year 4	$8,186.33
					Year 5	$4,093.17
					5-Year Subtotal	**$45,024.83**

Lakewood Farms Preserve						
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
Contracted - Crew Lead	1			2	$85.00	$170.00
Contracted - Crew Members	1			16	$45.00	$720.00
Contractor Equipment						$850.00
Contractor Chemicals						$411.00
Contractor Transportation						$112.00
WCLC Staff	1	2	4	8	$35.00	$280.00
Travel Expense						$200.00
					Total	**$2,743.00**
					Year 1	$2,743.00
					Year 2	$2,743.00
					Year 3	$2,743.00
					Year 4	$2,194.40
					Year 5	$2,194.40
					5-Year Subtotal	**$12,617.80**
Geigner Preserve						
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
Contracted - Crew Lead	1			4	$75.00	$300.00
Contracted - Crew Members	1			16	$50.00	$800.00
Contractor Equipment						$500.00
Contractor Chemicals						$300.00
Contractor Transportation						$100.00
WCLC Staff	1	2	4	8	$35.00	$280.00
Travel Expense						$100.00
					Total	**$2,380.00**
					Year 1	$2,380.00
					Year 2	$2,380.00
					Year 3	$2,380.00
					Year 4	$1,904.00
					Year 5	$1,904.00
					5-Year Subtotal	**$10,948.00**
					5-Year Total	**$90,440.63**

Phragmites						
Martin's Woods						
	Cash Cost					
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
WCLC Staff	2	1	4	8	$35.00	$280.00
Permit						$50.00
Equipment & Supplies						$300.00
Travel Expense						$100.00
					Total	**$730.00**
					Year 1	$730.00
					Year 2	$547.50
					Year 3	$365.00
					Year 4	$182.50
					Year 5	$182.50
					5-Year Subtotal	**$2,007.50**
Tamarack Swamp Preserve						
	Cash Cost					
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
WCLC Staff	2	1	4	8	$35.00	$280.00
Equipment & Supplies						$300.00
Travel Expense						$100.00
					Total	**$680.00**
					Year 1	$680.00
					Year 2	$510.00
					Year 3	$340.00
					Year 4	$170.00
					Year 5	$170.00
					5-Year Subtotal	**$1,870.00**
					5-Year Total	**$3,877.50**

Garlic Mustard & Dame's Rocket						
Martin's Woods						
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Value (**
Volunteers	5	5	4	100	$12.50	$1,250.00
					Year 1	$1,250.00
					Year 2	$1,250.00
					Year 3	$1,000.00
					Year 4	$1,000.00
					Year 5	$750.00
					5-Year Subtotal	**$5,250.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
WCLC Staff	2	5	4	40	$30.00	$1,200.00
Equipment & Supplies						$400.00
Travel Expense						$200.00
					Total	**$1,800.00**
					Year 1	$1,200.00
					Year 2	$1,200.00
					Year 3	$1,000.00
					Year 4	$1,000.00
					Year 5	$850.00
					5-Year Subtotal	**$5,250.00**
Nelson's Woods						
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Value (**
Volunteers	5	4	4	80	$12.50	$1,000.00
					Year 1	$1,000.00
					Year 2	$1,000.00
					Year 3	$750.00
					Year 4	$750.00
					Year 5	$750.00
					5-Year Subtotal	**$4,250.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
Contractor - Crew Lead				16	$70.00	$1,120.00
Contractor - Crew Members				16	$60.00	$960.00
Contractor - Chemicals						$100.00
Contractor - Equipment						$300.00
Contractor - Transportation						$100.00
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00
WCLC Staff - Workdays	2	4	4	32	$30.00	$960.00
Equipment & Supplies						$400.00
Travel Expense						$200.00
					Total	**$4,420.00**
					Year 1	$4,420.00
					Year 2	$4,420.00
					Year 3	$3,315.00
					Year 4	$3,315.00
					Year 5	$2,210.00
					5-Year Subtotal	**$17,680.00**

Ottawa Wildlife Refuge						
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
Contractor - Crew Lead				18	$70.00	$1,260.00
Contractor - Crew Members				18	$60.00	$1,080.00
Contractor - Chemicals						$100.00
Contractor - Equipment						$400.00
Contractor - Transportation						$100.00
WCLC Staff	1	2	4	8	$30.00	$240.00
Travel Expense						$200.00
					Total	**$3,380.00**
					Year 1	$3,380.00
					Year 2	$3,380.00
					Year 3	$2,535.00
					Year 4	$2,535.00
					Year 5	$1,690.00
					5-Year Subtotal	**$13,520.00**
Hartland Marsh						
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Value ($)**
Volunteers	5	5	4	100	$12.50	$1,250.00
					Year 1	$1,250.00
					Year 2	$1,250.00
					Year 3	$1,000.00
					Year 4	$1,000.00
					Year 5	$750.00
					5-Year Subtotal	**$5,250.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
Contractor - Crew Lead				11	$70.00	$770.00
Contractor - Crew Members				11	$60.00	$660.00
Contractor - Chemicals						$100.00
Contractor - Equipment						$200.00
Contractor - Transportation						$100.00
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00
WCLC Staff - Workdays	2	5	4	40	$30.00	$1,200.00
Equipment & Supplies						$400.00
Travel Expense						$200.00
					Total	**$1,800.00**
					Year 1	$1,200.00
					Year 2	$1,200.00
					Year 3	$1,000.00
					Year 4	$1,000.00
					Year 5	$850.00
					5-Year Subtotal	**$5,250.00**

Weiland Preserve						
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Value (**
Volunteers (Begin Year 3)	5	4	4	80	$12.50	$1,000.00
					Year 1	$0.00
					Year 2	$0.00
					Year 3	$1,000.00
					Year 4	$1,000.00
					Year 5	$1,000.00
					5-Year Subtotal	**$3,000.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
Contractor - Crew Lead				8	$70.00	$560.00
Contractor - Crew Members				8	$60.00	$480.00
Contractor - Chemicals						$100.00
Contractor - Equipment						$200.00
Contractor - Transportation						$100.00
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00
					Subtotal	**$1,720.00**
WCLC Staff - Workdays (Begin Year 3)	2	4	4	32	$30.00	$960.00
Equipment & Supplies						$400.00
Travel Expense						$200.00
					Subtotal	**$1,560.00**
					Year 1	$1,720.00
					Year 2	$1,720.00
					Year 3	$3,280.00
					Year 4	$3,280.00
					Year 5	$2,186.67
					5-Year Subtotal	**$12,186.67**
Marsh Hawk						
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
Contractor - Crew Lead				4	$70.00	$280.00
Contractor - Crew Members				4	$60.00	$240.00
Contractor - Chemicals						$75.00
Contractor - Equipment						$200.00
Contractor - Transportation						$75.00
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00
Travel Expense						$100.00
					Total	**$1,250.00**
					Year 1	$1,250.00
					Year 2	$1,250.00
					Year 3	$1,000.00
					Year 4	$1,000.00
					Year 5	$625.00
					5-Year Subtotal	**$5,125.00**

Frog Hollow						
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($)**	**First Year Value (**
Volunteers (Beginning Year 5)	5	3	4	60	$12.50	$750.00
					Year 1	$0.00
					Year 2	$0.00
					Year 3	$0.00
					Year 4	$0.00
					Year 5	$750.00
					5-Year Subtotal	**$750.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($**
WCLC Staff - Workdays (Beginning Year 5)	2	3	4	24	$30.00	$720.00
Equipment & Supplies						$300.00
Travel Expense						$200.00
					Total	**$1,220.00**
					Year 1	$0.00
					Year 2	$0.00
					Year 3	$0.00
					Year 4	$0.00
					Year 5	$1,220.00
					5-Year Subtotal	**$1,220.00**
					5-Year Total	**$78,731.67**

Purple Loosestrife						
Nelson's Woods - Beetle Biocontrol						
Donated Professional Service						
Service	**# Volunteers/Da**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($**	**First Year Value ($)**
Waukesha County/Town of Ottawa - Consultation				20	$75.00	$1,500.00
					Year 1	$1,500.00
					Year 2	$1,500.00
					Year 3	$1,125.00
					Year 4	$1,125.00
					Year 5	$750.00
					5-Year Subtotal	**$6,000.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
WCLC Staff - Conservation Manager				40	$35.00	$1,400.00
WCLC Interns - Program Assistance	2	1	5	10	$30.00	$300.00
Equipment & Supplies						$100.00
Travel Expense						$200.00
					Total	**$2,000.00**
					Year 1	$2,000.00
					Year 2	$2,000.00
					Year 3	$1,500.00
					Year 4	$1,500.00
					Year 5	$1,000.00
					5-Year Subtotal	**$8,000.00**
Ottawa Wildlife Refuge						
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
Contractor - Crew Lead				8	$70.00	$560.00
Contractor - Crew Members				8	$60.00	$480.00
Contractor - Chemicals						$100.00
Contractor - Equipment						$400.00
Contractor - Transportation						$100.00
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00
Travel Expense						$100.00
					Total	**$2,020.00**
					Year 1	$2,020.00
					Year 2	$2,020.00
					Year 3	$1,010.00
					Year 4	$1,010.00
					Year 5	$1,010.00
					5-Year Subtotal	**$7,070.00**

Hartland Marsh Preserve - Beetle Biocontrol						
Donated Professional Service						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($**	**First Year Value ($)**
Arrowhead H.S. Environmental Teacher/Earth Club Leader - Consultation				20	$75.00	$1,500.00
					Year 1	$1,500.00
					Year 2	$1,500.00
					Year 3	$1,125.00
					Year 4	$1,125.00
					Year 5	$750.00
					5-Year Subtotal	**$6,000.00**
In-kind Services						
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Rate ($**	**First Year Value ($)**
Volunteers - H.S. Students	20	1	4	80	$12.50	$1,000.00
					Year 1	$1,000.00
					Year 2	$1,000.00
					Year 3	$1,000.00
					Year 4	$1,000.00
					Year 5	$1,000.00
					5-Year Subtotal	**$5,000.00**
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
WCLC Staff - Conservation Manager				60	$35.00	$2,100.00
WCLC Interns - Program Assistance	2	2	8	32	$30.00	$960.00
Equipment & Supplies						$300.00
Travel Expense						$250.00
					Total	**$3,610.00**
					Year 1	$3,610.00
					Year 2	$3,610.00
					Year 3	$2,707.50
					Year 4	$2,707.50
					Year 5	$1,805.00
					5-Year Subtotal	**$14,440.00**

Frog Hollow						
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
WCLC Staff - Conservation Manager	1	1	8	8	$35.00	$280.00
WCLC Staff - Interns	2	1	8	16	$30.00	$480.00
Equipment & Supplies						$100.00
Travel Expense						$100.00
					Total	**$960.00**
					Year 1	$960.00
					Year 2	$960.00
					Year 3	$480.00
					Year 4	$480.00
					Year 5	$480.00
					5-Year Subtotal	**$3,360.00**
Nagawicka Kettle Bog						
Cash Cost						
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**
Contractor - Crew Lead				8	$70.00	$560.00
Contractor - Crew Members				8	$60.00	$480.00
Contractor - Chemicals						$100.00
Contractor - Equipment						$400.00
Contractor - Transportation						$100.00
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00
Travel Expense						$100.00
					Total	**$2,020.00**
					Year 1	$2,020.00
					Year 2	$2,020.00
					Year 3	$1,010.00
					Year 4	$1,010.00
					Year 5	$1,010.00
					5-Year Subtotal	**$7,070.00**
					5-Year Total	**$56,940.00**

Wild Parsnip							
Tamarack Swamp Preserve							
In-kind Services							
Service	**# Volunteers/Da**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Ra**	**First Year Value ($)**	
Volunteers	5	2	4	40	$12.50	$500.00	**Beginning Year 3**
					Year 1	$0.00	
					Year 2	$0.00	
					Year 3	$500.00	
					Year 4	$500.00	
					Year 5	$500.00	
					5-Year Subtotal	**$1,500.00**	
Cash Cost							
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**	
Contractor - Crew Lead				6	$70.00	$420.00	
Contractor - Crew Members				6	$60.00	$360.00	
Contractor - Chemicals						$100.00	**Years 1 & 2 Only**
Contractor - Equipment						$300.00	
Contractor - Transportation						$100.00	
					Subtotal	**$1,280.00**	
WCLC Staff - Workdays (Begin Year 3)	2	2	4	16	$30.00	$480.00	**Beginning Year 3**
Equipment & Supplies						$300.00	
					Subtotal	**$780.00**	
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00	**Yearly**
Travel Expense						$100.00	
					Subtotal	**$380.00**	
					Year 1	$1,660.00	
					Year 2	$1,660.00	
					Year 3	$1,160.00	
					Year 4	$1,160.00	
					Year 5	$1,160.00	
					5-Year Subtotal	**$6,800.00**	

Weiland Preserve							
In-kind Services							
Service	**# Volunteers/Day**	**# Days**	**# Hours/Day**	**Hours/Year**	**In-kind Hourly Ra**	**First Year Value ($)**	
Volunteers	5	2	4	40	$12.50	$500.00	**Beginning Year 3**
					Year 1	$0.00	
					Year 2	$0.00	
					Year 3	$500.00	
					Year 4	$500.00	
					Year 5	$500.00	
					5-Year Subtotal	**$1,500.00**	
Cash Cost							
Cost	**# Person(s)/day**	**# Days**	**# Hours/Day**	**Hours/Year**	**Rate/Hour ($)**	**First Year Cost ($)**	
Contractor - Crew Lead				6	$70.00	$420.00	
Contractor - Crew Members				6	$60.00	$360.00	
Contractor - Chemicals						$100.00	**Years 1 & 2 Only**
Contractor - Equipment						$300.00	
Contractor - Transportation						$100.00	
					Subtotal	**$1,280.00**	
WCLC Staff - Workdays (Begin Year 3)	2	2	4	16	$30.00	$480.00	**Beginning Year 3**
Equipment & Supplies						$100.00	
					Subtotal	**$580.00**	
WCLC Staff - Conservation Manager	1	2	4	8	$35.00	$280.00	**Yearly**
Travel Expense						$100.00	
					Subtotal	**$380.00**	
					Year 1	$1,660.00	
					Year 2	$1,660.00	
					Year 3	$960.00	
					Year 4	$960.00	
					Year 5	$960.00	
					5-Year Subtotal	**$6,200.00**	
					5-Year Total	**$16,000.00**	

Photos








References

Wisconsin Department of Natural Resources. (n.d.). Retrieved April 19, 2018 from https://dnr.wi.gov/