NES ECOLOGICAL SERVICES
A Division of Robert E. Lee & Associates, Inc.
1250 Centennial Centre Blvd. • Hobart, WI 54155
Serving Wisconsin, Michigan, Minnesota and Illinois

Lower Menominee River Area of Concern
South Channel Restoration Project
Great Lakes Restoration Initiative Grant
Grant/Project No. GL-00E01568

Prepared for

City of Marinette
1905 Hall Avenue
Marinette, Wisconsin 54143
Project No. 13775005

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Project Overview

NES Ecological Services (NES) – A Division of Robert E. Lee and Associates, Inc. (REL), was contracted by the City of Marinette to provide vegetation monitoring services at South Channel located in Sections 5 & 8, T30N, R24E, City of Marinette, Marinette County, Wisconsin (Figure 1). The City began restoration at South Channel as part of a Great Lakes Restoration Initiative (GLRI) Grant to restore the Lower Menominee River Area of Concern (AOC). In the summer of 2016 NES/REL finalized a Restoration Plan for the Harbor and the Quality Assurance Project Plan (QAPP) was signed in September 2016. The Project area is approximately 21.38 acres in size and is designed to encompass (Figure 2):

- 1.75 acres of Aquatic Submergent/Emergent Restoration
- 2.13 acres of Mapped Aquatic Submergent/Emergent Restoration
- 2.69 acres of Cattail Marsh Enhancement (not evaluated in monitoring)
- 2.43 acres of Mesic Forest Restoration
- 0.83 acres of Mesic Prairie Planting
- 7.15 acres of Northern Sedge Meadow (0.72 acres of Northern Sedge Meadow Enhancement, 2.47 acres of Northern Sedge Meadow Enhancement (Standing Water), 2.71 acres of Northern Sedge Meadow Restoration, 1.25 acres of Northern Sedge Meadow Restoration (Standing Water))
- 0.45 acres of Open Water (not evaluated in monitoring)
- 2.59 acres of Shrub-Carr (0.21 acres of Shrub-Carr Upland Planting, 1.18 acres of Shrub-Carr Wetland Restoration, 1.20 acres of Tag Alder Enhancement)
- 0.75 acres of Wet Mesic Forested Wetland (0.31 acres of Wet Mesic Forested Wetland Enhancement, 0.44 acres of Wet Mesic Forested Wetland Restoration)
- 0.60 acres of Wet Mesic Prairie Planting

NES ecologists conducted the first year of monitoring on July 12, September 11, 12, & 25th, 2017. The completion and submittal of this monitoring report (Year 1), satisfies the requirements outlined in the (QAPP). Report submittals are required for three consecutive post-construction growing seasons.

Goals, Objectives & Performance Standards

Goals

The purpose of the South Channel Habitat Improvement ecological restoration is to restore native vegetation and habitat within a degraded wetland complex. This relates to the goals of the *2013 Fish and Wildlife Population and Habitat Management* and *Restoration Plan Update for the Lower Menominee River Area Concern*. The achievement of the goals outlined in that plan would mean conditions have improved such that the BUIs of degradation of fish and wildlife populations and the loss of fish and wildlife habitat will no longer be applicable within the AOC. The goals include:

- Provide shallow water, emergent vegetation areas suitable for the spawning requirements of native fish species including northern pike (Esox lucius) and muskellunge (Esox masquinongy)
- Provide foraging and loafing opportunities for native amphibians, reptiles, waterfowl, and other water birds
- Provide additional flow and improved fish passage at Ogden Street Bridge

- Contribute towards the achievement of restoration goals and objectives found within the Lower Menominee River Area of Concern Fish and Wildlife Population and Habitat Management and Restoration Plan (2013) by implementing the final design and specifications provided by USFWS

Objectives

In support of these goals, the objectives and related target criteria of this restoration are as follows:

1. Restore benthic habitats for use by invertebrates and native fish species which historically utilize the South Channel.
    a) Install fish sticks, log structures, lunker structures, pike spawning channel, woody debris and rock structures to increase cover and feeding opportunities.
    b) Establish populations of emergent native vegetation in the channel.
    c) Eliminate and control invasive species within emergent aquatic communities, while establishing native plants to provide spawning habitat.

2. Establish healthy and diverse native vegetation communities
    a) Restore/create community types found to be high priority communities within the Northern Lake Michigan Coastal Ecological Landscape.
    b) Install a variety of ferns, grasses, sedges, forbs, shrubs and trees currently and historically found within Marinette County.
    c) Increase plant diversity by adding a few species typically found more often within southern Wisconsin to account for temperature increases due to global climate shifts.
    d) Absolute cover of invasive species will be < 15% within each community type.

3. Restore wetland and upland habitat for use by invertebrates, amphibians, reptiles, mammals and birds.
    a) Native vegetation capable of providing a variety of food and cover will be established throughout the restored/created communities.
    b) Existing snags will be left and protected to provide food sources and potential future nesting sites.
    c) Rock and brush piles will be added to provide cover.
    d) Downed woody debris will be placed in the emergent aquatic and wet meadow communities to provide sites for loafing and basking.
    e) Nesting boxes and platforms will be installed to increase suitable nesting sites.
    f) Bat houses will be erected to provide roosting sites.

Over the course of the monitoring period it is expected that site functions will improve in all of the above categories. In addition to the habitat benefits towards removing BUIs in the AOC, the project presents opportunities for public outreach, education, recreation, beautification, and connectivity with other nearby restoration projects. As a result of achieving the restoration objectives, the project will also increase wetland functional values significantly.

This project is being conducted as one of the multiple projects concurrently happening within this Area of Concern. The overall goal is to delist the AOC.

Ecological Performance Standards

Performance standards are the measures utilized to determine whether desired objectives regarding the overall mitigation goal have been met. Post-construction monitoring activities are performed throughout the duration of a project to evaluate progress toward achieving the functional objectives. The below performance standards in Table 1, as outlined in the approved QAPP, will be used to verify the success of the Mesic Forest, Mesic Prairie, Northern Sedge Meadow, Shrub-Carr Upland, Shrub-Carr Wetland, Tag Alder, Wet-Mesic Forested Wetland and Wet-Mesic Prairie Communities.

Table 1. Status of Ecological Performance Standard Achievement

Ecological Performance Standards (PS) For Year One	PS Achievement 2016	2017	2018	Monitoring Results			Discussion of Monitoring Results/Trends
Except in the far eastern Mesic Forest stand, aerial coverage of invasive, nonnative species such as giant reed grass, reed canary grass, purple loosestrife, Japanese knotweed and garlic mustard will not be >10% absolute cover after one year, and will not be >5% absolute cover after two and three years.	Y	--	--	**Invasive, non-native species**	**% Cover**	**% Relative Cover**	The five main invasive species of concern currently have <5% total coverage within the project area.
				Giant reed grass	0.25	0.21	
				Reed canary grass	1.25	1.03	
				Japanese knotweed.	0	0	
				Purple loosestrife	0.5	0.41	
				Garlic mustard	0.5	0.41	
Aerial coverage of garlic mustard will not be >75% absolute cover after one year, >50% absolute cover after two years, and >25% absolute cover after three years within the far eastern Mesic Forest stand.	IP	--	--	Garlic mustard has an absolute cover of 85%.			The amount of garlic mustard in the far eastern Mesic Forest exceeded 75%. After our survey, herbicide treatment of garlic mustard basal leaves was performed to keep this area on track to meet this performance standard in Year 2.
After one year, >75% of the vegetative cover within the restoration site will be native species, <25% of the cover will be invasive, non-native species. After two years, >80% of the vegetative cover within the restoration site will be native species, <20% of the cover will be invasive, non-native species. After three years, >85% of the vegetative cover within the restoration site will be native, non-invasive species, <15% of the cover will be invasive, non-native species.	Y	--	--	Native vegetative cover was 77.47% and non-native vegetative coverage was 22.53%.			This performance standard was met by having greater than 75% native species coverage and less than 25% non-native species coverage.
Eighty percent of the site will be vegetated within one year. Eighty-five percent of the site will be vegetated within two years. Ninety percent of the site will be vegetated within three years.	Y	--	--	Sum of average percent cover across the site = 121.72%			Based on the sum of average percent cover across all communities this criterion has been met. The lowest percent cover across all communities was the s Aquatic Submergent/Emergent Restoration Community at 73% cover. Otherwise all communities had greater than 80% cover.
90% of trees, shrubs and live stakes planted within the various communities will be present and healthy one year after installation, 80% two years after installation, and 75% three years after installation.	NA	--	--	Monitoring was not performed; but, visual observations suggest this performance standard is on track to be met.			Year 1 monitoring was intended to be conducted once the woody species were established for roughly one year. Since additional planting was conducted in the spring of 2017, survival surveys will being in 2018.
The Aquatic Submergent/Emergent Restoration Community shall have a minimum of 20 native, non-invasive species present	Y	--	--	There were 24 native, non-invasive species.			Performance standard was met.
The 2017 Mapped Aquatic Submergent/Emergent Restoration Community shall have a minimum of 20 native, non-invasive species present.	Y	--	--	There were 25 native, non-invasive species.			Performance standard was met.
The Mesic Forest, Mesic Prairie*, Northern Sedge Meadow, Shrub-Carr Upland, Shrub-Carr Wetland, Tag Alder, Wet-Mesic Forested Wetland and Wet-Mesic Prairie* Communities shall each have a minimum of 20 native, non-invasive species present after one year, 25 native, non-invasive species present after two years and 30 native, non-invasive species present after three years. **The Mesic Prairie and Wet Mesic Prairie were not evaluated in this standard due to these communities having separate requirements listed in the performance standard below.*	Y	--	--	**Community**	**Number of Native, Non-invasive species**		Planted species along with naturally occurring species allowed this performance standard to be met in all communities.
				Mesic Forest	57		
				Northern Sedge Meadow	40		
				Shrub-Carr (Shrub-Carr Upland, Shrub-Carr Wetland, Tag Alder)	64		
				Wet-Mesic Forested Wetland	57		
The Mesic Prairie and Wet-Mesic Prairie Communities shall each have a minimum of 15 native, non-invasive species present after one year, 20 native, non-invasive species present after two years, and 25 native, non-invasive species present after three years.	Y	--	--	**Community**	**Number of Native, Non-invasive Species**		All communities for this performance standard currently meet the goal. The Wet Mesic Prairie currently has the lowest number of native species with 16. Because the prairie was started from bare soil and seed, it will take longer to become fully established and display a higher number of native species.
				Mesic Prairie	26		
				Wet-Mesic Prairie	16		

NA = Not Applicable IP = In Progress P = Performance Standard is Partially Met Y = Performance Standard is Met

Table 1. Status of Ecological Performance Standard Achievement (continued).

<table>
<tr><th rowspan="2">Ecological Performance Standards (PS) For Year One</th><th colspan="3">PS Achievement</th><th>Monitoring Results</th><th>Discussion of Monitoring Results/Trends</th></tr>
<tr><th>2016</th><th>2017</th><th>2018</th><th></th><th></th></tr>
<tr><td>To ensure the restored communities have natural significance, the floristic quality index (FQI) and Coefficient of Conservatism (Mean C) for each shall be >20 and >3.5, respectively, after one year, >22 and >3.8, respectively, after two years, and >25 and >4.0, respectively . FQI values will be calculated utilizing all species present: non-native species will be assigned a value of zero.</td><td>P</td><td>--</td><td>--</td><td><table><tr><th>Community</th><th>FQI</th><th>Mean C</th></tr><tr><td>Mesic Forest</td><td>22.11</td><td>2.26</td></tr><tr><td>Mesic Prairie</td><td>8.76</td><td>1.18</td></tr><tr><td>Northern Sedge Meadow</td><td>21.77</td><td>2.96</td></tr><tr><td>Shrub-Carr (Shrub-Carr Upland, Shrub-Carr Wetland, Tag Alder)</td><td>25.27</td><td>2.72</td></tr><tr><td>Wet-Mesic Forested Wetland</td><td>26.58</td><td>3.15</td></tr><tr><td>Wet-Mesic Prairie</td><td>8.28</td><td>1.29</td></tr><tr><td>Aquatic Submergent/Emergent</td><td>21.54</td><td>4.07</td></tr><tr><td>2017 Mapped Aquatic Submergent/Emergent</td><td>23.40</td><td>4.34</td></tr></table></td><td>All communities with the exception of the Mesic Prairie and Wet Mesic Prairie have met the performance standard of having an FQI greater than 20. Only the Aquatic Submergent/Emergent and 2017 Mapped Aquatic Submergent/Emergent communities met the standard of having an FQI greater than 3.5. This is due to the communities' early stage of development.</td></tr>
<tr><td>Twenty-one of the forty-two nesting and roosting boxes shall be utilized or occupied annually by year three.</td><td>IP</td><td>--</td><td>--</td><td>This standard was not analyzed in Year 1.</td><td>This standard was not analyzed in Year 1; however, an osprey successfully utilized a nesting platform.</td></tr>
<tr><td>Twenty avian species, five species of reptiles and amphibians, and five mammal species will be recorded, either through direct observation, calls or sign left by the species, utilizing the site after three years.</td><td>IP</td><td>--</td><td>--</td><td><table><tr><th></th><th>2017</th><th>2018</th><th>2019</th></tr><tr><td>Avian</td><td>9</td><td>--</td><td>--</td></tr><tr><td>Herptiles</td><td>4</td><td>--</td><td>--</td></tr><tr><td>Mammals</td><td>1</td><td>--</td><td>--</td></tr></table></td><td>This standard does not need to be evaluated until Year 3, but it is currently on track to be met.</td></tr>
</table>

NA = Not Applicable IP = In Progress P = Performance Standard is Partially Met Y = Performance Standard is Met

Summary Data

Methods

Vegetation/Floristic Diversity

Meander surveys were conducted within the project area to gather a representative sample of the floristic diversity of each plant community. Surveys were completed in July and September to compile a list of plant species and their associated coverages found within each community. A comprehensive species list of the entire site can be found in Appendix A.

NES utilized the timed-meander sampling protocol for vegetation monitoring developed by the Wisconsin Department of Natural Resources (Appendix B). On September 11, 12 & 25th timed meanders were conducted in the Aquatic Submergent/Emergent Restoration, Mesic Forest Restoration, Mesic Prairie, Northern Sedge Meadow, Shrub-Carr, Wet Mesic Forested Wetland, and Wet Mesic Prairie.

Due to the increase in water levels from 2016 to 2017, the Northern Sedge Meadow Restoration (Standing Water) in the western portion of the project area had too much water to support a sedge meadow community. Therefore NES re-categorized this area as 2017 Mapped Aquatic Submergent/Emergent and evaluated the community using the Aquatic Submergent/Emergent Restoration Community performance standards. Also, due to rising water levels, the tag alder community ranged from over a foot of standing water to elevated conditions having dry soils such as in the area disconnected from the mainland. Due to the range of species recorded within this community, there was little species difference between the Tag Alder, Shrub-Carr, and Shrub-Carr Upland communities. These communities will be re-evaluated during the 2018 growing season to determine community status based on current water levels and vegetation

Results

Vegetation/Floristic Diversity

A list of species found during the meander surveys and a summary of each community type can be found in Appendix A. These data were used to compute the information reported in Table 2 below. A total of 205 plant species were recorded during the 2017 surveys.

Photos (Appendix C) documenting existing site conditions within each community type were taken throughout the site (Figure 3).

Table 2. Vegetation Data Summary.

Community	# Total Species	# Native Species	FQI	Mean C	% Native Coverage	% Invasive Species Coverage
Mesic Forest	96	57	22.11	2.26	72.56	27.44
Wet Mesic Forest	71	57	26.58	3.15	91.03	8.97
Wet Mesic Prairie	41	16	8.28	1.29	45.45	54.55
Aquatic Submergent/Emergent Restoration	28	24	21.54	4.07	93.15	6.85

Table 2. Vegetation Data Summary (continued).

Community	# Total Species	# Native Species	FQI	Mean C	% Native Coverage	% Invasive Species Coverage
2017 Mapped Aquatic Submergent/ Emergent Restoration	29	25	23.40	4.34	93.92	6.08
Shrub Carr	85	64	25.27	2.72	82.39	17.61
Mesic Prairie	55	26	8.76	1.18	44.83	55.17
Northern Sedge Meadow	54	40	21.77	2.96	82.18	17.82
Entire Site	**205**	**142**	**39.46**	**2.76**	**77.47**	**22.53**

Native Species Dominance

All communities had native species coverage greater than 75% except the Mesic Forest and Mesic and Wet Mesic Prairies. Native species coverage in the Mesic Forest, Wet Mesic Prairie and Mesic Prairie was 72.56, 45.45 and 44.83, respectively. All communities had greater than 20 native species except for the Mesic Prairie which had 16 native species. All communities except the Wet Mesic Prairie and Mesic Prairie had an FQI greater than 20, but only the Aquatic Submergent/Emergent Restoration and the 2017 Mapped area had Mean C's greater than 3.5. All dominant species in the Wet Mesic Forest (5 native), Aquatic Submergent/Emergent (4 native) and 2017 Mapped Aquatic Submergent/Emergent (4 native) were native while the Mesic Forest (5 non-native, 7 native), Wet Mesic Prairie (2 non-native, 5 native), Shrub-Carr (3 non-native, 18 native), Mesic Prairie (6 non-native, 7 native) and Northern Sedge Meadow (3 non-native, 13 native) contained a mix of both native and non-native species. Table 3 contains a list of dominant species found within the South Channel communities. Additional information pertaining to the percent areal coverage of native and invasive species can be found in the community summary data (Appendix A).

Table 3. Plant Species Dominance.

Community Type	**Dominant Species**
Mesic Forest	*Galeopsis tetrahit*
	Acer negundo
	Alliaria petiolate
	Echinochloa crus-galli
	Panicum capillare
	Populus balsamifera
	Carex pensylvanica
	Melilotus albus
	Urtica dioica
	Fraxinus pennsylvanica
	Salix nigra
	Leonurus cardiaca
Wet Mesic Forest	*Acer saccharinum*
	Acer nugundo
	Calamagrostis canadensis
	Carex lacustris

Table 3. Plant Species Dominance (continued).

Community Type	**Dominant Species**
Wet Mesic Forest	*Carex stricta*
Wet Mesic Prairie	*Verbena hastata*
	Monarda fistulosa
	Calamagrostis canadensis
	Dactylis glomerata
	Poa palustris
	Agrostis stolonifera
	Carex muhlenbergii
Aquatic Submergent/Emergent	*Sparganium americanum*
	Schoenoplectus tabernaemontani
	Lemna minor
	Pontederia cordata
2017 Mapped Aquatic Submergent/Emergent	*Sparganium americanum*
	Lemna minor
	Elodea canadensis
	Carex lacustris
Shrub Carr	*Alnus incana*
	Fraxinus pennsylvanica
	Panicum capillare
	Betula papyrifera
	Salix interior
	Cyperus esculentus
	Bidens cernua
	Carex stricta
	Leersia oryzoides
	Agrostis stolonifera
	Calamagrostis canadensis
	Poa palustris
	Eleocharis palustris
	Persicaria hydropiper
	Scirpus cyperinus
	Sparganium americanum
	Echinochloa crus-galli
	Eleocharis palustris
	Carex lacustris
	Juncus tenuis
	Salix nigra
Mesic Prairie	*Elymus canadensis*
	Setaria pumila
	Leonurus cardiac
	Erechtites hieracifolius
	Asclepias syriaca
	Panicum capillare
	Rudbeckia hirta
	Berteroa incana
	Verbascum thapsus
	Linaria vulgaris

Table 3. Plant Species Dominance (continued).

Community Type	**Dominant Species**
Mesic Prairie	*Solidago gigantea*
	Monarda fistulosa
	Glechoma hederacea
Northern Sedge Meadow	*Bidens cernua*
	Persicaria hydropiper
	Phalaris arundinacea
	Calamagrostis canadensis
	Panicum capillare
	Carex vulpinoidea
	Sparganium americanum
	Verbena hastata
	Juncus tenuis
	Carex lacustris
	Poa palustris
	Echinochloa crus-galli
	Cyperus esculentus
	Scirpus cyperinus
	Panicum virgatum
	Carex stipata

Invasive/Non-native Species

Based on the information in Table 4, there are currently 63 invasive and/or non-native species found across all communities with an overall absolute and relative coverage of 27.42% and 22.53%, respectively. Please see the plot data sheets in Appendix A for specific sample plot percentages. Table 4 includes a list of all non-native species identified during plant surveys in 2017. Several of the species listed below often invade newly seeded sites such as the prairie communities which have the largest proportion of non-native species present. Many of these species are biennial and perennial weeds, including the most common species – orchard grass (*Dactylis glomerata*) and spreading bent grass (*Agrostis stolonifera*), which quickly disappear with proper maintenance and native species establishment. Continued monitoring and management of non-native species will eliminate or suppress their spread throughout the site.

Table 4. Invasive/Non-native Species Relative Coverage (%).

Species		Community							
Common Name	Scientific Name	Mesic Forest	Wet Mesic Forest	Wet Mesic Prairie	Aquatic Submergent/ Emergent	2017 Mapped Aquatic Submergent/ Emergent	Shrub Carr	Mesic Prairie	Northern Sedge Meadow
Asiatic Day-Flower	*Commelina communis*	-	-	1.01	-	-	-	-	-
Barnyard Grass	*Echinochloa crus-galli*	1.22	0.64	-	-	-	1.41	-	1.98
Bittersweet Nightshade	*Solanum dulcamara*	-	-	1.01	-	-	-	-	-

Table 4. Invasive/Non-native Species Relative Coverage (%) (continued).

Species		Community							
Common Name	Scientific Name	Mesic Forest	Wet Mesic Forest	Wet Mesic Prairie	Aquatic Submergent/ Emergent	2017 Mapped Aquatic Submergent/ Emergent	Shrub Carr	Mesic Prairie	Northern Sedge Meadow
Black Bindweed	*Fallopia convolvulus*	0.61	-	-	-	-	0.70	-	-
Black Medic	*Medicago lupulina*	0.61	-	-	-	-	-	1.15	-
Black Mustard	*Brassica nigra*	-	-	-	-	-	0.70	1.15	-
Bladder Campion	*Silene vulgaris*	-	-	1.01	-	-	0.70	-	-
Bull Thistle	*Cirsium vulgare*	-	-	1.01	-	-	-	1.15	0.99
Butter and Eggs	*Linaria vulgaris*	0.61	0.64	1.01	-	-	0.70	2.30	0.99
Canada Thistle	*Cirsium arvense*	0.61	0.64	1.01	-	-	0.70	1.15	-
Catnip	*Nepeta cataria*	0.61	-	1.01	-	-	-	1.15	0.99
Charlock Mustard	*Sinapis arvensis*	-	-	-	-	-	0.70	-	-
Cheat Grass	*Bromus tectorum*	0.61	-	-	-	-	-	-	-
Common Burdock	*Arctium minus*	0.61	-	-	-	-	-	-	-
Common Knotweed	*Polygonum aviculare*	0.61	-	-	-	-	-	1.15	-
Common Mouse Ear Chickweed	*Cirastium fontanum*	0.61	0.64	1.01	-	-	-	-	-
Common mullein	*Verbascum Thapsus*	0.61	-	1.01	-	-	-	3.45	0.99
Common Plantain	*Plantago major*	0.61	-	-	-	-	-	-	-
Common Quick-weed	*Galinsoga quadriradriata*	-	0.64	-	-	-	-	-	-
Common Reed	*Phragmites australis*	-	-	1.37	-	-	-	-	0.99
Creeping Charlie	*Glechoma hederacea*	0.61	-	-	-	-	-	5.75	-
Curly Dock	*Rumex crispus*	0.61	-	1.01	-	-	-	-	-
Dame's Rocket	*Hesperis matronalis*	0.61	-	-	-	-	-	-	-
Dandelion	*Taraxacum officinale*	0.61	-	-	-	-	0.70	1.15	0.99

Table 4. Invasive/Non-native Species Relative Coverage (%) (continued).

Species		Community							
Common Name	Scientific Name	Mesic Forest	Wet Mesic Forest	Wet Mesic Prairie	Aquatic Submergent/ Emergent	2017 Mapped Aquatic Submergent/ Emergent	Shrub Carr	Mesic Prairie	Northern Sedge Meadow
Dog Mustard	*Erucastrum gallicum*	0.61	-	-	-	-	-	1.15	-
Birdsfoot Trefoil	*Lotus corniculatus*	0.61	-	-	-	-	-	-	-
Field Bindweed	*Convulvulus arvensis*	-	-	-	-	-	-	-	0.99
Field Daisy	*Leucanthemum vulgare*	-	-	-	-	-	-	1.15	
Field Sow Thistle	*Sonchus arvensis*	0.61	-	-	-	-	-	-	-
Foxtail Barley	*Hordeum jubatum*	0.61	-	-	-	-	-	-	-
Garlic Mustard	*Alliaria petiolata*	1.22	0.64	-	-	-	-	1.15	-
Giant Foxtail	*Setaria faberi*	0.61	-	-	-	-	-	1.15	-
Glossy Buckthorn	*Frangula alnus*	0.61	-	1.01	-	-	0.70	-	-
Hemp Nettle	*Galeopsis tetrahit*	1.22	0.64	1.01	-	-	0.70	-	0.99
Hoary Alyssum	*Berteroa incana*	-	-	1.01	-	-	-	8.05	-
Hound's Tongue	*Cynoglossum officinale*	0.61	-	-	-	-	-	1.15	-
Horse Nettle	*Solanum carolinense*	0.61	-	-	-	-	-	-	-
Hybrid Cattail	*Typha x glauca*	-	0.64	-	2.74	3.38	0.70	-	0.99
Kentucky Bluegrass	*Poa pratensis*	0.61	-	-	-	-	-	1.15	-
Marsh-Pepper Smartweed	*Persicaria hydropiper*	-	0.64	1.01	1.37	0.68	2.11	-	1.98
Motherwort	*Leonurus cardiac*	1.83	-	2.02	-	-	0.70	3.45	-
Oats	*Avena Sativa*	0.61	-	1.01	-	-	-	-	-
Orchard Grass	*Dactylis glomerata*	0.61	-	20.20	-		-	-	-
Pineapple Weed	*Matricaria discoidia*	-	-	-	-	-	-	1.15	-
Purple Loosestrife	*Lythrum salicaria*	-	0.64	-	1.37	0.68	0.70	-	-

Table 4. Invasive/Non-native Species Relative Coverage (%) (continued).

Species		Community							
Common Name	Scientific Name	Mesic Forest	Wet Mesic Forest	Wet Mesic Prairie	Aquatic Submergent/ Emergent	2017 Mapped Aquatic Submergent/ Emergent	Shrub Carr	Mesic Prairie	Northern Sedge Meadow
Prairie Pepperweed	*Lepidium densiflorum*	-	-	-	-	-	-	1.15	-
Quackgrass	*Elymus repens*	0.61	-	1.01	-	-	-	-	-
Queen Anne's-Lace	*Daucus carota*	-	-	1.01	-	-	-	-	-
Red Clover	*Trifolium pretense*	-	0.64	-	-	-	-	-	-
Reed Canary Grass	*Phalaris arundinacea*	-	0.64	2.02	-	1.35	0.70	1.15	2.97
Smooth Brome	*Bromus inermis*	0.61	-	-	-	-	-	-	-
Spotted Lady's Thumb	*Persicaria maculosa*	0.61	0.64	-	-	-	-	1.15	0.99
Spotted Knapweed	*Centaurea maculosa*	0.61	-	-	-	-	-	1.15	-
Spreading Bent Grass	*Agrostis stolonifera*	0.61	-	7.07	-	-	1.41	-	-
St. John's Wort	*Hypericaum perforatum*	-	-	-	-	-	-	1.15	-
Tartarian Honeysuckle	*Lonicera tatarica*	-	-	-	-	-	0.70	-	-
Timothy	*Phleum pretense*	-	-	-	-	-	-	1.15	-
White Clover	*Trifolium repens*	0.61	-	2.02	-	-	0.70	-	0.99
White Sweetclover	*Melilotus albus*	1.22	-	-	-	-	0.70	1.15	-
Wormseed Mustard	*Erysimum cheiranthoides*	0.61	-	1.01	-	-	-	1.15	-
Yellow foxtail	*Setaria pumila*	-	0.64	2.02	-	-	-	5.75	-
Yellow Rocket	*Barbarea vulgaris*	0.61	-	-	-	-	0.70	1.15	-

Wildlife

A total of 14 species were noted during the 2017 field season. There was one mammal, four herptiles and nine avian species. Observations were noted when personnel were on-site for monitoring activities (Table 5). An osprey successfully used one of the nesting platforms. There was no additional data gathered for nesting box use.

Table 5. Wildlife Observations.

Species		Year Observed		
Common Name	Scientific Name	2017	2018	2019
Mammals				
White-tailed Deer	*Odocoileus virginianus*			
Herptiles				
Eastern American Toad	*Bufo americanus americanus*			
Painted Turtle	*Chrysemys picta*			
Leopard Frog	*Lithobates pipiens*			
Common Garter Snake	*Thamnophis sirtalis*			
Birds				
Great Egret	*Ardea alba*			
Red-winged Blackbird	*Agelaius phoeniceus*			
Mallard	*Anas platyrhynchos*			
Great Blue Heron	*Ardea herodias*			
Bald Eagle	*Haleaeetus leucocephalus*			
Ringed-bill Gull	*Larus delawarensis*			
Belted Kingfisher	*Megaceryle alcyon*			
Osprey	*Pandion haliaetus*			
Common Tern	*Sterna hirundo*			

Conclusions & Recommendations

Overall, the condition of South Channel one year after restoration is relatively normal. Native species can take 2-3 years to begin developing after seeding and planting. During that time many non-native upland and wetland species can become established due to the high levels of disturbance during initial restoration efforts, which negatively impacts the coverage of native species. The Mesic Prairie and Wet Mesic Prairie have the lowest native cover at 44.83% and 45.45% respectively. Since it takes time for seeded prairie species to establish, it can be expected that weedy species fill in these areas in the early years after seeding. With continued maintenance by Applied Ecological Services (AES), the prairie should achieve desired native species coverage. The greatest concern is damage to the Mesic Prairie plantings on the berms since they are access points for performing maintenance activities. The disturbance and soil compaction caused from driving or repeatedly walking on the berms may prevent native species from dominating these areas. It is recommended that disturbance be confined and minimized on the berms. The areas will be re-evaluated in 2018 to monitor native species development and determine if supplemental seeding is required. Although not very abundant, species such as reed canary grass, *Phragmites* and purple loosestrife need to continue to be aggressively treated throughout the upcoming growing season. Continued treatment of narrow-leaved and hybrid cattail also needs to be performed, especially in areas near the Cattail Marsh Enhancement Community. Garlic mustard treatment also needs to continue to be performed, and it is crucial to continue garlic mustard control in the far eastern Mesic Forest to reduce the population and prevent future seed set in this area. Herbicide treatments and mowing operations should be conducted at the appropriate time of year to achieve best results. In some cases, maintenance activities should be conducted 2 or 3 times throughout the growing season in order to more effectively reduce populations. Continuation of invasive species control will be critical while planted and seeded communities fill in with desirable plant species.

The timed meander sampling protocol appears to be efficient in capturing the total number of species recorded at South Channel. During the 2017 surveys a total of 205 species were recorded across all communities. Of those 205 species 63 are non-native, and of those 63 there are only 4 species of

significant concern (reed canary grass, *Phragmites*, purple loosestrife & garlic mustard). The above species are currently under control in most areas, but will continue to need aggressive monitoring and treatments in order to maintain their suppression and inhibit their ability to become re-established.

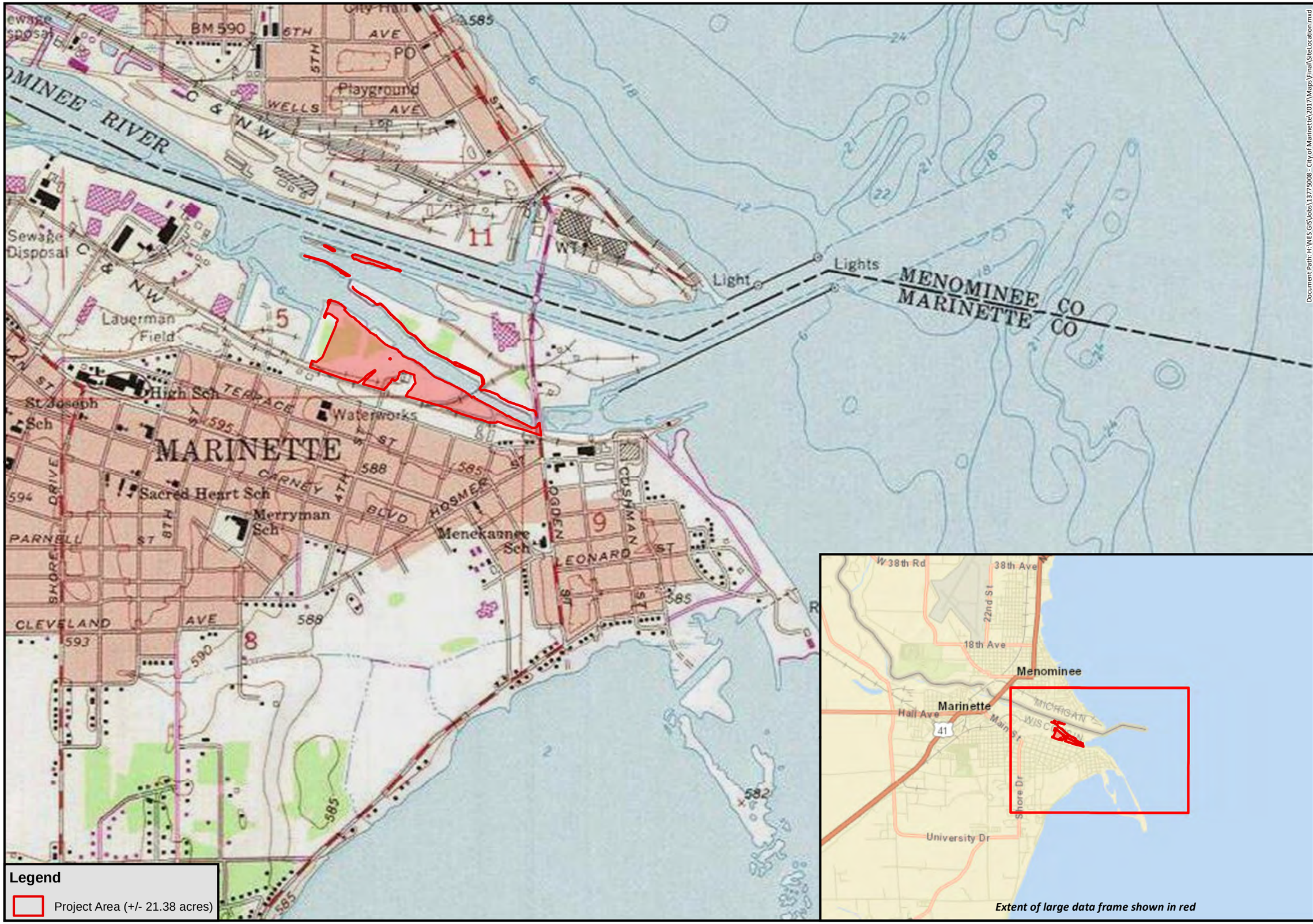

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Figure 1
Site Location

1/23/2018

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
Marinette County, Wisconsin

Located in part of:
Section 5,8, & 9, T30N, R24E
City of Marinette
Marinette County
Wisconsin

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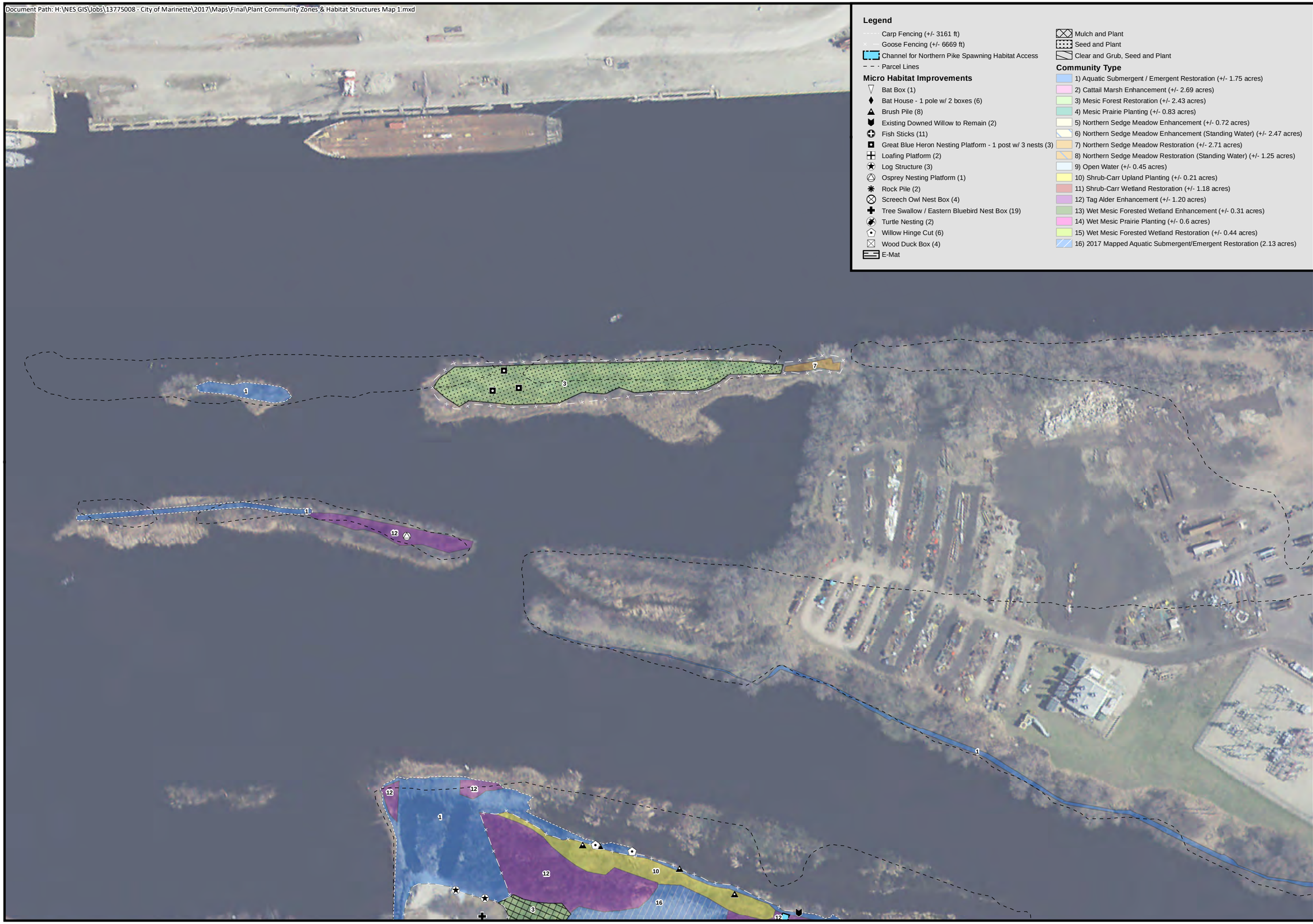

Legend

- Carp Fencing (+/- 3161 ft)
- Goose Fencing (+/- 6669 ft)
- Channel for Northern Pike Spawning Habitat Access
- Parcel Lines

Micro Habitat Improvements

- Bat Box (1)
- Bat House - 1 pole w/ 2 boxes (6)
- Brush Pile (8)
- Existing Downed Willow to Remain (2)
- Fish Sticks (11)
- Great Blue Heron Nesting Platform - 1 post w/ 3 nests (3)
- Loafing Platform (2)
- Log Structure (3)
- Osprey Nesting Platform (1)
- Rock Pile (2)
- Screech Owl Nest Box (4)
- Tree Swallow / Eastern Bluebird Nest Box (19)
- Turtle Nesting (2)
- Willow Hinge Cut (6)
- Wood Duck Box (4)
- E-Mat

- Mulch and Plant
- Seed and Plant
- Clear and Grub, Seed and Plant

Community Type

- 1) Aquatic Submergent / Emergent Restoration (+/- 1.75 acres)
- 2) Cattail Marsh Enhancement (+/- 2.69 acres)
- 3) Mesic Forest Restoration (+/- 2.43 acres)
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- 11) Shrub-Carr Wetland Restoration (+/- 1.18 acres)
- 12) Tag Alder Enhancement (+/- 1.20 acres)
- 13) Wet Mesic Forested Wetland Enhancement (+/- 0.31 acres)
- 14) Wet Mesic Prairie Planting (+/- 0.6 acres)
- 15) Wet Mesic Forested Wetland Restoration (+/- 0.44 acres)
- 16) 2017 Mapped Aquatic Submergent/Emergent Restoration (2.13 acres)

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Figure 2
Plant Community Zones & Habitat Structures Map 1

1/19/2018

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
Marinette County, Wisconsin

Sources: Robert E. Lee & Associates, Inc., Marinette County

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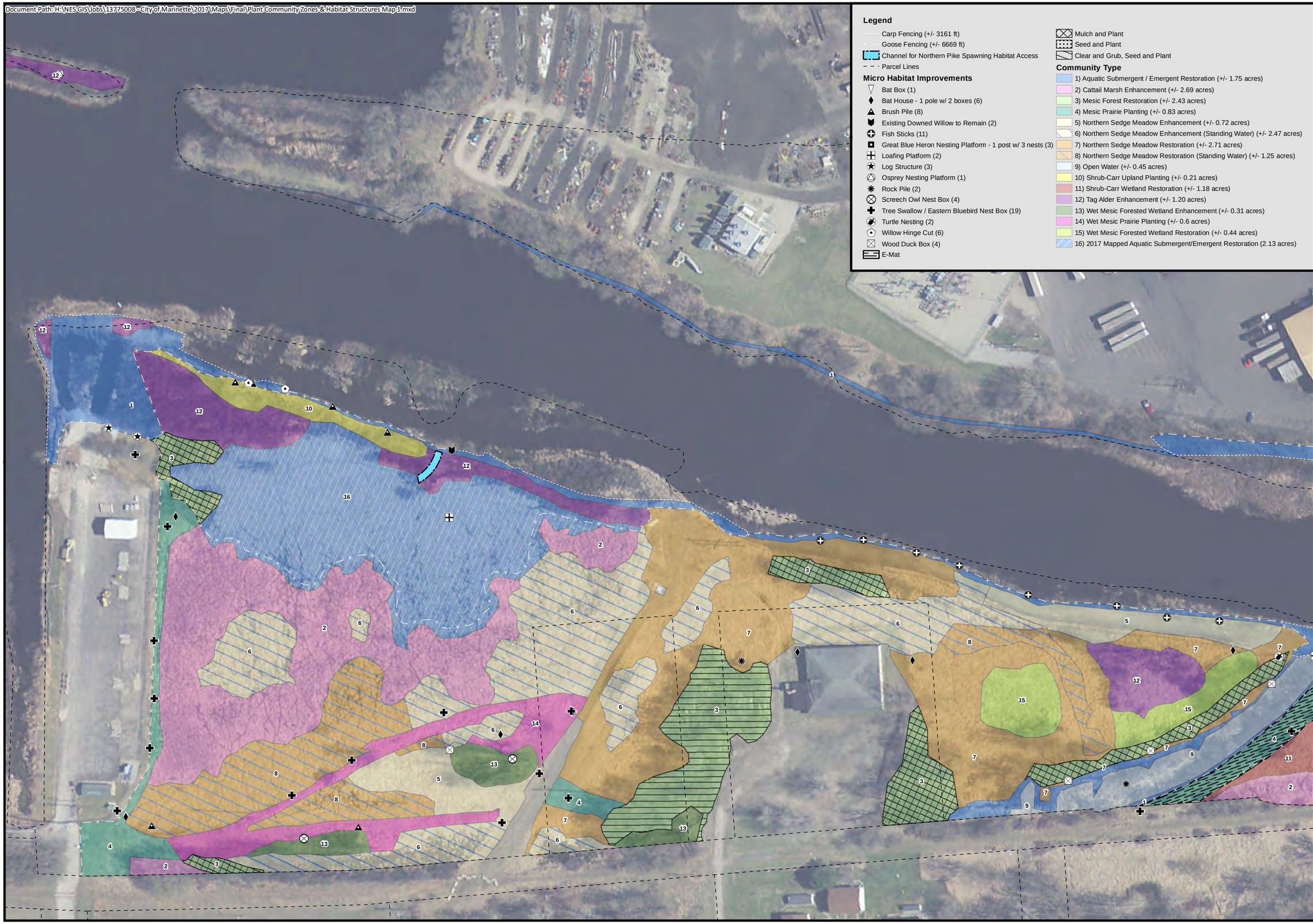

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Figure 2
Plant Community Zones & Habitat Structures Map 2

1/19/2018

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
Marinette County, Wisconsin

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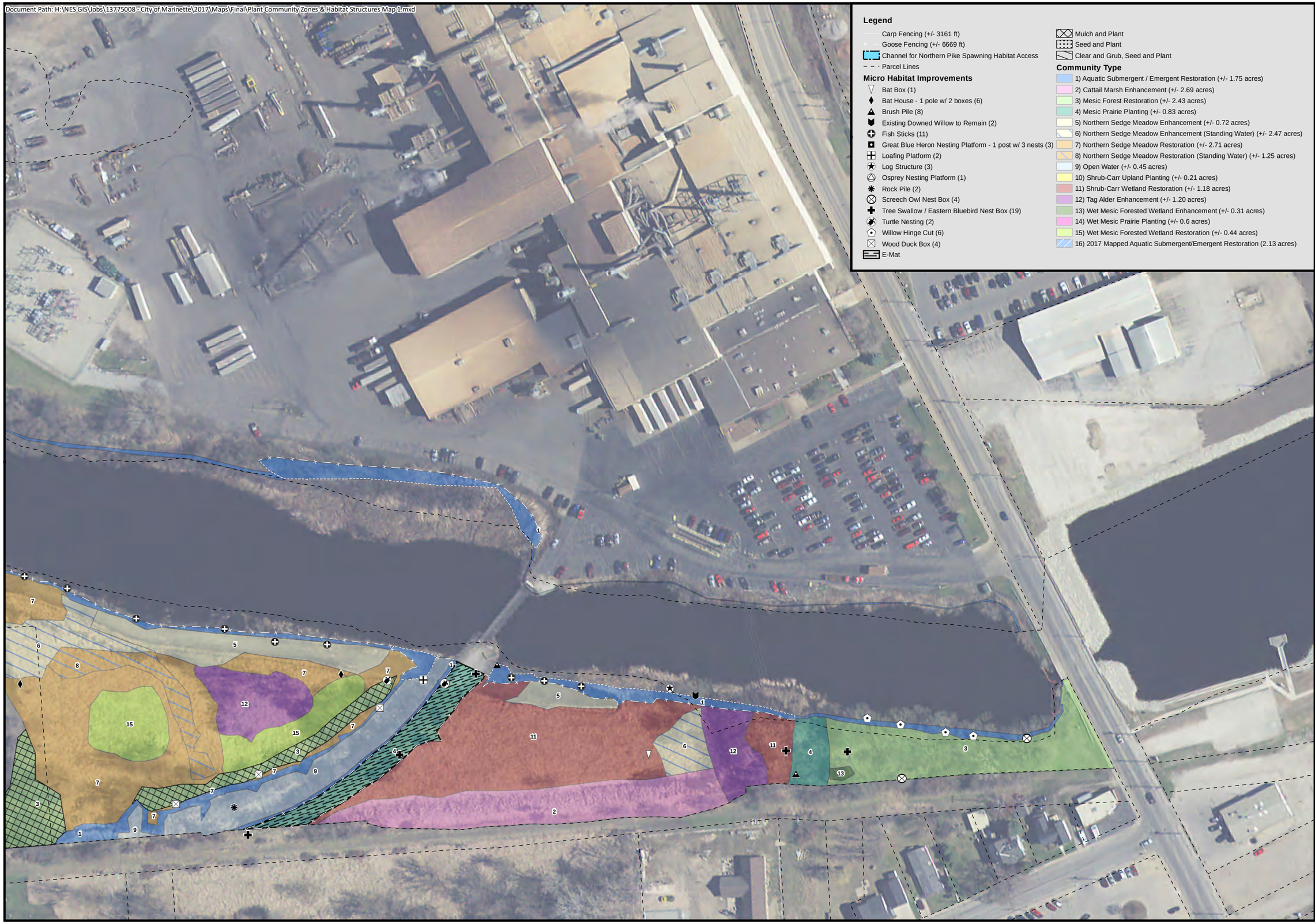

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Figure 2
Plant Community Zones & Habitat Structures Map 3

1/19/2018

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
Marinette County, Wisconsin

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Legend

- Photo Points
- Track Log
- Parcel Lines

Community Type

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Figure 3
Photo Points and
Track Log
Map 1

1/19/2018

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
Marinette County, Wisconsin

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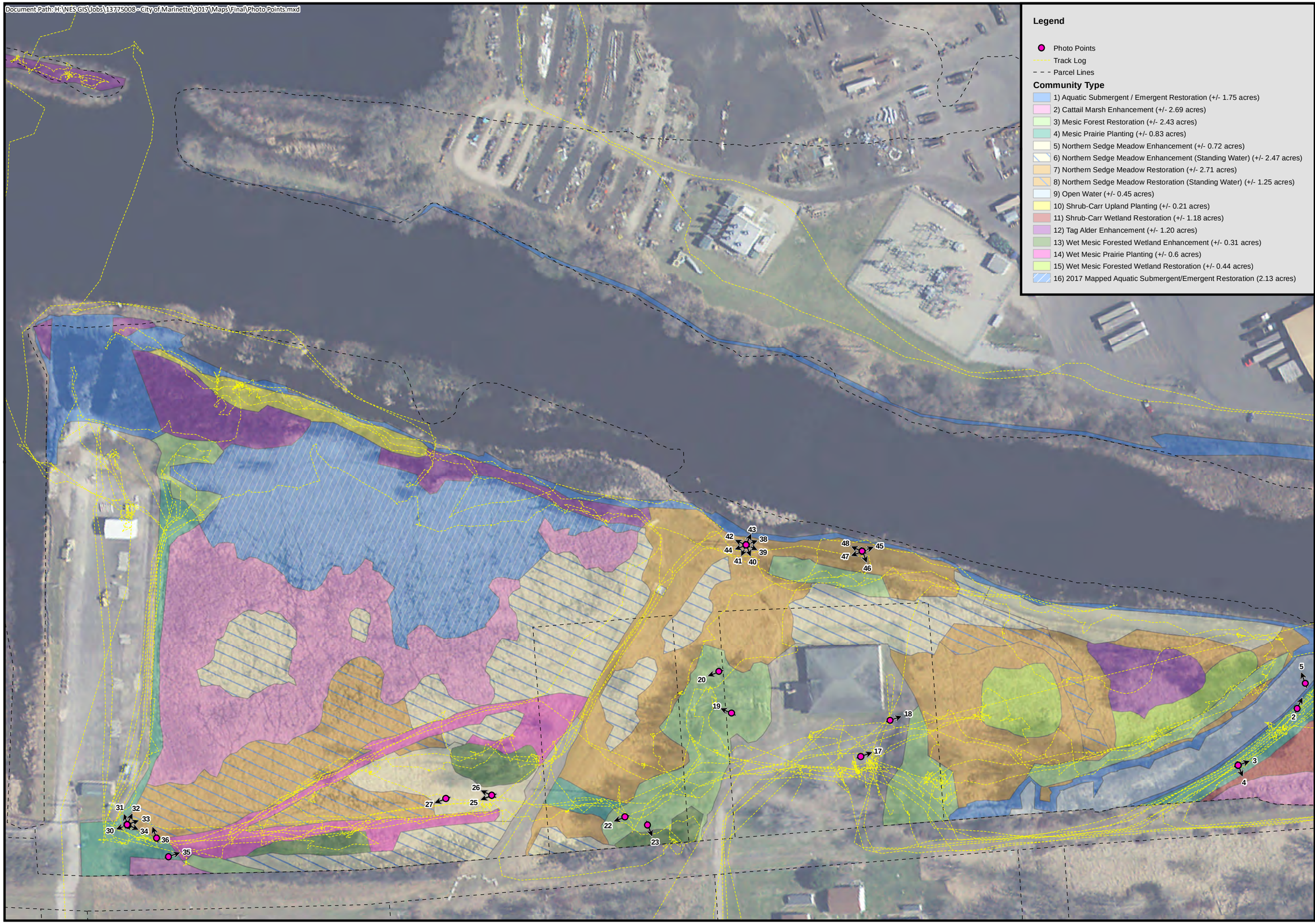

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Figure 3
Photo Points and
Track Log
Map 2

1/19/2018

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
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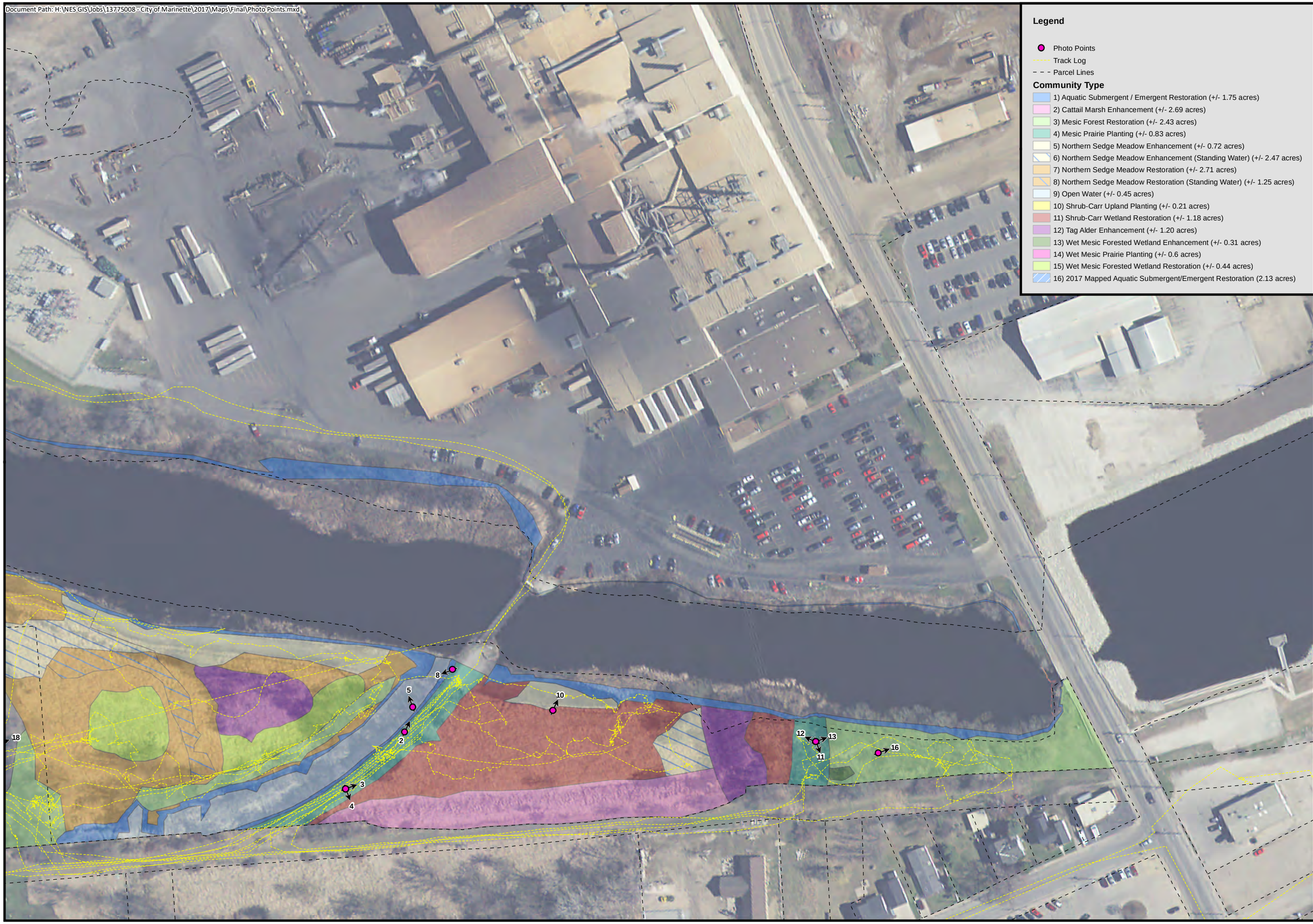

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Figure 3
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Track Log
Map 3

1/19/2018

City of Marinette
Preliminary Wetland Analysis
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City of Marinette
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A

APPENDIX A

Vegetation Survey Data

SITE NAME:
REFERENCE COMMUNITY: Mesic Forest Restoration
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta=CARSTR)	Absolute Cover (164)	Relative Cover (100.00)	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form		W	Dominant (117)
Herbaceous 5'	1	galtet	2	1.22	*Galeopsis tetrahit*	*brittle-stem hemp-nettle, common hemp-*	0	Introduced	annual	forb		x	x
	2	aceneg	50	30.49	*Acer negundo*	*box elder*	FAC	Native	perennial	tree		0	x
	3	allpet	2	1.22	*Alliaria petiolata*	*garlic mustard*	FAC / FACU	Introduced	biennial	forb		x	x
	4	acesac	1	0.61	*Acer saccharinum*	*silver maple, soft maple*	FACW	Native	perennial	tree		-3	
	5	acesaccharu	1	0.61	*Acer saccharum*	*hard maple, sugar maple*	FACU	Native	perennial	tree		3	
	6	horjub	1	0.61	*Hordeum jubatum*	*foxtail barley, squirrel-tail grass*	FAC	Introduced	perennial	grass		0	
	7	broine	1	0.61	*Bromus inermis*	*Smooth brome*	FACU / UPL	Introduced	perennial	grass		x	
	8	arcmin	1	0.61	*Arctium minus*	*common burdock, lesser burdock*	FACU	Introduced	biennial	forb		3	
	9	oxastr	1	0.61	*Oxalis stricta*	*common yellow oxalis*	FACU	Native	perennial	forb		3	
	10	parqui	1	0.61	*Parthenocissus quinquefolia*	*Virginia creeper, woodbine*	FACU	Native	perennial	vine		3	
	11	equarv	1	0.61	*Equisetum arvense*	*field horsetail*	FAC	Native	perennial	fern ally		0	
	12	cirarv	1	0.61	*Cirsium arvense*	*Canada thistle, creeping thistle, field thistle*	FACU	Introduced	perennial	forb		3	
	13	querub	1	0.61	*Quercus rubra*	*northern red oak*	FACU	Native	perennial	tree		3	
	14	vacang	1	0.61	*Vaccinium angustifolium*	*low-bush blueberry*	FACU	Native	perennial	shrub		3	
	15	ilever	1	0.61	*Ilex verticillata*	*common winterberry*	FACW	Native	perennial	shrub		-3	
	16	symcor	1	0.61	*Symphyotrichum cordifolium*	*common blue heart-leaved aster, common blue*	0	Native		0	0	x	
	17	trirep	1	0.61	*Trifolium repens*	*white clover*	FACU	Introduced	perennial	forb		3	
	18	echcru	2	1.22	*Echinochloa crus-galli*	*barnyard grass, large barnyard grass*	FACW / FAC	Introduced	annual	grass		x	x
	19	pancap	2	1.22	*Panicum capillare*	*witch grass*	FAC	Native		0	0	0	x
	20	brotec	1	0.61	*Bromus tectorum*	*cheat grass, downy brome, downy chess, June*	0	Introduced	annual	grass		x	
	21	elyhys	1	0.61	*Elymus hystrix*	*bottlebrush grass, eastern bottlebrush grass,*	FACU	Native	perennial	grass		3	
	22	thuocc	1	0.61	*Thuja occidentalis*	*northern white-cedar*	FACW	Native	perennial	tree		-3	
	23	samcan	1	0.61	*Sambucus canadensis*	*elderberry*	FACU	Native	perennial	shrub		3	
	24	erehie	1	0.61	*Erechtites hieraciifolius*	*fireweed*	0	Native	annual	forb		x	
	25	popbal	3	1.83	*Populus balsamifera*	*balsam poplar, hackmatack*	FACW	Native	perennial	tree		-3	x
	26	corser	1	0.61	*Cornus sericea*	*red osier dogwood*	FACW	Native	perennial	shrub		-3	
	27	vertha	1	0.61	*Verbascum thapsus*	*common mullein*	UPL	Introduced	biennial	forb		5	
	28	carpen	2	1.22	*Carex pensylvanica*	*Pennsylvania sedge*	0	Native	perennial	sedge		x	x
	29	melalb	2	1.22	*Melilotus albus*	*white sweet-clover*	0	Introduced	annual/bien-ial	forb		x	x
	30	falcon	1	0.61	*Fallopia convolvulus*	*black-bindweed, false buckwheat*	FACU	Introduced		0	0	3	
	31	rubida	1	0.61	*Rubus idaeus*	*wild red raspberry*	FACU / FAC*	Native	perennial	shrub		x	
	32	eupgly	1	0.61	*Euphorbia glyptosperma*	*rib-seed sand-mat, ridge-seeded spurge*	0	Native		0	0	x	
	33	medlup	1	0.61	*Medicago lupulina*	*black medick*	FACU	Introduced	annual/bien-ial	forb		3	
	34	taroff	1	0.61	*Taraxacum officinale*	*common dandelion*	FACU	Introduced	perennial	forb		3	
	35	glehed	1	0.61	*Glechoma hederacea*	*creeping-Charlie*	FACU	Introduced	perennial	forb		3	
	36	athfil	1	0.61	*Athyrium filix-femina*	*common lady fern*	0	Native	perennial	fern		x	
	37	sonarv	1	0.61	*Sonchus arvensis*	*field sow-thistle*	FACU	Introduced	perennial	forb		3	
	38	drymar	1	0.61	*Dryopteris marginalis*	*marginal shield fern, marginal wood fern*	FACU	Native	perennial	fern		3	
	39	setfab	1	0.61	*Setaria faberi*	*Chinese foxtail, giant foxtail, Japanese bristle*	FACU	Introduced	annual	grass		3	
	40	poapra	1	0.61	*Poa pratensis*	*Kentucky bluegrass*	FAC / FACU	Introduced	perennial	grass		x	
	41	urtdio	2	1.22	*Urtica dioica*	*stinging nettle*	FACW / FAC	Native	perennial	forb		x	x
	42	ascsyr	1	0.61	*Asclepias syriaca*	*common milkweed*	FACU / UPL	Native	perennial	forb		x	
	43	pinstr	1	0.61	*Pinus strobus*	*eastern white pine*	FACU	Native	perennial	tree		3	
	44	poptre	1	0.61	*Populus tremuloides*	*aspen, quaking aspen, trembling aspen*	FAC / FAC*	Native	perennial	tree		x	
	45	frapen	5	3.05	*Fraxinus pennsylvanica*	*green ash, red ash*	FACW	Native	perennial	tree		-3	x
	46	celocc	1	0.61	*Celtis occidentalis*	*northern hackberry*	FAC	Native	perennial	tree		0	
	47	tilame	1	0.61	*Tilia americana*	*American linden, basswood*	FACU	Native	perennial	tree		3	
	48	abibal	1	0.61	*Abies balsamea*	*balsam fir*	FACW / FAC	Native	perennial	tree		x	
	49	calcan	1	0.61	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass		-5	
	50	salnig	5	3.05	*Salix nigra*	*black willow*	OBL	Native	perennial	tree		-5	x
	51	lycame	1	0.61	*Lycopus americanus*	*common water-horehound*	OBL	Native	perennial	forb		-5	
	52	censto	1	0.61	*Centaurea stoebe*	*spotted knapweed*	UPL	Introduced	biennial/per-----i-	forb		5	
	53	cerfon	1	0.61	*Cerastium fontanum*	*common mouse-ear chickweed*	FACU	Introduced	perennial	forb		3	
	54	sciatr	1	0.61	*Scirpus atrovirens*	*dark-green bulrush*	OBL	Native	perennial	sedge		-5	
	55	ulmrub	1	0.61	*Ulmus rubra*	*red elm, slippery elm*	FAC	Native	perennial	tree		0	
	56	lotcor	1	0.61	*Lotus corniculatus*	*bird's-foot trefoil*	FACU	Introduced	perennial	forb		3	
	57	picgla	1	0.61	*Picea glauca*	*white spruce*	FACU	Native	perennial	tree		3	
	58	tsucan	1	0.61	*Tsuga canadensis*	*northern hemlock*	FACU	Native	perennial	tree		3	
	59	epicil	1	0.61	*Epilobium ciliatum*	*hairy willow-herb*	FACW	Native	perennial	forb		-3	
	60	elycan	1	0.61	*Elymus canadensis*	*Canada wild-rye, Great Plains wild-rye*	FACU	Native	perennial	grass		3	
	61	cypesc	1	0.61	*Cyperus esculentus*	*field nut sedge*	FACW	Native		0	0	-3	
	62	permac	1	0.61	*Persicaria maculosa*	*heart's-ease, spotted lady's-thumb*	FACW / FAC	Introduced	annual		0	x	
	63	plamaj	1	0.61	*Plantago major*	*common plantain*	FAC / FACU	Introduced	perennial	forb		x	
	64	lepvir	1	0.61	*Lepidium virginicum*	*common peppergrass, poor-man's-pepper,*	FACU	Native		0	0	3	
	65	erugal	1	0.61	*Erucastrum gallicum*	*common dog-mustard, dog-mustard*	0	Introduced	annual/bien-ial	forb		x	
	66	despin	1	0.61	*Descurainia pinnata*	*pinnate tansy mustard, western tansy mustard*	0	Native		0	0	x	
	67	polavi	1	0.61	*Polygonum aviculare*	*common knotweed*	FAC / FACU	Introduced	annual	forb		x	
	68	elyrep	1	0.61	*Elymus repens*	*quackgrass*	FACU	Introduced	perennial	grass		3	
	69	percar	1	0.61	*Persicaria careyi*	*Carey's heart's-ease, Carey's smartweed*	FACW	Native	annual	forb		-3	
	70	barvul	1	0.61	*Barbarea vulgaris*	*winter-cress, yellow-rocket*	FAC	Introduced	biennial/per-----i-	forb		0	
	71	avesat	1	0.61	*Avena sativa*	*oats*	UPL	Introduced	annual	grass		5	
	72	dacglo	1	0.61	*Dactylis glomerata*	*orchard grass*	FACU	Introduced	perennial	grass		3	
	73	hesmat	1	0.61	*Hesperis matronalis*	*dame's rocket*	FACU	Introduced	biennial/per-----i-	forb		3	
	74	pruvul	1	0.61	*Prunella vulgaris*	*heal-all*	FAC	Native	perennial	forb		0	
	75	rumcri	1	0.61	*Rumex crispus*	*curly dock*	FAC	Introduced	perennial	forb		0	
	76	stapal	1	0.61	*Stachys palustris*	*hedge-nettle, marsh hedge-nettle, woundwort*	OBL	Native	perennial	forb		-5	
	77	spapec	1	0.61	*Spartina pectinata*	*prairie cord grass*	FACW	Native	perennial	grass		-3	
	78	alninc	1	0.61	*Alnus incana*	*speckled alder, tag alder*	FACW	Native	perennial	shrub		-3	
	79	pinstr	1	0.61	*Pinus strobus*	*eastern white pine*	FACU	Native	perennial	tree		3	
	80	vibtri	1	0.61	*Viburnum trilobum*	*American cranberry-bush*	FAC / FACW	Native	perennial	shrub		x	
	81	linvul	1	0.61	*Linaria vulgaris*	*butter-and-eggs*	UPL	Introduced	perennial	forb		5	
	82	verhas	1	0.61	*Verbena hastata*	*blue vervain, simpler's-joy, swamp verbena*	FACW	Native	biennial/per-----i-	forb		-3	
	83	cynoff	1	0.61	*Cynoglossum officinale*	*common hound's-tongue, gypsy-flower*	FACU / UPL	Introduced	biennial	forb		x	
	84	solcar1	1	0.61	*Solanum carolinense*	*Carolina horse-nettle, horse-nettle*	FACU	Introduced		0	0	3	
	85	nepcat	1	0.61	*Nepeta cataria*	*catnip*	FACU	Introduced	perennial	forb		3	
	86	boecyl	1	0.61	*Boehmeria cylindrica*	*small-spike false nettle*	OBL	Native	perennial	forb		-5	
	87	viosor	1	0.61	*Viola sororia*	*common blue violet*	FAC	Native	annual/pere-----i-	forb		0	
	88	leocar	3	1.83	*Leonurus cardiaca*	*lion's-tail, motherwort*	0	Introduced	perennial	forb		x	x
	89	agrsto	1	0.61	*Agrostis stolonifera*	*creeping bent grass, creeping tickle grass*	FACW	Introduced	perennial	grass		-3	
	90	ribame	1	0.61	*Ribes americanum*	*American black currant*	FACW	Native	perennial	shrub		-3	
	91	ambart	1	0.61	*Ambrosia artemisiifolia*	*short ragweed*	FACU	Native	annual	forb		3	
	92	rosbla	1	0.61	*Rosa blanda*	*smooth rose, wild rose*	FACU	Native	perennial	shrub		3	
	93	fraaln	1	0.61	*Frangula alnus*	*glossy buckthorn*	FACW / FAC	Introduced	perennial	shrub		x	
	94	eryche	1	0.61	*Erysimum cheiranthoides*	*worm-seed mustard, worm-seed wallflower*	FACU	Introduced	annual	forb		3	
	95	jugnig	1	0.61	*Juglans nigra*	*black walnut*	FACU	Native	perennial	tree		3	
	96	camame1	1	0.61	*Campanulastrum americanum*	*American bellflower, tall bellflower*	FAC	Native		0	0	0	

Species Richness:

Total Species	96
Native Species	57
Non-Native Species	39
Proportion Native Cover	59.38
Percent Cover Native	72.56
Percent Cover Non-Native	27.44

Floristic Quality Metrics: Native Species Only

Unweighted Mean C	3.80
Unweighted FQI	28.70
Weighted Mean C (wC)	3.63
Weighted FQI (wFQIn)	27.42

Floristic Quality Metrics: All Species

Unweighted Mean C	2.26
Unweighted FQIa	22.11
Weighted Mean C (wCa)	1.51
Weighted FQI (wFQIa)	14.82

Wetland Species:

Mean W	0.76
Native Wetland Species	27
Percent Native Wetland Species	28.13
Percent Cover Native Wetland Species	87

Dominance

Percent Total Aerial Coverage	164
50%	82
20%	32.8

SITE NAME:
REFERENCE COMMUNITY: Wet-Mesic Forested Wetland Enhancement & Wet Mesic Forested Restoration
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

			156	100.00	142								
	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	Absolute Cover	Relative Cover	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form		W	Dominant
Herbaceous 5'	1	galtet	1	0.64	*Galeopsis tetrahit*	*brittle-stem hemp-nettle, common hemp-nettle, hemp-nettle*	0	Introduced	annual	forb		x	
	2	permac	1	0.64	*Persicaria maculosa*	*heart's-ease, spotted lady's-thumb*	FACW / FAC	Introduced	annual		0	x	
	3	allpet	1	0.64	*Alliaria petiolata*	*garlic mustard*	FAC / FACU	Introduced	biennial	forb		x	
	4	ascsyr	1	0.64	*Asclepias syriaca*	*common milkweed*	FACU / UPL	Native	perennial	forb		x	
	5	galqua	1	0.64	*Galinsoga quadriradiata*	*common quick-weed, Peruvian-daisy, quick-weed, shaggy-soldier*	FACU	Introduced	annual	forb		3	
	6	equarv	1	0.64	*Equisetum arvense*	*field horsetail*	FAC	Native	perennial	fern ally		0	
	7	erehie	1	0.64	*Erechtites hieraciifolius*	*fireweed*	0	Native	annual	forb		x	
	8	parqui	1	0.64	*Parthenocissus quinquefolia*	*Virginia creeper, woodbine*	FACU	Native	perennial	vine		3	
	9	oxastr	1	0.64	*Oxalis stricta*	*common yellow oxalis*	FACU	Native	perennial	forb		3	
	10	fravir	1	0.64	*Fragaria virginiana*	*wild strawberry*	FACU	Native	perennial	forb		3	
	11	cirarv	1	0.64	*Cirsium arvense*	*Canada thistle, creeping thistle, field thistle*	FACU	Introduced	perennial	forb		3	
	12	camapa	1	0.64	*Campanula aparinoides*	*marsh bellflower*	OBL	Native	perennial	forb		-5	
	13	vibtri	1	0.64	*Viburnum trilobum*	*American cranberry-bush*	FAC / FACW	Native	perennial	shrub		x	
	14	persag	1	0.64	*Persicaria sagittata*	*arrow-leaved tearthumb*	OBL	Native	annual	vine		-5	
	15	loncan	1	0.64	*Lonicera canadensis*	*American fly honeysuckle*	FACU	Native	perennial	shrub		3	
	16	stapal	1	0.64	*Stachys palustris*	*hedge-nettle, marsh hedge-nettle, woundwort*	OBL	Native	perennial	forb		-5	
	17	impcap	1	0.64	*Impatiens capensis*	*orange jewelweed*	FACW	Native	annual	forb		-3	
	18	cerfon	1	0.64	*Cerastium fontanum*	*common mouse-ear chickweed*	FACU	Introduced	perennial	forb		3	
	19	ribame	1	0.64	*Ribes americanum*	*American black currant*	FACW	Native	perennial	shrub		-3	
	20	thadas	1	0.64	*Thalictrum dasycarpum*	*purple meadow-rue, tall meadow-rue*	FACW	Native	perennial	forb		-3	
	21	betpum	1	0.64	*Betula pumila*	*bog birch, dwarf birch, swamp birch*	OBL	Native	perennial	shrub		-5	
	22	acesac	5	3.21	*Acer saccharinum*	*silver maple, soft maple*	FACW	Native	perennial	tree		-3	x
	23	picgla	1	0.64	*Picea glauca*	*white spruce*	FACU	Native	perennial	tree		3	
	24	aceneg	60	38.46	*Acer negundo*	*box elder*	FAC	Native	perennial	tree		0	x
	25	echcru	1	0.64	*Echinochloa crus-galli*	*barnyard grass, large barnyard grass*	FACW / FAC	Introduced	annual	grass		x	
	26	thuocc	1	0.64	*Thuja occidentalis*	*northern white-cedar*	FACW	Native	perennial	tree		-3	
	27	samcan	1	0.64	*Sambucus canadensis*	*elderberry*	FACU	Native	perennial	shrub		3	
	28	corser	1	0.64	*Cornus sericea*	*red osier dogwood*	FACW	Native	perennial	shrub		-3	
	29	setpum	1	0.64	*Setaria pumila*	*pigeon grass, yellow foxtail*	FAC	Introduced	annual	grass		0	
	30	urtdio	1	0.64	*Urtica dioica*	*stinging nettle*	FACW / FAC	Native	perennial	forb		x	
	31	frapen	3	1.92	*Fraxinus pennsylvanica*	*green ash, red ash*	FACW	Native	perennial	tree		-3	
	32	calcan	10	6.41	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass		-5	x
	33	lycame	1	0.64	*Lycopus americanus*	*common water-horehound*	OBL	Native	perennial	forb		-5	
	34	perpen	1	0.64	*Persicaria pensylvanica*	*Pennsylvania knotweed*	FACW	Native	annual	forb		-3	
	35	bidfro	2	1.28	*Bidens frondosa*	*common beggar-ticks*	FACW	Native	annual	forb		-3	
	36	spaame	1	0.64	*Sparganium americanum*	*American bur-reed*	OBL	Native	perennial	aquatic		-5	
	37	lytsal	1	0.64	*Lythrum salicaria*	*purple loosestrife*	OBL	Introduced	perennial	forb		-5	
	38	tripra	1	0.64	*Trifolium pratense*	*red clover*	FACU	Introduced	perennial	forb		3	
	39	tsucan	1	0.64	*Tsuga canadensis*	*northern hemlock*	FACU	Native	perennial	tree		3	
	40	epicil	1	0.64	*Epilobium ciliatum*	*hairy willow-herb*	FACW	Native	perennial	forb		-3	
	41	elycan	1	0.64	*Elymus canadensis*	*Canada wild-rye, Great Plains wild-rye*	FACU	Native	perennial	grass		3	
	42	phaaru	1	0.64	*Phalaris arundinacea*	*reed canary grass*	FACW	Introduced	perennial	grass		-3	
	43	scicyp	1	0.64	*Scirpus cyperinus*	*wool-grass*	OBL	Native	perennial	sedge		-5	
	44	carlac	5	3.21	*Carex lacustris*	*common lake sedge*	OBL	Native	perennial	sedge		-5	x
	45	larlar	1	0.64	*Larix laricina*	*larch, tamarack*	FACW	Native	perennial	tree		-3	
	46	schtab	1	0.64	*Schoenoplectus tabernaemontani*	*soft-stem bulrush*	OBL	Native	perennial	sedge		-5	
	47	mencan	1	0.64	*Mentha canadensis*	*field mint, wild mint*	0	Native	perennial	forb		x	
	48	bidcer	1	0.64	*Bidens cernua*	*nodding beggar-ticks*	OBL	Native	annual	forb		-5	
	49	typgla	1	0.64	*Typha X glauca*	*hybrid cat-tail, white cat-tail*	OBL	Introduced	perennial	semi-aquatic		-5	
	50	sculat	1	0.64	*Scutellaria lateriflora*	*blue skullcap, mad-dog skullcap*	OBL	Native	perennial	forb		-5	
	51	cypbip	1	0.64	*Cyperus bipartitus*	*shining flat sedge, slender flat sedge*	OBL / FACW	Native	annual	sedge		x	
	52	cypesc	2	1.28	*Cyperus esculentus*	*field nut sedge*	FACW	Native		0	0	-3	
	53	alitri	1	0.64	*Alisma triviale*	*northern water-plantain*	OBL	Native	perennial	semi-aquatic		-5	
	54	lemmin	1	0.64	*Lemna minor*	*common duckweed*	OBL	Native	perennial	aquatic		-5	
	55	perhyd	1	0.64	*Persicaria hydropiper*	*marsh-pepper smartweed, water-pepper*	OBL	Introduced	annual	forb		-5	
	56	mimrin	1	0.64	*Mimulus ringens*	*monkey-flower*	OBL	Native		0	0	-5	
	57	quemac	1	0.64	*Quercus macrocarpa*	*bur oak*	FAC / FACU	Native	perennial	tree		x	
	58	eupper	1	0.64	*Eupatorium perfoliatum*	*boneset*	OBL / FACW	Native	perennial	forb		x	
	59	polrep	1	0.64	*Polemonium reptans*	*spreading Jacob's-ladder*	FAC	Native		0	0	0	
	60	ambtri	1	0.64	*Ambrosia trifida*	*giant ragweed*	FAC	Native	annual	forb		0	
	61	carstr	5	3.21	*Carex stricta*	*tussock sedge*	OBL	Native	perennial	sedge		-5	x
	62	spialb	1	0.64	*Spiraea alba*	*white meadowsweet*	FACW	Native	perennial	shrub		-3	
	63	linvul	1	0.64	*Linaria vulgaris*	*butter-and-eggs*	UPL	Introduced	perennial	forb		5	
	64	verhas	1	0.64	*Verbena hastata*	*blue vervain, simpler's-joy, swamp verbena*	FACW	Native	biennial/per ennial	forb		-3	
	65	poapal	1	0.64	*Poa palustris*	*marsh bluegrass*	FACW	Native	perennial	grass		-3	
	66	iriver	1	0.64	*Iris versicolor*	*northern blue flag*	OBL	Native	perennial	forb		-5	
	67	potnor	1	0.64	*Potentilla norvegica*	*Norwegian cinquefoil*	FAC	Native	annual/per ennial	forb		0	
	68	ransce	1	0.64	*Ranunculus sceleratus*	*celery-leaf buttercup*	OBL	Native	annual/per ennial	forb		-5	
	69	onosen	1	0.64	*Onoclea sensibilis*	*sensitive fern*	FACW	Native	perennial	fern		-3	
	70	pancap	2	1.28	*Panicum capillare*	*witch grass*	FAC	Native		0	0	0	
	71	jugnig	1	0.64	*Juglans nigra*	*black walnut*	FACU	Native	perennial	tree		3	

Species Richness:

Total Species	71
Native Species	57
Non-Native Species	14
Proportion Native Cover	80.28
Percent Cover Native	91.03
Percent Cover Non-Native	8.97

Floristic Quality Metrics: Native Species Only

Unweighted Mean C	3.93
Unweighted FQI	29.67
Weighted Mean C (wC)	2.36
Weighted FQI (wFQIn)	17.81

Floristic Quality Metrics: All Species

Unweighted Mean C	3.15
Unweighted FQIa	26.58
Weighted Mean C (wCa)	2.15
Weighted FQI (wFQIa)	18.09

Wetland Species:

Mean W	-1.90
Native Wetland Species	40
Percent Native Wetland Species	56.34
Percent Cover Native Wetland Species	80

Dominance

Percent Total Aerial Coverage	156
50%	78
20%	31.2

SITE NAME:
REFERENCE COMMUNITY: Wet Mesic Prairie Planting
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

			99	100.00	45									
	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	Absolute Cover	Relative Cover	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form		W	Dominant	
Herbaceous 5'	1	avesat	1	1.01	*Avena sativa*	*oats*	UPL	Introduced	annual	grass		5		
	2	verhas	5	5.05	*Verbena hastata*	*blue vervain, simpler's-joy, swamp verbena*	FACW	Native	biennial/perennial	forb		-3	X	
	3	monfis	5	5.05	*Monarda fistulosa*	*bee balm, wild bergamot*	FACU	Native	perennial	forb		3	X	
	4	oxastr	1	1.01	*Oxalis stricta*	*common yellow oxalis*	FACU	Native	perennial	forb		3		
	5	calcan	7	7.07	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass		-5	X	
	6	galtet	1	1.01	*Galeopsis tetrahit*	*brittle-stem hemp-nettle, common hemp-nettle, hemp-nettle*	0	Introduced	annual	forb		x		
	7	cirarv	1	1.01	*Cirsium arvense*	*Canada thistle, creeping thistle, field thistle*	FACU	Introduced	perennial	forb		3		
	8	agafoe	1	1.01	*Agastache foeniculum*	*blue giant hyssop, fragrant giant hyssop, lavender giant hyssop*	0	Native	perennial	forb		x		
	9	urtdio	3	3.03	*Urtica dioica*	*stinging nettle*	FACW / FAC	Native	perennial	forb		x		
	10	vertha	1	1.01	*Verbascum thapsus*	*common mullein*	UPL	Introduced	biennial	forb		5		
	11	phaaru	2	2.02	*Phalaris arundinacea*	*reed canary grass*	FACW	Introduced	perennial	grass		-3		
	12	rudhir	2	2.02	*Rudbeckia hirta*	*black-eyed Susan*	FACU	Native	0		0	3		
	13	oenbie	1	1.01	*Oenothera biennis*	*common evening-primrose*	FACU	Native	biennial/perennial	forb		3		
	14	leocar	2	2.02	*Leonurus cardiaca*	*lion's-tail, motherwort*	0	Introduced	perennial	forb		x		
	15	erehie	1	1.01	*Erechtites hieraciifolius*	*fireweed*	0	Native	annual	forb		x		
	16	eryche	1	1.01	*Erysimum cheiranthoides*	*worm-seed mustard, worm-seed wallflower*	FACU	Introduced	annual	forb		3		
	17	nepcat	1	1.01	*Nepeta cataria*	*catnip*	FACU	Introduced	perennial	forb		3		
	18	perhyd	1	1.01	*Persicaria hydropiper*	*marsh-pepper smartweed, water-pepper*	OBL	Introduced	annual	forb		-5		
	19	lycame	1	1.01	*Lycopus americanus*	*common water-horehound*	OBL	Native	perennial	forb		-5		
	20	setpum	2	2.02	*Setaria pumila*	*pigeon grass, yellow foxtail*	FAC	Introduced	annual	grass		0		
	21	silvul	1	1.01	*Silene vulgaris*	*bladder-campion, maiden's-tears*	0	Introduced	perennial	forb		x		
	22	elyrep	1	1.01	*Elymus repens*	*quackgrass*	FACU	Introduced	perennial	grass		3		
	23	linvul	1	1.01	*Linaria vulgaris*	*butter-and-eggs*	UPL	Introduced	perennial	forb		5		
	24	cirvul	1	1.01	*Cirsium vulgare*	*bull thistle, common thistle*	FACU	Introduced	biennial	forb		3		
	25	dacglo	20	20.20	*Dactylis glomerata*	*orchard grass*	FACU	Introduced	perennial	grass		3	X	
	26	poapal	5	5.05	*Poa palustris*	*marsh bluegrass*	FACW	Native	perennial	grass		-3	X	
	27	fraaln	1	1.01	*Frangula alnus*	*glossy buckthorn*	FACW / FAC	Introduced	perennial	shrub		x		
	28	soldul	1	1.01	*Solanum dulcamara*	*bittersweet nightshade*	FAC	Introduced	perennial	vine		0		
	29	andger	2	2.02	*Andropogon gerardii*	*big blue-stem, turkey-foot*	FAC / FACU	Native	perennial	grass		x		
	30	comcom	1	1.01	*Commelina communis*	*Asiatic day-flower, common day-flower*	FACU / FAC	Introduced	annual	forb		x		
	31	agrsto	7	7.07	*Agrostis stolonifera*	*creeping bent grass, creeping tickle grass*	FACW	Introduced	perennial	grass		-3	X	
	32	spapec	1	1.01	*Spartina pectinata*	*prairie cord grass*	FACW	Native	perennial	grass		-3		
	33	lobsip	2	2.02	*Lobelia siphilitica*	*great blue lobelia*	OBL / FACW	Native	perennial	forb		x		
	34	ascsyr	3	3.03	*Asclepias syriaca*	*common milkweed*	FACU / UPL	Native	perennial	forb		x		
	35	daucar	1	1.01	*Daucus carota*	*Queen Anne's-lace*	UPL	Introduced	biennial	forb		5		
	36	rumcri	1	1.01	*Rumex crispus*	*curly dock*	FAC	Introduced	perennial	forb		0		
	37	trirep	2	2.02	*Trifolium repens*	*white clover*	FACU	Introduced	perennial	forb		3		
	38	eryche	1	1.01	*Erysimum cheiranthoides*	*worm-seed mustard, worm-seed wallflower*	FACU	Introduced	annual	forb		3		
	39	cerfon	1	1.01	*Cerastium fontanum*	*common mouse-ear chickweed*	FACU	Introduced	perennial	forb		3		
	40	berinc	1	1.01	*Berteroa incana*	*hoary false madwort, hoary-alyssum*	0	Introduced	annual/perennial	forb		x		
	41	carmuh	5	5.05	*Carex muhlenbergii*	*sand sedge*	0	Native	perennial	sedge		x	X	

Species Richness:

Total Species	41
Native Species	16
Non-Native Species	25
Proportion Native Cover	39.02
Percent Cover Native	45.45
Percent Cover Non-Native	54.55

Floristic Quality Metrics: Native Species Only

Unweighted Mean C	3.31
Unweighted FQI	13.25
Weighted Mean C (wC)	3.56
Weighted FQI (wFQIn)	14.22

Floristic Quality Metrics: All Species

Unweighted Mean C	1.29
Unweighted FQIa	8.28
Weighted Mean C (wCa)	1.62
Weighted FQI (wFQIa)	10.35

Wetland Species:

Mean W	1.04
Native Wetland Species	5
Percent Native Wetland Species	12.20
Percent Cover Native Wetland Species	19

Dominance

Percent Total Aerial Coverage	99
50%	49.5
20%	19.8

SITE NAME:
REFERENCE COMMUNITY: Aquatic Submergent/Emergent Restoration
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

			73	100.00	68								
	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	Absolute Cover	Relative Cover	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form	W	Dominant	
Herbaceous 5'	1	schpun	1	1.37	*Schoenoplectus pungens*	*common three-square bulrush*	OBL	Native	perennial	sedge	-5		
	2	salint	1	1.37	*Salix interior*	*sandbar willow*	FACW	Native	perennial	shrub	-3		
	3	myrsib	2	2.74	*Myriophyllum sibiricum*	*common water-milfoil, short-spike*	OBL	Native	perennial	aquatic	-5		
	4	potnat	1	1.37	*Potamogeton natans*	*common pondweed*	OBL	Native	perennial	aquatic	-5		
	5	potzos	1	1.37	*Potamogeton zosteriformis*	*flat-stem pondweed, flat-stemmed*	OBL	Native	perennial	aquatic	-5		
	6	valame	1	1.37	*Vallisneria americana*	*American eelgrass, water-celery*	OBL	Native	perennial	aquatic	-5		
	7	nymodo	1	1.37	*Nymphaea odorata*	*fragrant water-lily*	OBL	Native	perennial	aquatic	-5		
	8	spaame	20	27.40	*Sparganium americanum*	*American bur-reed*	OBL	Native	perennial	aquatic	-5	x	
	9	frapen	1	1.37	*Fraxinus pennsylvanica*	*green ash, red ash*	FACW	Native	perennial	tree	-3		
	10	schtab	15	20.55	*Schoenoplectus tabernaemontani*	*soft-stem bulrush*	OBL	Native	perennial	sedge	-5	x	
	11	typgla	2	2.74	*Typha X glauca*	*hybrid cat-tail, white cat-tail*	OBL	Introduced	perennial	semi-aquatic	-5		
	12	scicyp	1	1.37	*Scirpus cyperinus*	*wool-grass*	OBL	Native	perennial	sedge	-5		
	13	sciatr	1	1.37	*Scirpus atrovirens*	*dark-green bulrush*	OBL	Native	perennial	sedge	-5		
	14	lemmin	5	6.85	*Lemna minor*	*common duckweed*	OBL	Native	perennial	aquatic	-5	x	
	15	ransce	1	1.37	*Ranunculus sceleratus*	*celery-leaf buttercup*	OBL	Native	annual/perennial	forb	-5		
	16	perhyd	1	1.37	*Persicaria hydropiper*	*marsh-pepper smartweed, water-*	OBL	Introduced	annual	forb	-5		
	17	peramp	1	1.37	*Persicaria amphibia*	*water smartweed*	OBL	Native	perennial	forb/aquatic	-5		
	18	calcan	1	1.37	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass	-5		
	19	saglat	1	1.37	*Sagittaria latifolia*	*broad-leaved arrowhead*	OBL	Native	perennial	semi-aquatic	-5		
	20	carlac	2	2.74	*Carex lacustris*	*common lake sedge*	OBL	Native	perennial	sedge	-5		
	21	siusua	1	1.37	*Sium suave*	*hemlock water-parsnip, common*	OBL	Native	(annual?)/perennial	forb	-5		
	22	poncor	5	6.85	*Pontederia cordata*	*pickerel-weed*	OBL	Native	perennial	semi-aquatic	-5	x	
	23	phraus	1	1.37	*Phragmites australis*	*common reed grass*	FACW	Introduced	perennial	grass	-3		
	24	lytsal	1	1.37	*Lythrum salicaria*	*purple loosestrife*	OBL	Introduced	perennial	forb	-5		
	25	leeory	1	1.37	*Leersia oryzoides*	*rice cutgrass*	OBL	Native	perennial	grass	-5		
	26	cicbul	1	1.37	*Cicuta bulbifera*	*bulblet water-hemlock*	OBL	Native	perennial	forb	-5		
	27	juneff	1	1.37	*Juncus effusus*	*common rush, soft rush*	OBL	Native	perennial	rush	-5		
	28	alitri	2	2.74	*Alisma triviale*	*northern water-plantain*	OBL	Native	perennial	semi-aquatic	-5		
	29												

Species Richness:	
Total Species	28
Native Species	24
Non-Native Species	4
Proportion Native Cover	85.71
Percent Cover Native	93.15
Percent Cover Non-Native	6.85

Floristic Quality Metrics: Native Species Only	
Unweighted Mean C	4.75
Unweighted FQI	23.27
Weighted Mean C (wC)	5.68
Weighted FQI (wFQIn)	27.81

Floristic Quality Metrics: All Species	
Unweighted Mean C	4.07
Unweighted FQIa	21.54
Weighted Mean C (wCa)	5.29
Weighted FQI (wFQIa)	27.98

Wetland Species:	
Mean W	-4.79
Native Wetland Species	24
Percent Native Wetland Species	85.71
Percent Cover Native Wetland Species	93

Dominance	
Percent Total Aerial Coverage	73
50%	36.5
20%	14.6

SITE NAME:
REFERENCE COMMUNITY: 2017 Mapped Aquatic Submergent/ Emergent Restoration
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

			148	100.00	139								
	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	ENTER COVER	Relative Cover	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form	W	Dominant
Herbaceous 5'	1	spaame	15	10.14	*Sparganium americanum*	*American bur-reed*	OBL	Native	perennial	aquatic	-5	x
	2	typgla	5	3.38	*Typha X glauca*	*hybrid cat-tail, white cat-tail*	OBL	Introduced	perennial	semi-aquatic	-5	
	3	peramp	3	2.03	*Persicaria amphibia*	*water smartweed*	OBL	Native	perennial	forb/aquatic	-5	
	4	alninc	2	1.35	*Alnus incana*	*speckled alder, tag alder*	FACW	Native	perennial	shrub	-3	
	5	lemmin	30	20.27	*Lemna minor*	*common duckweed*	OBL	Native	perennial	aquatic	-5	x
	6	elocan	25	16.89	*Elodea canadensis*	*Canadian waterweed, common*	OBL	Native	perennial	aquatic	-5	x
	7	myrsib	10	6.76	*Myriophyllum sibiricum*	*common water-milfoil, short-spike*	OBL	Native	perennial	aquatic	-5	
	8	hetdub	5	3.38	*Heteranthera dubia*	*water star-grass*	OBL	Native	perennial	aquatic	-5	
	9	potper	5	3.38	*Potamogeton perfoliatus*	*perfoliate pondweed*	OBL	Native	0	0	-5	
	10	saglat	2	1.35	*Sagittaria latifolia*	*broad-leaved arrowhead*	OBL	Native	perennial	semi-aquatic	-5	
	11	perhyd	1	0.68	*Persicaria hydropiper*	*marsh-pepper smartweed, water-*	OBL	Introduced	annual	forb	-5	
	12	calcan	5	3.38	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass	-5	
	13	carlac	15	10.14	*Carex lacustris*	*common lake sedge*	OBL	Native	perennial	sedge	-5	x
	14	phaaru	2	1.35	*Phalaris arundinacea*	*reed canary grass*	FACW	Introduced	perennial	grass	-3	
	15	ascinc	1	0.68	*Asclepias incarnata*	*swamp milkweed*	OBL	Native	perennial	forb	-5	
	16	schtab	1	0.68	*Schoenoplectus tabernaemontani*	*soft-stem bulrush*	OBL	Native	perennial	sedge	-5	
	17	ransce	1	0.68	*Ranunculus sceleratus*	*celery-leaf buttercup*	OBL	Native	annual/perennial	forb	-5	
	18	elepal	1	0.68	*Eleocharis palustris*	*common spike-rush, marsh spike-*	OBL	Native	perennial	sedge	-5	
	19	ludpal	1	0.68	*Ludwigia palustris*	*marsh purslane, marsh seed-box,*	OBL	Native	perennial	forb	-5	
	20	mimrin	1	0.68	*Mimulus ringens*	*monkey-flower*	OBL	Native	0	0	-5	
	21	iriver	1	0.68	*Iris versicolor*	*northern blue flag*	OBL	Native	perennial	forb	-5	
	22	nymodo	1	0.68	*Nymphaea odorata*	*fragrant water-lily*	OBL	Native	perennial	aquatic	-5	
	23	lytsal	1	0.68	*Lythrum salicaria*	*purple loosestrife*	OBL	Introduced	perennial	forb	-5	
	24	utrvul	3	2.03	*Utricularia vulgaris*	*Common bladderwort*	OBL	Native	perennial	aquatic	-5	
	25	potnat	5	3.38	*Potamogeton natans*	*common pondweed*	OBL	Native	perennial	aquatic	-5	
	26	poncor	2	1.35	*Pontederia cordata*	*pickerel-weed*	OBL	Native	perennial	semi-aquatic	-5	
	27	potzos	2	1.35	*Potamogeton zosteriformis*	*flat-stem pondweed, flat-stemmed*	OBL	Native	perennial	aquatic	-5	
	28	lemtri	1	0.68	*Lemna trisulca*	*star duckweed*	OBL	Native	perennial	aquatic	-5	
	29	siusua	1	0.68	*Sium suave*	*hemlock water-parsnip, common*	OBL	Native	(annual?)/perennial	forb	-5	

Species Richness:	
Total Species	29
Native Species	25
Non-Native Species	4
Proportion Native Cover	86.21
Percent Cover Native	93.92
Percent Cover Non-Native	6.08

Floristic Quality Metrics: Native Species Only	
Unweighted Mean C	5.04
Unweighted FQI	25.20
Weighted Mean C (wC)	4.84
Weighted FQI (wFQIn)	24.21

Floristic Quality Metrics: All Species	
Unweighted Mean C	4.34
Unweighted FQIa	23.40
Weighted Mean C (wCa)	4.55
Weighted FQI (wFQIa)	24.49

Wetland Species:	
Mean W	-4.86
Native Wetland Species	25
Percent Native Wetland Species	86.21
Percent Cover Native Wetland Species	94

Dominance	
Percent Total Aerial Coverage	148
50%	74
20%	29.6

SITE NAME:
REFERENCE COMMUNITY: Shrub-Carr Upland Planting, Shrub-Carr Wetland Restoration & Tag Alder Enhancement
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

			142	100.00	117								
	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	Absolute Cover	Relative Cover	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form		W	Dominant
Herbaceous 5'	1	vitrip	1	0.70	*Vitis riparia*	*river bank grape*	FACW / FAC	Native	perennial	vine		x	
	2	popdel	1	0.70	*Populus deltoides*	*eastern cottonwood*	FAC	Native	perennial	tree		0	
	3	impcap	1	0.70	*Impatiens capensis*	*orange jewelweed*	FACW	Native	annual	forb		-3	
	4	alninc	25	17.61	*Alnus incana*	*speckled alder, tag alder*	FACW	Native	perennial	shrub		-3	x
	5	parqui	1	0.70	*Parthenocissus quinquefolia*	*Virginia creeper, woodbine*	FACU	Native	perennial	vine		3	
	6	fraaln	1	0.70	*Frangula alnus*	*glossy buckthorn*	FACW / FAC	Introduced	perennial	shrub		x	
	7	erehie	1	0.70	*Erechtites hieracifolius*	*fireweed*	0	Native	annual	forb		x	
	8	rubocc	1	0.70	*Rubus occidentalis*	*black-cap, black raspberry*	0	Native	perennial	shrub		x	
	9	frapen	3	2.11	*Fraxinus pennsylvanica*	*green ash, red ash*	FACW	Native	perennial	tree		-3	x
	10	silvul	1	0.70	*Silene vulgaris*	*bladder-campion, maiden's-tears*	0	Introduced	perennial	forb		x	
	11	melalb	1	0.70	*Melilotus albus*	*white sweet-clover*	0	Introduced	annual/bien nial	forb		x	
	12	rhutyp	1	0.70	*Rhus typhina*	*staghorn sumac*	0	Native	0		0	x	
	13	oenbie	1	0.70	*Oenothera biennis*	*common evening-primrose*	FACU	Native	biennial/per ennial	forb		3	
	14	pilpum	1	0.70	*Pilea pumila*	*Canadian clearweed*	FACW	Native	annual	forb		-3	
	15	onosen	1	0.70	*Onoclea sensibilis*	*sensitive fern*	FACW	Native	perennial	fern		-3	
	16	epicil	1	0.70	*Epilobium ciliatum*	*hairy willow-herb*	FACW	Native	perennial	forb		-3	
	17	eupper	1	0.70	*Eupatorium perfoliatum*	*boneset*	OBL / FACW	Native	perennial	forb		x	
	18	ascsyr	1	0.70	*Asclepias syriaca*	*common milkweed*	FACU / UPL	Native	perennial	forb		x	
	19	pancap	2	1.41	*Panicum capillare*	*witch grass*	FAC	Native	0		0	0	x
	20	verhas	1	0.70	*Verbena hastata*	*blue vervain, simpler's-joy, swamp*	FACW	Native	biennial/per ennial	forb		-3	
	21	lytsal	1	0.70	*Lythrum salicaria*	*purple loosestrife*	OBL	Introduced	perennial	forb		-5	
	22	urtdio	1	0.70	*Urtica dioica*	*stinging nettle*	FACW / FAC	Native	perennial	forb		x	
	23	corser	1	0.70	*Cornus sericea*	*red osier dogwood*	FACW	Native	perennial	shrub		-3	
	24	lontat	1	0.70	*Lonicera tatarica*	*Tartarian honeysuckle*	FACU	Introduced	perennial	shrub		3	
	25	rubida	1	0.70	*Rubus idaeus*	*wild red raspberry*	FACU / FAC*	Native	perennial	shrub		x	
	26	linvul	1	0.70	*Linaria vulgaris*	*butter-and-eggs*	UPL	Introduced	perennial	forb		5	
	27	cirarv	1	0.70	*Cirsium arvense*	*Canada thistle, creeping thistle, field*	FACU	Introduced	perennial	forb		3	
	28	betpap	2	1.41	*Betula papyrifera*	*paper birch*	FACU	Native	perennial	tree		3	x
	29	salint	3	2.11	*Salix interior*	*sandbar willow*	FACW	Native	perennial	shrub		-3	x
	30	cheglab	1	0.70	*Chelone glabra*	*turtlehead, white turtlehead*	OBL	Native	perennial	forb		-5	
	31	falcon	1	0.70	*Fallopia convolvulus*	*black-bindweed, false buckwheat*	FACU	Introduced	0		0	3	
	32	spialb	1	0.70	*Spiraea alba*	*white meadowsweet*	FACW	Native	perennial	shrub		-3	
	33	agapau	1	0.70	*Agalinis paupercula*	*small-flowered false foxglove,*	OBL	Native	annual	forb		-5	
	34	phaaru	1	0.70	*Phalaris arundinacea*	*reed canary grass*	FACW	Introduced	perennial	grass		-3	
	35	bidfro	1	0.70	*Bidens frondosa*	*common beggar-ticks*	FACW	Native	annual	forb		-3	
	36	cypesc	2	1.41	*Cyperus esculentus*	*field nut sedge*	FACW	Native	0		0	-3	x
	37	bidcer	2	1.41	*Bidens cernua*	*nodding beggar-ticks*	OBL	Native	annual	forb		-5	x
	38	carstr	2	1.41	*Carex stricta*	*tussock sedge*	OBL	Native	perennial	sedge		-5	x
	39	leeory	2	1.41	*Leersia oryzoides*	*rice cutgrass*	OBL	Native	perennial	grass		-5	x
	40	mencan	1	0.70	*Mentha canadensis*	*field mint, wild mint*	0	Native	perennial	forb		x	
	41	leocar	1	0.70	*Leonurus cardiaca*	*lion's-tail, motherwort*	0	Introduced	perennial	forb		x	
	42	agrsto	2	1.41	*Agrostis stolonifera*	*creeping bent grass, creeping tickle*	FACW	Introduced	perennial	grass		-3	x
	43	fravir	1	0.70	*Fragaria virginiana*	*wild strawberry*	FACU	Native	perennial	forb		3	
	44	boecyl	1	0.70	*Boehmeria cylindrica*	*small-spike false nettle*	OBL	Native	perennial	forb		-5	
	45	ribame	1	0.70	*Ribes americanum*	*American black currant*	FACW	Native	perennial	shrub		-3	
	46	agafoe	1	0.70	*Agastache foeniculum*	*blue giant hyssop, fragrant giant*	0	Native	perennial	forb		x	
	47	potnor	1	0.70	*Potentilla norvegica*	*Norwegian cinquefoil*	FAC	Native	annual/pere nnial	forb		0	
	48	thadas	1	0.70	*Thalictrum dasycarpum*	*purple meadow-rue, tall meadow-*	FACW	Native	perennial	forb		-3	
	49	calcan	3	2.11	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass		-5	x
	50	achmil	1	0.70	*Achillea millefolium*	*common yarrow, milfoil*	FACU	Native	perennial	forb		3	
	51	ransce	1	0.70	*Ranunculus sceleratus*	*celery-leaf buttercup*	OBL	Native	annual/pere nnial	forb		-5	
	52	poapal	2	1.41	*Poa palustris*	*marsh bluegrass*	FACW	Native	perennial	grass		-3	x
	53	lycame	1	0.70	*Lycopus americanus*	*common water-horehound*	OBL	Native	perennial	forb		-5	
	54	glystr	1	0.70	*Glyceria striata*	*fowl manna grass*	OBL	Native	perennial	grass		-5	
	55	elepal	3	2.11	*Eleocharis palustris*	*common spike-rush, marsh spike-*	OBL	Native	perennial	sedge		-5	x
	56	perhyd	3	2.11	*Persicaria hydropiper*	*marsh-pepper smartweed, water-*	OBL	Introduced	annual	forb		-5	x
	57	scicyp	2	1.41	*Scirpus cyperinus*	*wool-grass*	OBL	Native	perennial	sedge		-5	x
	58	galtet	1	0.70	*Galeopsis tetrahit*	*brittle-stem hemp-nettle, common*	0	Introduced	annual	forb		x	
	59	spaame	5	3.52	*Sparganium americanum*	*American bur-reed*	OBL	Native	perennial	aquatic		-5	x
	60	echcru	2	1.41	*Echinochloa crus-galli*	*barnyard grass, large barnyard grass*	FACW / FAC	Introduced	annual	grass		x	x
	61	alitri	1	0.70	*Alisma triviale*	*northern water-plantain*	OBL	Native	perennial	semi-aquatic		-5	
	62	schtab	1	0.70	*Schoenoplectus tabernaemontani*	*soft-stem bulrush*	OBL	Native	perennial	sedge		-5	
	63	typgla	1	0.70	*Typha X glauca*	*hybrid cat-tail, white cat-tail*	OBL	Introduced	perennial	semi-aquatic		-5	
	64	mimrin	1	0.70	*Mimulus ringens*	*monkey-flower*	OBL	Native	0		0	-5	
	65	iriver	1	0.70	*Iris versicolor*	*northern blue flag*	OBL	Native	perennial	forb		-5	
	66	saglat	1	0.70	*Sagittaria latifolia*	*broad-leaved arrowhead*	OBL	Native	perennial	semi-aquatic		-5	
	67	lemmin	1	0.70	*Lemna minor*	*common duckweed*	OBL	Native	perennial	aquatic		-5	
	68	elepal	5	3.52	*Eleocharis palustris*	*common spike-rush, marsh spike-*	OBL	Native	perennial	sedge		-5	x
	69	peramp	1	0.70	*Persicaria amphibia*	*water smartweed*	OBL	Native	perennial	forb/aquatic		-5	
	70	carlac	3	2.11	*Carex lacustris*	*common lake sedge*	OBL	Native	perennial	sedge		-5	x
	71	stapal	1	0.70	*Stachys palustris*	*hedge-nettle, marsh hedge-nettle,*	OBL	Native	perennial	forb		-5	
	72	echcru	1	0.70	*Echinochloa crus-galli*	*barnyard grass, large barnyard grass*	FACW / FAC	Introduced	annual	grass		x	
	73	spapec	1	0.70	*Spartina pectinata*	*prairie cord grass*	FACW	Native	perennial	grass		-3	
	74	trirep	1	0.70	*Trifolium repens*	*white clover*	FACU	Introduced	perennial	forb		3	
	75	taroff	1	0.70	*Taraxacum officinale*	*common dandelion*	FACU	Introduced	perennial	forb		3	
	76	junten	2	1.41	*Juncus tenuis*	*path rush*	FAC	Native	perennial	rush		0	x
	77	carvul	1	0.70	*Carex vulpinoidea*	*brown fox sedge*	FACW / OBL	Native	perennial	sedge		x	
	78	sinarv	1	0.70	*Sinapis arvensis*	*California rape, charlock mustard*	0	Introduced	annual	forb		x	
	79	barvul	1	0.70	*Barbarea vulgaris*	*winter-cress, yellow-rocket*	FAC	Introduced	biennial/per ennial	forb		0	
	80	branig	1	0.70	*Brassica nigra*	*black mustard*	0	Introduced	annual	forb		x	
	81	oxastr	1	0.70	*Oxalis stricta*	*common yellow oxalis*	FACU	Native	perennial	forb		3	
	82	salnig	3	2.11	*Salix nigra*	*black willow*	OBL	Native	perennial	tree		-5	x
	83	cicbul	1	0.70	*Cicuta bulbifera*	*bulblet water-hemlock*	OBL	Native	perennial	forb		-5	
	84	juncan	1	0.70	*Juncus canadensis*	*Canadian rush*	OBL	Native	perennial	rush		-5	
	85	juneff	1	0.70	*Juncus effusus*	*common rush, soft rush*	OBL	Native	perennial	rush		-5	

Species Richness:

Total Species	85
Native Species	64
Non-Native Species	21
Proportion Native Cover	75.29
Percent Cover Native	82.39
Percent Cover Non-Native	17.61

Floristic Quality Metrics: Native Species Only

Unweighted Mean C	3.64
Unweighted FQI	29.13
Weighted Mean C (wC)	3.96
Weighted FQI (wFQIn)	31.66

Floristic Quality Metrics: All Species

Unweighted Mean C	2.74
Unweighted FQIa	25.27
Weighted Mean C (wCa)	3.26
Weighted FQI (wFQIa)	30.06

Wetland Species:

Mean W	-2.55
Native Wetland Species	47
Percent Native Wetland Species	55.29
Percent Cover Native Wetland Species	70

Dominance

Percent Total Aerial Coverage	142
50%	71
20%	28.4

SITE NAME:
REFERENCE COMMUNITY: Mesic Prairie Planting
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

87 100.00 39

	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	Absolute Cover	Relative Cover	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form		W	Dominant
Herbaceous 5'	1	elycan	3	3.45	*Elymus canadensis*	*Canada wild-rye, Great Plains wild-*	FACU	Native	perennial	grass		3	x
	2	achmil	1	1.15	*Achillea millefolium*	*common yarrow, milfoil*	FACU	Native	perennial	forb		3	
	3	setpum	5	5.75	*Setaria pumila*	*pigeon grass, yellow foxtail*	FAC	Introduced	annual	grass		0	x
	4	verhas	1	1.15	*Verbena hastata*	*blue vervain, simpler's-joy, swamp*	FACW	Native	biennial/perennial	forb		-3	
	5	leocar	3	3.45	*Leonurus cardiaca*	*lion's-tail, motherwort*	0	Introduced	perennial	forb		x	x
	6	erehie	2	2.30	*Erechtites hieraciifolius*	*fireweed*	0	Native	annual	forb		x	x
	7	cirarv	1	1.15	*Cirsium arvense*	*Canada thistle, creeping thistle, field*	FACU	Introduced	perennial	forb		3	
	8	ascsyr	3	3.45	*Asclepias syriaca*	*common milkweed*	FACU / UPL	Native	perennial	forb		x	x
	9	pancap	3	3.45	*Panicum capillare*	*witch grass*	FAC	Native		0	0	0	x
	10	urtdio	1	1.15	*Urtica dioica*	*stinging nettle*	FACW / FAC	Native	perennial	forb		x	
	11	ambart	1	1.15	*Ambrosia artemisiifolia*	*short ragweed*	FACU	Native	annual	forb		3	
	12	melalb	1	1.15	*Melilotus albus*	*white sweet-clover*	0	Introduced	annual/biennial	forb		x	
	13	rudhir	3	3.45	*Rudbeckia hirta*	*black-eyed Susan*	FACU	Native		0	0	3	x
	14	berinc	7	8.05	*Berteroa incana*	*hoary false madwort, hoary-alyssum*	0	Introduced	annual/perennial	forb		x	x
	15	phaaru	1	1.15	*Phalaris arundinacea*	*reed canary grass*	FACW	Introduced	perennial	grass		-3	
	16	censto	1	1.15	*Centaurea stoebe*	*spotted knapweed*	UPL	Introduced	biennial/perennial	forb		5	
	17	vertha	3	3.45	*Verbascum thapsus*	*common mullein*	UPL	Introduced	biennial	forb		5	x
	18	linvul	2	2.30	*Linaria vulgaris*	*butter-and-eggs*	UPL	Introduced	perennial	forb		5	x
	19	panvir	1	1.15	*Panicum virgatum*	*switch grass*	FAC	Native	perennial	grass		0	
	20	phlpra	1	1.15	*Phleum pratense*	*timothy*	FACU	Introduced	perennial	grass		3	
	21	solgig	3	3.45	*Solidago gigantea*	*giant goldenrod*	FACW	Native	perennial	forb		-3	x
	22	cynoff	1	1.15	*Cynoglossum officinale*	*common hound's-tongue, gypsy-*	FACU / UPL	Introduced	biennial	forb		x	
	23	oxastr	1	1.15	*Oxalis stricta*	*common yellow oxalis*	FACU	Native	perennial	forb		3	
	24	verhas	1	1.15	*Verbena hastata*	*blue vervain, simpler's-joy, swamp*	FACW	Native	biennial/perennial	forb		-3	
	25	monfis	3	3.45	*Monarda fistulosa*	*bee balm, wild bergamot*	FACU	Native	perennial	forb		3	x
	26	barvul	1	1.15	*Barbarea vulgaris*	*winter-cress, yellow-rocket*	FAC	Introduced	biennial/perennial	forb		0	
	27	rubocc	1	1.15	*Rubus occidentalis*	*black-cap, black raspberry*	0	Native	perennial	shrub		x	
	28	traohi	1	1.15	*Tradescantia ohiensis*	*blue-jacket, common spiderwort,*	FACU	Native	perennial	forb		3	
	29	chealb	1	1.15	*Chenopodium album*	*common lamb's-quarters*	FACU	Native	annual	forb		3	
	30	permac	1	1.15	*Persicaria maculosa*	*heart's-ease, spotted lady's-thumb*	FACW / FAC	Introduced	annual		0	x	
	31	eryche	1	1.15	*Erysimum cheiranthoides*	*worm-seed mustard, worm-seed*	FACU	Introduced	annual	forb		3	
	32	agapau	1	1.15	*Agalinis paupercula*	*small-flowered false foxglove,*	OBL	Native	annual	forb		-5	
	33	erugal	1	1.15	*Erucastrum gallicum*	*common dog-mustard, dog-mustard*	0	Introduced	annual/biennial	forb		x	
	34	polavi	1	1.15	*Polygonum aviculare*	*common knotweed*	FAC / FACU	Introduced	annual	forb		x	
	35	potnor	1	1.15	*Potentilla norvegica*	*Norwegian cinquefoil*	FAC	Native	annual/perennial	forb		0	
	36	lepden	1	1.15	*Lepidium densiflorum*	*prairie pepper-weed, small*	FAC / FACU	Introduced	annual/biennial	forb		x	
	37	percar	1	1.15	*Persicaria careyi*	*Carey's heart's-ease, Carey's*	FACW	Native	annual	forb		-3	
	38	rorpal	1	1.15	*Rorippa palustris*	*bog yellow-cress, common yellow-*	OBL	Native	annual/biennial	forb		-5	
	39	hypper	1	1.15	*Hypericum perforatum*	*St. John's-wort*	FACU / UPL	Introduced	perennial	forb		x	
	40	poapra	1	1.15	*Poa pratensis*	*Kentucky bluegrass*	FAC / FACU	Introduced	perennial	grass		x	
	41	despin	1	1.15	*Descurainia pinnata*	*pinnate tansy mustard, western*	0	Native		0	0	x	
	42	setfab	1	1.15	*Setaria faberi*	*Chinese foxtail, giant foxtail,*	FACU	Introduced	annual	grass		3	
	43	cypesc	1	1.15	*Cyperus esculentus*	*field nut sedge*	FACW	Native		0	0	-3	
	44	cirvul	1	1.15	*Cirsium vulgare*	*bull thistle, common thistle*	FACU	Introduced	biennial	forb		3	
	45	nepcat	1	1.15	*Nepeta cataria*	*catnip*	FACU	Introduced	perennial	forb		3	
	46	matdis	1	1.15	*Matricaria discoidea*	*pineapple-weed*	FACU	Introduced	annual	forb		3	
	47	medlup	1	1.15	*Medicago lupulina*	*black medick*	FACU	Introduced	annual/biennial	forb		3	
	48	lacbie	1	1.15	*Lactuca biennis*	*woodland lettuce*	FAC	Native	annual/biennial	forb		0	
	49	taroff	1	1.15	*Taraxacum officinale*	*common dandelion*	FACU	Introduced	perennial	forb		3	
	50	glehed	5	5.75	*Glechoma hederacea*	*creeping-Charlie*	FACU	Introduced	perennial	forb		3	x
	51	ascinc	1	1.15	*Asclepias incarnata*	*swamp milkweed*	OBL	Native	perennial	forb		-5	
	52	leuvul	1	1.15	*Leucanthemum vulgare*	*common daisy, field daisy,*	UPL	Introduced	perennial	forb		5	
	53	branig	1	1.15	*Brassica nigra*	*black mustard*	0	Introduced	annual	forb		x	
	54	allpet	1	1.15	*Alliaria petiolata*	*garlic mustard*	FAC / FACU	Introduced	biennial	forb		x	
	55	ratpin	1	1.15	*Ratibida pinnata*	*pinnate prairie coneflower*	0	Native	perennial	forb		x	

Species Richness:

Total Species	55
Native Species	26
Non-Native Species	29
Proportion Native Cover	47.27
Percent Cover Native	44.83
Percent Cover Non-Native	55.17

Floristic Quality Metrics: Native Species Only

Unweighted Mean C	2.50
Unweighted FQI	12.75
Weighted Mean C (wC)	2.54
Weighted FQI (wFQIn)	12.94

Floristic Quality Metrics: All Species

Unweighted Mean C	1.18
Unweighted FQIa	8.76
Weighted Mean C (wCa)	1.14
Weighted FQI (wFQIa)	8.44

Wetland Species:

Mean W	1.11
Native Wetland Species	12
Percent Native Wetland Species	21.82
Percent Cover Native Wetland Species	18

Dominance

Percent Total Aerial Coverage	87
50%	43.5
20%	17.4

SITE NAME:
REFERENCE COMMUNITY: N Sedge Meadow Enhancement, N Sedge Meadow Enhancement (Standing Water), N Sedge Meadow Restoration & N Sedge Meadow Restoration (Standing Water)
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	Absolute Cover (101)	Relative Cover (100.00)	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form		W	Dominant (83)
Herbaceous 5'	1	bidcer	2	1.98	*Bidens cernua*	*nodding beggar-ticks*	OBL	Native	annual	forb		-5	x
	2	perhyd	2	1.98	*Persicaria hydropiper*	*marsh-pepper smartweed, water-*	OBL	Introduced	annual	forb		-5	x
	3	typang	1	0.99	*Typha angustifolia*	*narrow-leaved cat-tail*	OBL	Introduced	perennial	semi-aquatic		-5	
	4	phaaru	3	2.97	*Phalaris arundinacea*	*reed canary grass*	FACW	Introduced	perennial	grass		-3	x
	5	calcan	5	4.95	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass		-5	x
	6	schtab	1	0.99	*Schoenoplectus*	*soft-stem bulrush*	OBL	Native	perennial	sedge		-5	
	7	ransce	1	0.99	*Ranunculus sceleratus*	*celery-leaf buttercup*	OBL	Native	annual/perennial	forb		-5	
	8	pancap	2	1.98	*Panicum capillare*	*witch grass*	FAC	Native	0		0	0	x
	9	carvul	5	4.95	*Carex vulpinoidea*	*brown fox sedge*	FACW / OBL	Native	perennial	sedge		x	x
	10	spaame	3	2.97	*Sparganium americanum*	*American bur-reed*	OBL	Native	perennial	aquatic		-5	x
	11	verhas	2	1.98	*Verbena hastata*	*blue vervain, simpler's-joy, swamp*	FACW	Native	biennial/perennial	forb		-3	x
	12	alitri	1	0.99	*Alisma triviale*	*northern water-plantain*	OBL	Native	perennial	semi-aquatic		-5	
	13	lemmin	1	0.99	*Lemna minor*	*common duckweed*	OBL	Native	perennial	aquatic		-5	
	14	junten	2	1.98	*Juncus tenuis*	*path rush*	FAC	Native	perennial	rush		0	x
	15	conarv	1	0.99	*Convolvulus arvensis*	*field bindweed*	UPL	Introduced	perennial	vine		5	
	16	urtdio	1	0.99	*Urtica dioica*	*stinging nettle*	FACW / FAC	Native	perennial	forb		x	
	17	carlac	5	4.95	*Carex lacustris*	*common lake sedge*	OBL	Native	perennial	sedge		-5	x
	18	bidfro	1	0.99	*Bidens frondosa*	*common beggar-ticks*	FACW	Native	annual	forb		-3	
	19	poapal	2	1.98	*Poa palustris*	*marsh bluegrass*	FACW	Native	perennial	grass		-3	x
	20	erehie	1	0.99	*Erechtites hieraciifolius*	*fireweed*	0	Native	annual	forb		x	
	21	xanstr	1	0.99	*Xanthium strumarium*	*common cocklebur, rough*	FAC	Native	annual	forb		0	
	22	cirvul	1	0.99	*Cirsium vulgare*	*bull thistle, common thistle*	FACU	Introduced	biennial	forb		3	
	23	vertha	1	0.99	*Verbascum thapsus*	*common mullein*	UPL	Introduced	biennial	forb		5	
	24	iriver	1	0.99	*Iris versicolor*	*northern blue flag*	OBL	Native	perennial	forb		-5	
	25	acesac	1	0.99	*Acer saccharinum*	*silver maple, soft maple*	FACW	Native	perennial	tree		-3	
	26	galtet	1	0.99	*Galeopsis tetrahit*	*brittle-stem hemp-nettle, common*	0	Introduced	annual	forb		x	
	27	echcru	2	1.98	*Echinochloa crus-galli*	*barnyard grass, large barnyard*	FACW / FAC	Introduced	annual	grass		x	x
	28	cypesc	3	2.97	*Cyperus esculentus*	*field nut sedge*	FACW	Native	0		0	-3	x
	29	permac	1	0.99	*Persicaria maculosa*	*heart's-ease, spotted lady's-*	FACW / FAC	Introduced	annual		0	x	
	30	eupper	1	0.99	*Eupatorium perfoliatum*	*boneset*	OBL / FACW	Native	perennial	forb		x	
	31	lobsip	1	0.99	*Lobelia siphilitica*	*great blue lobelia*	OBL / FACW	Native	perennial	forb		x	
	32	agafoe	1	0.99	*Agastache foeniculum*	*blue giant hyssop, fragrant giant*	0	Native	perennial	forb		x	
	33	taroff	1	0.99	*Taraxacum officinale*	*common dandelion*	FACU	Introduced	perennial	forb		3	
	34	nepcat	1	0.99	*Nepeta cataria*	*catnip*	FACU	Introduced	perennial	forb		3	
	35	scicyp	3	2.97	*Scirpus cyperinus*	*wool-grass*	OBL	Native	perennial	sedge		-5	x
	36	caltpal	1	0.99	*Caltha palustris*	*cowslip, marsh-marigold, yellow*	OBL	Native	perennial	forb		-5	
	37	mimrin	1	0.99	*Mimulus ringens*	*monkey-flower*	OBL	Native	0		0	-5	
	38	persag	1	0.99	*Persicaria sagittata*	*arrow-leaved tearthumb*	OBL	Native	annual	vine		-5	
	39	carstr	1	0.99	*Carex stricta*	*tussock sedge*	OBL	Native	perennial	sedge		-5	
	40	juncan	1	0.99	*Juncus canadensis*	*Canadian rush*	OBL	Native	perennial	rush		-5	
	41	siusua	1	0.99	*Sium suave*	*hemlock water-parsnip, common*	OBL	Native	(annual)/perennial	forb		-5	
	42	caraqu	1	0.99	*Carex aquatilis*	*water sedge*	OBL	Native	0		0	-5	
	43	panvir	7	6.93	*Panicum virgatum*	*switch grass*	FAC	Native	perennial	grass		0	x
	44	ascsyr	1	0.99	*Asclepias syriaca*	*common milkweed*	FACU / UPL	Native	perennial	forb		x	
	45	agapau	1	0.99	*Agalinis paupercula*	*small-flowered false foxglove,*	OBL	Native	annual	forb		-5	
	46	juneff	1	0.99	*Juncus effusus*	*common rush, soft rush*	OBL	Native	perennial	rush		-5	
	47	trirep	1	0.99	*Trifolium repens*	*white clover*	FACU	Introduced	perennial	forb		3	
	48	potans	1	0.99	*Potentilla anserina*	*silver-weed*	FACW	Native	0		0	-3	
	49	phraus	1	0.99	*Phragmites australis*	*common reed grass*	FACW	Introduced	perennial	grass		-3	
	50	spapec	1	0.99	*Spartina pectinata*	*prairie cord grass*	FACW	Native	perennial	grass		-3	
	51	junbuf	1	0.99	*Juncus bufonius*	*toad rush*	FACW	Native	annual	rush		-3	
	52	epicil	1	0.99	*Epilobium ciliatum*	*hairy willow-herb*	FACW	Native	perennial	forb		-3	
	53	linvul	1	0.99	*Linaria vulgaris*	*butter-and-eggs*	UPL	Introduced	perennial	forb		5	
	54	carsti	15	14.85	*Carex stipata*	*common fox sedge*	OBL	Native	perennial	sedge		-5	x

Species Richness:

Total Species	54
Native Species	40
Non-Native Species	14
Proportion Native Cover	74.07
Percent Cover Native	82.18
Percent Cover Non-Native	17.82

Floristic Quality Metrics: Native Species Only

Unweighted Mean C	4.00
Unweighted FQI	25.30
Weighted Mean C (wC)	3.64
Weighted FQI (wFQIn)	23.01

Floristic Quality Metrics: All Species

Unweighted Mean C	2.96
Unweighted FQIa	21.77
Weighted Mean C (wCa)	2.99
Weighted FQI (wFQIa)	21.97

Wetland Species:

Mean W	-2.64
Native Wetland Species	33
Percent Native Wetland Species	61.11
Percent Cover Native Wetland	71

Dominance

Percent Total Aerial Coverage	101
50%	50.5
20%	20.2

SITE NAME:
REFERENCE COMMUNITY: Entire Site - Summary
COUNTY:
PLOT NUMBER
ECOREGION:
SURVEYORS:
SURVEY DATE:

			121.72	100.00	94.3									
	MINUTES	ENTER SPECIES CODE (i.e.Carex stricta= CARSTR)	Absolute Cover	Relative Cover	*Latin Name*	Common Name	Wetland Indicator Status (MW/NCNE)	Origin	Duration	Form		W	Dominant
Herbaceous 5'		abibal	0.13	0.11	*Abies balsamea*	*balsam fir*	FACW / FAC	Native	perennial	tree		x	
		aceneg	13.75	11.30	*Acer negundo*	*box elder*	FAC	Native	perennial	tree		0	x
		acesac	0.88	0.72	*Acer saccharinum*	*silver maple, soft maple*	FACW	Native	perennial	tree		-3	
		acesaccharu	0.13	0.11	*Acer saccharum*	*hard maple, sugar maple*	FACU	Native	perennial	tree		3	
		achmil	0.25	0.21	*Achillea millefolium*	*common yarrow, milfoil*	FACU	Native	perennial	forb		3	
		agafoe	0.38	0.31	*Agastache foeniculum*	*blue giant hyssop, fragrant giant*	0	Native	perennial	forb		x	
		agapau	0.38	0.31	*Agalinis paupercula*	*small-flowered false foxglove,*	OBL	Native	annual	forb		-5	
		agrsto	1.25	1.03	*Agrostis stolonifera*	*creeping bent grass, creeping tickle*	FACW	Introduced	perennial	grass		-3	x
		alitri	0.63	0.52	*Alisma triviale*	*northern water-plantain*	OBL	Native	perennial	semi-aquatic		-5	
		allpet	0.50	0.41	*Alliaria petiolata*	*garlic mustard*	FAC / FACU	Introduced	biennial	forb		x	
		alninc	3.50	2.88	*Alnus incana*	*speckled alder, tag alder*	FACW	Native	perennial	shrub		-3	x
		ambart	0.25	0.21	*Ambrosia artemisiifolia*	*short ragweed*	FACU	Native	annual	forb		3	
		ambtri	0.13	0.11	*Ambrosia trifida*	*giant ragweed*	FAC	Native	annual	forb		0	
		andger	0.25	0.21	*Andropogon gerardii*	*big blue-stem, turkey-foot*	FAC / FACU	Native	perennial	grass		x	
		arcmin	0.13	0.11	*Arctium minus*	*common burdock, lesser burdock*	FACU	Introduced	biennial	forb		3	
		ascinc	0.25	0.21	*Asclepias incarnata*	*swamp milkweed*	OBL	Native	perennial	forb		-5	
		ascsyr	1.25	1.03	*Asclepias syriaca*	*common milkweed*	FACU / UPL	Native	perennial	forb		x	x
		athfil	0.13	0.11	*Athyrium filix-femina*	*common lady fern*	0	Native	perennial	fern		x	
		avesat	0.25	0.21	*Avena sativa*	*oats*	UPL	Introduced	annual	grass		5	
		barvul	0.38	0.31	*Barbarea vulgaris*	*winter-cress, yellow-rocket*	FAC	Introduced	biennial/per	forb		0	
		berinc	1.00	0.82	*Berteroa incana*	*hoary false madwort, hoary-alyssum*	0	Introduced	annual/pere	forb		x	
		betpap	0.25	0.21	*Betula papyrifera*	*paper birch*	FACU	Native	perennial	tree		3	
		betpum	0.13	0.11	*Betula pumila*	*bog birch, dwarf birch, swamp birch*	OBL	Native	perennial	shrub		-5	
		bidcer	0.63	0.52	*Bidens cernua*	*nodding beggar-ticks*	OBL	Native	annual	forb		-5	
		bidfro	0.50	0.41	*Bidens frondosa*	*common beggar-ticks*	FACW	Native	annual	forb		-3	
		boecyl	0.25	0.21	*Boehmeria cylindrica*	*small-spike false nettle*	OBL	Native	perennial	forb		-5	
		branig	0.25	0.21	*Brassica nigra*	*black mustard*	0	Introduced	annual	forb		x	
		broine	0.13	0.11	*Bromus inermis*	*Smooth brome*	FACU / UPL	Introduced	perennial	grass		x	
		brotec	0.13	0.11	*Bromus tectorum*	*cheat grass, downy brome, downy*	0	Introduced	annual	grass		x	
		calcan	4.00	3.29	*Calamagrostis canadensis*	*blue-joint grass*	OBL	Native	perennial	grass		-5	x
		caltpal	0.13	0.11	*Caltha palustris*	*cowslip, marsh-marigold, yellow*	OBL	Native	perennial	forb		-5	
		camame1	0.13	0.11	*Campanulastrum americanum*	*American bellflower, tall bellflower*	FAC	Native		0	0	0	
		camapa	0.13	0.11	*Campanula aparinoides*	*marsh bellflower*	OBL	Native	perennial	forb		-5	
		caraqu	0.13	0.11	*Carex aquatilis*	*water sedge*	OBL	Native		0	0	-5	
		carlac	3.75	3.08	*Carex lacustris*	*common lake sedge*	OBL	Native	perennial	sedge		-5	x
		carmuh	0.63	0.52	*Carex muhlenbergii*	*sand sedge*	0	Native	perennial	sedge		x	
		carpen	0.25	0.21	*Carex pensylvanica*	*Pennsylvania sedge*	0	Native	perennial	sedge		x	
		carsti	1.88	1.54	*Carex stipata*	*common fox sedge*	OBL	Native	perennial	sedge		-5	x
		carstr	1.00	0.82	*Carex stricta*	*tussock sedge*	OBL	Native	perennial	sedge		-5	
		carvul	0.75	0.62	*Carex vulpinoidea*	*brown fox sedge*	FACW / OBL	Native	perennial	sedge		x	
		celocc	0.13	0.11	*Celtis occidentalis*	*northern hackberry*	FAC	Native	perennial	tree		0	
		censto	0.25	0.21	*Centaurea stoebe*	*spotted knapweed*	UPL	Introduced	biennial/per	forb		5	
		cerfon	0.38	0.31	*Cerastium fontanum*	*common mouse-ear chickweed*	FACU	Introduced	perennial	forb		3	
		chealb	0.13	0.11	*Chenopodium album*	*common lamb's-quarters*	FACU	Native	annual	forb		3	
		cheglab	0.13	0.11	*Chelone glabra*	*turtlehead, white turtlehead*	OBL	Native	perennial	forb		-5	
		cicbul	0.25	0.21	*Cicuta bulbifera*	*bulblet water-hemlock*	OBL	Native	perennial	forb		-5	
		cirarv	0.63	0.52	*Cirsium arvense*	*Canada thistle, creeping thistle, field*	FACU	Introduced	perennial	forb		3	
		cirvul	0.38	0.31	*Cirsium vulgare*	*bull thistle, common thistle*	FACU	Introduced	biennial	forb		3	
		comcom	0.13	0.11	*Commelina communis*	*Asiatic day-flower, common day-*	FACU / FAC	Introduced	annual	forb		x	
		conarv	0.13	0.11	*Convolvulus arvensis*	*field bindweed*	UPL	Introduced	perennial	vine		5	
		corser	0.38	0.31	*Cornus sericea*	*red osier dogwood*	FACW	Native	perennial	shrub		-3	
		cynoff	0.25	0.21	*Cynoglossum officinale*	*common hound's-tongue, gypsy-*	FACU / UPL	Introduced	biennial	forb		x	
		cypbip	0.13	0.11	*Cyperus bipartitus*	*shining flat sedge, slender flat sedge*	OBL / FACW	Native	annual	sedge		x	
		cypesc	1.13	0.93	*Cyperus esculentus*	*field nut sedge*	FACW	Native		0	0	-3	x
		dacglo	2.63	2.16	*Dactylis glomerata*	*orchard grass*	FACU	Introduced	perennial	grass		3	x
		daucar	0.13	0.11	*Daucus carota*	*Queen Anne's-lace*	UPL	Introduced	biennial	forb		5	
		despin	0.25	0.21	*Descurainia pinnata*	*pinnate tansy mustard, western*	0	Native		0	0	x	
		drymar	0.13	0.11	*Dryopteris marginalis*	*marginal shield fern, marginal wood*	FACU	Native	perennial	fern		3	
		echcru	1.00	0.82	*Echinochloa crus-galli*	*barnyard grass, large barnyard grass*	FACW / FAC	Introduced	annual	grass		x	
		elepal	1.13	0.93	*Eleocharis palustris*	*common spike-rush, marsh spike-*	OBL	Native	perennial	sedge		-5	x
		elocan	3.13	2.57	*Elodea canadensis*	*Canadian waterweed, common*	OBL	Native	perennial	aquatic		-5	x
		elycan	0.63	0.52	*Elymus canadensis*	*Canada wild-rye, Great Plains wild-*	FACU	Native	perennial	grass		3	
		elyhys	0.13	0.11	*Elymus hystrix*	*bottlebrush grass, eastern*	FACU	Native	perennial	grass		3	
		elyrep	0.25	0.21	*Elymus repens*	*quackgrass*	FACU	Introduced	perennial	grass		3	
		epicil	0.50	0.41	*Epilobium ciliatum*	*hairy willow-herb*	FACW	Native	perennial	forb		-3	
		equarv	0.25	0.21	*Equisetum arvense*	*field horsetail*	FAC	Native	perennial	fern ally		0	
		erehie	0.88	0.72	*Erechtites hieraciifolius*	*fireweed*	0	Native	annual	forb		x	
		erugal	0.25	0.21	*Erucastrum gallicum*	*common dog-mustard, dog-mustard*	0	Introduced	annual/bien	forb		x	
		eryche	0.50	0.41	*Erysimum cheiranthoides*	*worm-seed mustard, worm-seed*	FACU	Introduced	annual	forb		3	
		eupgly	0.13	0.11	*Euphorbia glyptosperma*	*rib-seed sand-mat, ridge-seeded*	0	Native		0	0	x	
		eupper	0.38	0.31	*Eupatorium perfoliatum*	*boneset*	OBL / FACW	Native	perennial	forb		x	
		falcon	0.25	0.21	*Fallopia convolvulus*	*black-bindweed, false buckwheat*	FACU	Introduced		0	0	3	
		fraaln	0.38	0.31	*Frangula alnus*	*glossy buckthorn*	FACW / FAC	Introduced	perennial	shrub		x	
		frapen	1.50	1.23	*Fraxinus pennsylvanica*	*green ash, red ash*	FACW	Native	perennial	tree		-3	x
		fravir	0.25	0.21	*Fragaria virginiana*	*wild strawberry*	FACU	Native	perennial	forb		3	
		galqua	0.13	0.11	*Galinsoga quadriradiata*	*common quick-weed, Peruvian-daisy,*	FACU	Introduced	annual	forb		3	
		galtet	0.75	0.62	*Galeopsis tetrahit*	*brittle-stem hemp-nettle, common*	0	Introduced	annual	forb		x	
		glehed	0.75	0.62	*Glechoma hederacea*	*creeping-Charlie*	FACU	Introduced	perennial	forb		3	
		glystr	0.13	0.11	*Glyceria striata*	*fowl manna grass*	OBL	Native	perennial	grass		-5	
		hesmat	0.13	0.11	*Hesperis matronalis*	*dame's rocket*	FACU	Introduced	biennial/per	forb		3	
		hetdub	0.63	0.52	*Heteranthera dubia*	*water star-grass*	OBL	Native	perennial	aquatic		-5	
		horjub	0.13	0.11	*Hordeum jubatum*	*foxtail barley, squirrel-tail grass*	FAC	Introduced	perennial	grass		0	
		hypper	0.13	0.11	*Hypericum perforatum*	*St. John's-wort*	FACU / UPL	Introduced	perennial	forb		x	
		ilever	0.13	0.11	*Ilex verticillata*	*common winterberry*	FACW	Native	perennial	shrub		-3	
		impcap	0.25	0.21	*Impatiens capensis*	*orange jewelweed*	FACW	Native	annual	forb		-3	
		iriver	0.50	0.41	*Iris versicolor*	*northern blue flag*	OBL	Native	perennial	forb		-5	

Species Richness:

Total Species	205
Native Species	142
Non-Native Species	63
Proportion Native Cover	69.27
Percent Cover Native	77.47
Percent Cover Non-Native	22.53

Floristic Quality Metrics: Native Species Only

Unweighted Mean C	4.04
Unweighted FQI	48.11
Weighted Mean C (wC)	6.29
Weighted FQI (wFQIn)	74.95

Floristic Quality Metrics: All Species

Unweighted Mean C	2.76
Unweighted FQIa	39.46
Weighted Mean C (wCa)	2.75
Weighted FQI (wFQIa)	39.31

Wetland Species:

Mean W	-1.04
Native Wetland Species	91
Percent Native Wetland Species	44.39
Percent Cover Native Wetland Species	64

Dominance

Percent Total Aerial Coverage	121.72
50%	60.86
20%	24.344

jugnig	0.25	0.21	*Juglans nigra*	*black walnut*	FACU	Native	perennial	tree		3	
junbuf	0.13	0.11	*Juncus bufonius*	*toad rush*	FACW	Native	annual	rush		-3	
juncan	0.25	0.21	*Juncus canadensis*	*Canadian rush*	OBL	Native	perennial	rush		-5	
juneff	0.38	0.31	*Juncus effusus*	*common rush, soft rush*	OBL	Native	perennial	rush		-5	
junten	0.50	0.41	*Juncus tenuis*	*path rush*	FAC	Native	perennial	rush		0	
lacbie	0.13	0.11	*Lactuca biennis*	*woodland lettuce*	FAC	Native	annual/biennial	forb		0	
larlar	0.13	0.11	*Larix laricina*	*larch, tamarack*	FACW	Native	perennial	tree		-3	
leeory	0.38	0.31	*Leersia oryzoides*	*rice cutgrass*	OBL	Native	perennial	grass		-5	
lemmin	4.75	3.90	*Lemna minor*	*common duckweed*	OBL	Native	perennial	aquatic		-5	x
leocar	1.13	0.93	*Leonurus cardiaca*	*lion's-tail, motherwort*	0	Introduced	perennial	forb		x	x
lepden	0.13	0.11	*Lepidium densiflorum*	*prairie pepper-weed, small*	FAC / FACU	Introduced	annual/biennial	forb		x	
lepvir	0.13	0.11	*Lepidium virginicum*	*common peppergrass, poor-man's-*	FACU	Native		0	0	3	
leuvul	0.13	0.11	*Leucanthemum vulgare*	*common daisy, field daisy,*	UPL	Introduced	perennial	forb		5	
linvul	0.88	0.72	*Linaria vulgaris*	*butter-and-eggs*	UPL	Introduced	perennial	forb		5	
lobsip	0.38	0.31	*Lobelia siphilitica*	*great blue lobelia*	OBL / FACW	Native	perennial	forb		x	
loncan	0.13	0.11	*Lonicera canadensis*	*American fly honeysuckle*	FACU	Native	perennial	shrub		3	
lontat	0.13	0.11	*Lonicera tatarica*	*Tartarian honeysuckle*	FACU	Introduced	perennial	shrub		3	
lotcor	0.13	0.11	*Lotus corniculatus*	*bird's-foot trefoil*	FACU	Introduced	perennial	forb		3	
lycame	0.50	0.41	*Lycopus americanus*	*common water-horehound*	OBL	Native	perennial	forb		-5	
lytsal	0.50	0.41	*Lythrum salicaria*	*purple loosestrife*	OBL	Introduced	perennial	forb		-5	
ludpal	0.13	0.11	*Ludwigia palustris*	*marsh purslane, marsh seed-box,*	OBL	Native	perennial	forb		-5	
matdis	0.13	0.11	*Matricaria discoidea*	*pineapple-weed*	FACU	Introduced	annual	forb		3	
medlup	0.25	0.21	*Medicago lupulina*	*black medick*	FACU	Introduced	annual/biennial	forb		3	
melalb	0.50	0.41	*Melilotus albus*	*white sweet-clover*	0	Introduced	annual/biennial	forb		x	
mencan	0.25	0.21	*Mentha canadensis*	*field mint, wild mint*	0	Native	perennial	forb		x	
mimrin	0.50	0.41	*Mimulus ringens*	*monkey-flower*	OBL	Native		0	0	-5	
monfis	1.00	0.82	*Monarda fistulosa*	*bee balm, wild bergamot*	FACU	Native	perennial	forb		3	
myrsib	1.50	1.23	*Myriophyllum sibiricum*	*common water-milfoil, short-spike*	OBL	Native	perennial	aquatic		-5	x
nepcat	0.50	0.41	*Nepeta cataria*	*catnip*	FACU	Introduced	perennial	forb		3	
nymodo	0.25	0.21	*Nymphaea odorata*	*fragrant water-lily*	OBL	Native	perennial	aquatic		-5	
oenbie	0.25	0.21	*Oenothera biennis*	*common evening-primrose*	FACU	Native	biennial/perennial	forb		3	
onosen	0.25	0.21	*Onoclea sensibilis*	*sensitive fern*	FACW	Native	perennial	fern		-3	
oxastr	0.63	0.52	*Oxalis stricta*	*common yellow oxalis*	FACU	Native	perennial	forb		3	
pancap	1.38	1.13	*Panicum capillare*	*witch grass*	FAC	Native		0	0	0	x
panvir	1.00	0.82	*Panicum virgatum*	*switch grass*	FAC	Native	perennial	grass		0	
parqui	0.38	0.31	*Parthenocissus quinquefolia*	*Virginia creeper, woodbine*	FACU	Native	perennial	vine		3	
peramp	0.63	0.52	*Persicaria amphibia*	*water smartweed*	OBL	Native	perennial	forb/aquatic		-5	
percar	0.25	0.21	*Persicaria careyi*	*Carey's heart's-ease, Carey's*	FACW	Native	annual	forb		-3	
perhyd	1.13	0.93	*Persicaria hydropiper*	*marsh-pepper smartweed, water-*	OBL	Introduced	annual	forb		-5	x
permac	0.50	0.41	*Persicaria maculosa*	*heart's-ease, spotted lady's-thumb*	FACW / FAC	Introduced	annual		0	x	
perpen	0.13	0.11	*Persicaria pensylvanica*	*Pennsylvania knotweed*	FACW	Native	annual	forb		-3	
persag	0.25	0.21	*Persicaria sagittata*	*arrow-leaved tearthumb*	OBL	Native	annual	vine		-5	
phaaru	1.25	1.03	*Phalaris arundinacea*	*reed canary grass*	FACW	Introduced	perennial	grass		-3	x
phlpra	0.13	0.11	*Phleum pratense*	*timothy*	FACU	Introduced	perennial	grass		3	
phraus	0.25	0.21	*Phragmites australis*	*common reed grass*	FACW	Introduced	perennial	grass		-3	
picgla	0.25	0.21	*Picea glauca*	*white spruce*	FACU	Native	perennial	tree		3	
pilpum	0.13	0.11	*Pilea pumila*	*Canadian clearweed*	FACW	Native	annual	forb		-3	
pinstr	0.25	0.21	*Pinus strobus*	*eastern white pine*	FACU	Native	perennial	tree		3	
plamaj	0.13	0.11	*Plantago major*	*common plantain*	FAC / FACU	Introduced	perennial	forb		x	
poapal	1.25	1.03	*Poa palustris*	*marsh bluegrass*	FACW	Native	perennial	grass		-3	x
poapra	0.25	0.21	*Poa pratensis*	*Kentucky bluegrass*	FAC / FACU	Introduced	perennial	grass		x	
polavi	0.25	0.21	*Polygonum aviculare*	*common knotweed*	FAC / FACU	Introduced	annual	forb		x	
polrep	0.13	0.11	*Polemonium reptans*	*spreading Jacob's-ladder*	FAC	Native		0	0	0	
poncor	0.88	0.72	*Pontederia cordata*	*pickerel-weed*	OBL	Native	perennial	semi-aquatic		-5	
popbal	0.38	0.31	*Populus balsamifera*	*balsam poplar, hackmatack*	FACW	Native	perennial	tree		-3	
popdel	0.13	0.11	*Populus deltoides*	*eastern cottonwood*	FAC	Native	perennial	tree		0	
poptre	0.13	0.11	*Populus tremuloides*	*aspen, quaking aspen, trembling*	FAC / FAC*	Native	perennial	tree		x	
potans	0.13	0.11	*Potentilla anserina*	*silver-weed*	FACW	Native		0	0	-3	
potnat	0.75	0.62	*Potamogeton natans*	*common pondweed*	OBL	Native	perennial	aquatic		-5	
potnor	0.38	0.31	*Potentilla norvegica*	*Norwegian cinquefoil*	FAC	Native	annual/perennial	forb		0	
potper	0.63	0.52	*Potamogeton perfoliatus*	*perfoliate pondweed*	OBL	Native		0	0	-5	
potzos	0.38	0.31	*Potamogeton zosteriformis*	*flat-stem pondweed, flat-stemmed*	OBL	Native	perennial	aquatic		-5	
pruvul	0.13	0.11	*Prunella vulgaris*	*heal-all*	FAC	Native	perennial	forb		0	
quemac	0.13	0.11	*Quercus macrocarpa*	*bur oak*	FAC / FACU	Native	perennial	tree		x	
querub	0.13	0.11	*Quercus rubra*	*northern red oak*	FACU	Native	perennial	tree		3	
ransce	0.63	0.52	*Ranunculus sceleratus*	*celery-leaf buttercup*	OBL	Native	annual/perennial	forb		-5	
ratpin	0.13	0.11	*Ratibida pinnata*	*pinnate prairie coneflower*	0	Native	perennial	forb		x	
rhutyp	0.13	0.11	*Rhus typhina*	*staghorn sumac*	0	Native		0	0	x	
ribame	0.38	0.31	*Ribes americanum*	*American black currant*	FACW	Native	perennial	shrub		-3	
rorpal	0.13	0.11	*Rorippa palustris*	*bog yellow-cress, common yellow-*	OBL	Native	annual/biennial	forb		-5	
rosbla	0.13	0.11	*Rosa blanda*	*smooth rose, wild rose*	FACU	Native	perennial	shrub		3	
rubida	0.25	0.21	*Rubus idaeus*	*wild red raspberry*	FACU / FAC*	Native	perennial	shrub		x	
rubocc	0.25	0.21	*Rubus occidentalis*	*black-cap, black raspberry*	0	Native	perennial	shrub		x	
rudhir	0.63	0.52	*Rudbeckia hirta*	*black-eyed Susan*	FACU	Native		0	0	3	
rumcri	0.25	0.21	*Rumex crispus*	*curly dock*	FAC	Introduced	perennial	forb		0	
saglat	0.50	0.41	*Sagittaria latifolia*	*broad-leaved arrowhead*	OBL	Native	perennial	semi-aquatic		-5	
salint	0.50	0.41	*Salix interior*	*sandbar willow*	FACW	Native	perennial	shrub		-3	
salnig	1.00	0.82	*Salix nigra*	*black willow*	OBL	Native	perennial	tree		-5	
samcan	0.25	0.21	*Sambucus canadensis*	*elderberry*	FACU	Native	perennial	shrub		3	
schpun	0.13	0.11	*Schoenoplectus pungens*	*common three-square bulrush*	OBL	Native	perennial	sedge		-5	
schtab	2.38	1.96	*Schoenoplectus tabernaemontani*	*soft-stem bulrush*	OBL	Native	perennial	sedge		-5	x
sciatr	0.25	0.21	*Scirpus atrovirens*	*dark-green bulrush*	OBL	Native	perennial	sedge		-5	
scicyp	0.88	0.72	*Scirpus cyperinus*	*wool-grass*	OBL	Native	perennial	sedge		-5	
sculat	0.13	0.11	*Scutellaria lateriflora*	*blue skullcap, mad-dog skullcap*	OBL	Native	perennial	forb		-5	
setfab	0.25	0.21	*Setaria faberi*	*Chinese foxtail, giant foxtail,*	FACU	Introduced	annual	grass		3	
setpum	1.00	0.82	*Setaria pumila*	*pigeon grass, yellow foxtail*	FAC	Introduced	annual	grass		0	
sillat	0.13	0.11	*Silene latifolia*	*bladder campion*	0	Introduced		0	0	x	
silvul	0.13	0.11	*Silene vulgaris*	*bladder-campion, maiden's-tears*	0	Introduced	perennial	forb		x	
sinarv	0.13	0.11	*Sinapis arvensis*	*California rape, charlock mustard*	0	Introduced	annual	forb		x	
siusua	0.38	0.31	*Sium suave*	*hemlock water-parsnip, common*	OBL	Native	(annual?)/perennial	forb		-5	
solcar1	0.13	0.11	*Solanum carolinense*	*Carolina horse-nettle, horse-nettle*	FACU	Introduced		0	0	3	
soldul	0.13	0.11	*Solanum dulcamara*	*bittersweet nightshade*	FAC	Introduced	perennial	vine		0	
solgig	0.38	0.31	*Solidago gigantea*	*giant goldenrod*	FACW	Native	perennial	forb		-3	
sonarv	0.13	0.11	*Sonchus arvensis*	*field sow-thistle*	FACU	Introduced	perennial	forb		3	
spaame	5.50	4.52	*Sparganium americanum*	*American bur-reed*	OBL	Native	perennial	aquatic		-5	x
spapec	0.50	0.41	*Spartina pectinata*	*prairie cord grass*	FACW	Native	perennial	grass		-3	
spialb	0.25	0.21	*Spiraea alba*	*white meadowsweet*	FACW	Native	perennial	shrub		-3	
stapal	0.38	0.31	*Stachys palustris*	*hedge-nettle, marsh hedge-nettle,*	OBL	Native	perennial	forb		-5	

symcor	0.13	0.11	*Symphyotrichum cordifolium*	*common blue heart-leaved aster,*	0	Native		0	0	x	
taroff	0.50	0.41	*Taraxacum officinale*	*common dandelion*	FACU	Introduced	perennial	forb		3	
thadas	0.25	0.21	*Thalictrum dasycarpum*	*purple meadow-rue, tall meadow-*	FACW	Native	perennial	forb		-3	
thuocc	0.25	0.21	*Thuja occidentalis*	*northern white-cedar*	FACW	Native	perennial	tree		-3	
tilame	0.13	0.11	*Tilia americana*	*American linden, basswood*	FACU	Native	perennial	tree		3	
traohi	0.13	0.11	*Tradescantia ohiensis*	*blue-jacket, common spiderwort,*	FACU	Native	perennial	forb		3	
tripra	0.13	0.11	*Trifolium pratense*	*red clover*	FACU	Introduced	perennial	forb		3	
trirep	0.63	0.52	*Trifolium repens*	*white clover*	FACU	Introduced	perennial	forb		3	
tsucan	0.25	0.21	*Tsuga canadensis*	*northern hemlock*	FACU	Native	perennial	tree		3	
typgla	1.25	1.03	*Typha X glauca*	*hybrid cat-tail, white cat-tail*	OBL	Introduced	perennial	semi-aquatic		-5	X
ulmrub	0.13	0.11	*Ulmus rubra*	*red elm, slippery elm*	FAC	Native	perennial	tree		0	
urtdio	1.13	0.93	*Urtica dioica*	*stinging nettle*	FACW / FAC	Native	perennial	forb		x	X
utrvul	0.38	0.31	*Utricularia vulgaris*	*Common bladderwort*	OBL	Native	perennial	aquatic		-5	
vacang	0.13	0.11	*Vaccinium angustifolium*	*low-bush blueberry*	FACU	Native	perennial	shrub		3	
valame	0.13	0.11	*Vallisneria americana*	*American eelgrass, water-celery*	OBL	Native	perennial	aquatic		-5	
verhas	1.50	1.23	*Verbena hastata*	*blue vervain, simpler's-joy, swamp*	FACW	Native	biennial/perennial	forb		-3	X
vertha	0.75	0.62	*Verbascum thapsus*	*common mullein*	UPL	Introduced	biennial	forb		5	
vibtri	0.25	0.21	*Viburnum trilobum*	*American cranberry-bush*	FAC / FACW	Native	perennial	shrub		x	
viosor	0.13	0.11	*Viola sororia*	*common blue violet*	FAC	Native	annual/perennial	forb		0	
vitrip	0.13	0.11	*Vitis riparia*	*river bank grape*	FACW / FAC	Native	perennial	vine		x	
xanstr	0.13	0.11	*Xanthium strumarium*	*common cocklebur, rough cocklebur*	FAC	Native	annual	forb		0	

B

APPENDIX B

Timed-Meander Sampling Protocol

Timed-Meander Sampling Protocol for Wetland Floristic Quality Assessment

Wisconsin Department of Natural Resources

INTRODUCTION

This standard operating procedure (SOP) describes the methods used by the Wisconsin Department of Natural Resources to conduct timed-meander surveys of wetland plant communities to determine wetland plant community condition. This SOP should be used in conjunction with the Floristic Quality Assessment Methodology for Wisconsin (Bernthal 2003). This SOP is based on and modified from procedures first developed and employed by the Lake Superior Research Institute (LSRI) (LSRI 2013). Possible uses for this protocol include Natural Heritage Inventory (NHI) surveys of State Natural Area wetland plant communities, FQA Benchmark Project surveys, water quality standards compliance surveys, wetland restoration site monitoring and wetland assessments for regulatory purposes.

DESCRIPTION

In this method, wetland types are first identified using aerial photographs and/or site investigations of the potential wetland(s) to be sampled. Assessment Areas (AAs) composed of relatively homogenous vegetation, are defined prior to sampling but can be modified after the survey based upon the conditions and features encountered during the survey. Natural communities, as defined by the NHI natural community classification, serve as the foundational unit of sampling (Table 1). When multiple types are present at a site, multiple Assessment Areas must be defined. Assign a wetland AA to the natural plant community type that it most closely resembles. If the AA's plant assemblage does not match any Natural Heritage Inventory community the dominant vegetation type (e.g., herbaceous, shrub, forested) may be noted. Table 1 contains a crosswalk to the Eggers and Reed classification system (2014).

Timed-meander start locations should begin far enough from the edge of a community type or from an anthropogenic disturbance (i.e., roadway, residential development, etc.) to avoid including transition zones from other plant communities in the survey. However, if the assessment area is surrounded by roadways, residential development, or other anthropogenic disturbance the timed-meander start location may be located at the edge of the disturbance. The survey consists of a search for all plant species present within a pre- or post- defined Assessment Area and an estimate of abundance and percent areal cover for each species at the end of the search period. The search takes place during timed intervals documented by the time keeper. The timer is paused when surveyors need to divert their attention from the search for any reason, such as conferring on an identification, documenting a rare species, or investigating an area with a plant composition different from the target community. The total time spent searching is an indication of search effort. All plant species are recorded when first observed and search intervals are documented on the Field Sheet. After all search intervals are complete, abundance and percent areal cover over the entire Assessment Area is estimated for each plant species, and notes on disturbance and other observations are documented.

The assessment areas must have homogeneous representation of wetland plants associated with each wetland community type. If a different wetland community type is encountered during a timed-meander survey of a given targeted community type, the timer is paused and the size of the new plant community is evaluated. If the new type is greater than 900 m^2 (30m x

30m) (9688 ft^2, 98ft x 98ft or approximately 0.09 hectare (0.25 acre), then the area is excluded from the Assessment Area and the search remains paused until the surveyors return to the targeted plant community. If necessary, the new community would need to be evaluated by a separate survey. If the new type is less than 900 m^2 in size, the search is resumed and the small pocket can be treated as an inclusion within the primary wetland type.

Invasive plant species and anthropogenic disturbances should be observed during the walk to and from the Assessment Area, and noted in comments on the Timed-Meander Survey Field Sheet. Additional condition assessment tools may also be used to evaluate the wetland's health. For regulatory decisions, the Condition Assessment in Section 3 of the Wisconsin Rapid Wetland Assessment Methodology version 2 (Trochlell 2014) should be used. A Disturbance Factor Checklist is used for rating disturbance levels for the FQA Benchmark Project surveys. For future wetland condition surveys the Disturbance Factors Checklist or a modification of it will be used to assess stressors that may be causing an impairment to the wetland.

Table 1: Examples of Wetland NHI Natural Communities and Crosswalk to Eggers and Reed (2014).[1]

NHI Natural community	Eggers and Reed (2014)	Dominant vegetation type
Submergent Marsh	Shallow Open Water Communities	Aquatic Herbaceous
Emergent Marsh	Shallow Water Marsh	Herbaceous
Northern Sedge Meadow	Sedge Meadow	Herbaceous
Southern Sedge Meadow	Sedge Meadow	Herbaceous
Wet-mesic Prairie	Wet/Wet-mesic Prairie	Herbaceous
Calcareous Fen	Calcareous Fen	Herbaceous
Boreal Rich Fen	N/A	Herbaceous
Central Poor Fen	N/A	Herbaceous
Ephemeral pond	Seasonally Flooded Basin	Herbaceous
Open Bog	Open Bog	Herbaceous/Low Shrub
Alder Thicket	Alder Thicket	Shrub
Shrub-carr	Shrub Carr	Shrub
Black Spruce Swamp	Coniferous Bog	Forested
Northern Wet-mesic Forest	Coniferous Swamp	Forested
Floodplain Forest	Floodplain Forest	Forested
Southern Hardwood Swamp	Hardwood Swamp	Forested

[1] Additional wetland community types, e.g., muskeg, interdunal, etc., may be surveyed. For a detailed description of each Natural Community, please refer to "Wisconsin's Natural Communities" on the WDNR NHI website.

DEFINITIONS

Assessment Area (AA): Discrete, homogenous area of a target plant community that is to be thoroughly sampled during the timed meander survey. Large wetlands/wetland complexes may contain multiple wetland assessment areas.

EO - Element Occurrence: In the Natural Heritage Inventory, a population of a species or an example of a natural community or natural feature naturally occurring at a specific, ecologically appropriate location.

Search: Locating, identifying and documenting plant species presence, while mentally noting percent cover. Previously un-documented plant species are continuously added until the search interval is paused or ends.

Search Interval: A pre-defined time interval, maintained by the time keeper. The search time may be paused whenever the active search for additional species stops for various reasons, including taking time to work out difficult identifications, documenting rare species, adjusting the Assessment Area or other reasons.

REFERENCES

Bernthal, Thomas W. 2003. Development of a Floristic Quality Assessment Methodology for Wisconsin**.**

Eggers, S.D. and D.M. Reed. 2014. Wetland Plants and Plant Communities of Minnesota and Wisconsin, Version 3.1. US. Army Corps of Engineers, S. Paul District, St. Paul, MN.

Lake Superior Research Institute (LSRI). 2013. Timed-meander Sampling Protocol for Forested and Non-forested Wetland Floristic Quality Assessment. University of Wisconsin-Superior. Superior, WI.

Trochlell, Patricia A. 2014. Wisconsin Rapid Wetland Assessment Methodology, version 2.

EQUIPMENT LIST

- ♦ Clipboard
- ♦ Compass
- ♦ Digital Camera
- ♦ Field Guides
- ♦ GPS Unit
- ♦ Digital watch with countdown timer
- ♦ Hand Lens (10X objective)
- ♦ Maps
- ♦ Markers
- ♦ Pencils (and sharpener/extra lead)
- ♦ Plant Collection Bags (i.e., Ziploc® Big Bags)
- ♦ Weather-Proof Datasheets

PROCEDURE

1. Upon arrival at the site, the survey team of two or more people must completely fill out the top portion of the WDNR Timed Meander Survey Sheet (Field Sheet) in Attachment 1 or other form for the Assessment Area (AA) to be surveyed. Use the Natural Heritage Inventory (NHI) Natural Community Descriptions to determine the appropriate plant community classification for the AA to be surveyed. If the survey involves an existing NHI Element Occurrence note the EO code. If the plant assemblage does not appear to match a natural community, note the dominant vegetation type from Table 1.

2. Start locations on the AA must begin at a point clearly within the target community type, away from transitional areas or anthropogenic disturbance (i.e., roadway, residential development, logging, ditching, etc.). The exception to this is that if an AA is immediately adjacent to an anthropogenic disturbance, then the start location may be located near the edge of this disturbance.

3. Travel to the AA start location and record any disturbance (e.g., invasive plants, logging, ditches) encountered while traveling to the survey start-up point on side 2 of the Field Sheet. This can also be completed at the end of the survey after the entire AA has been surveyed.

4. Take a waypoint at the survey start point using a handheld GPS unit. Record the starting point on the Field Sheet in decimal degrees. Indicate whether the GPS is set to a tracking function. This will create a record of survey locations over the course of the search.

5. Designate a lead observer and a data recorder for each survey; the observer will conduct the taxonomic identification and the recorder will complete the survey Field Sheet and operate the timer.

6. Set the countdown timer on the watch for 5 minutes. Start the stop watch and begin timing the first, 5-minute interval of the timed-meander survey. Standing at the start point, record all plants (ideally to species) that can be seen from the four cardinal directions before moving forward in search of new species. Upon reaching the end of a 5 minute interval, the timekeeper should instruct other observer(s) to stop searching until the next time interval begins.

7. Record plants using the full species name. Because there are numerous and often conflicting resources for accepted plant names (USDA Plants, Flora of North America, various state herbaria lists etc.), it is important to limit confusion caused by using multiple names for the same species. Therefore, this protocol follows the Wisconsin State Herbarium’s list of vascular flora, which has recently been updated to reflect the most recent taxonomic information and is available online. The State Herbarium nomenclature should be used for conducting plant surveys in Wisconsin whenever possible.

8. Record on the Field Sheet and collect all unknown, uncertain, and/or difficult-to-identify plant species, which will later be keyed or identified by experts (or eliminated from the analysis if identification is not possible).

9. Advance the search from the start point once the initial plants from the area surrounding the start point are recorded. Proceed walking through the site, taking care to identify all species encountered and making sure to investigate all vegetation layers. The search must always stay within the targeted plant community type for the duration of the survey, with one exception:

    a. If a different plant community type is encountered during the search, stop the watch to pause the elapsed time and evaluate the size of the community. If the new community type is less than 900 m^2 (30m x 30m or 0.09 hectares, 9688 ft^2 (98 ft x 98 ft) or 0.25 acres) the timed meander survey can continue through that community type.

    b. If the new community type is greater than 900 m^2, pause the survey until the surveyors have returned to the target plant community.

10. After each 5 minute time interval, the recorder should note on the Field Sheet the time interval in which those plant species were observed (i.e. 0-5 minutes, 5-10 minutes, 10-15 minutes, etc.). At the end of each time interval the observers may wish to briefly confer over any unknown species before resuming the next time interval. This reduces the number of unknown species for later office determination.

11. If an interruption of the process is necessary (e.g., intensive consulting with field guides and conferring with other surveyors over a difficult identification, bathroom breaks, difficult terrain, or vegetation encountered), stop the timer to pause the interval, eliminating these interruptions from the elapsed search time.

12. Pause the search if a rare, threatened, and/or endangered species is observed. Record the plant species on the Field Sheet, the location of the plant using the handheld GPS, take a digital photo of the species, and note associated species and other relevant information needed for the NHI Rare Plant Form. Collect a specimen if authorized and warranted. Resume the stop watch after all field recording is noted.

13. Typically a minimum of 30 minutes of total search time is needed to thoroughly search an AA. Stop the search when:
    a. A pre-defined area has been completely searched. For some uses of this SOP a search of an entire pre-defined area may be required, regardless of the time it takes, even if no new species are observed in a search interval, OR
    b. After 30 minutes of search time, one or no new species is found during the most recent 5 minute interval, OR
    c. After 30 minutes of search time, the number of species observed in the most recent 5 minute interval is less than 5% of the running total of recorded species (including unknowns). For example, if, after the 10^{th} five-minute interval (50 minutes of elapsed search time), 100 species have been observed, and 4 or fewer species were observed in the 10^{th} 5-minute interval, the survey should be ended. The justification for ending is that the survey has reached the point of

diminishing returns and has likely captured 90-95% of the species richness, and has likely captured 100% of the dominant and common species.

d. The search may end earlier than 30 minutes only if the entire AA has been thoroughly searched and no species were found in the final interval.

14. After the last search interval is completed take a waypoint at the survey end point using a handheld GPS unit. Record the waypoint on the Field Sheet in decimal degrees.

15. Once the species list is complete assign each species a percent cover based on an ocular estimate of the percent of the AA covered by the canopy of that species (see Figures 1 and 2). Estimate to the nearest whole number. For species that cover 1% or less, use 1.

16. For each species, assign an abundance code based upon the class categories listed in Table 2 below. Abundance estimates give a qualitative estimate of relative frequency and can be used to make comparisons with historically gathered site data. They also provide valuable data to compare species with small areal percent cover.

17. Record other data on the Field Sheet, including soil texture and pH on side 1, if taken. Animal species observed and other observations are recorded on side 2.

Table 2. Abundance Classification

Symbol	Abundance Code	Description
A	Abundant	The dominant plants throughout the site
C	Common	Locally abundant or frequently encountered
O	Occasional	Occasionally encountered, or locally common but absent or infrequent across much of site
U	Uncommon	Infrequently encountered
R	Rare	Very few plants seen

Figure 1: Comparison chart for visual percentage estimation. NPS US Dept. of the Interior, Damage Assessment Handbook, 2002.

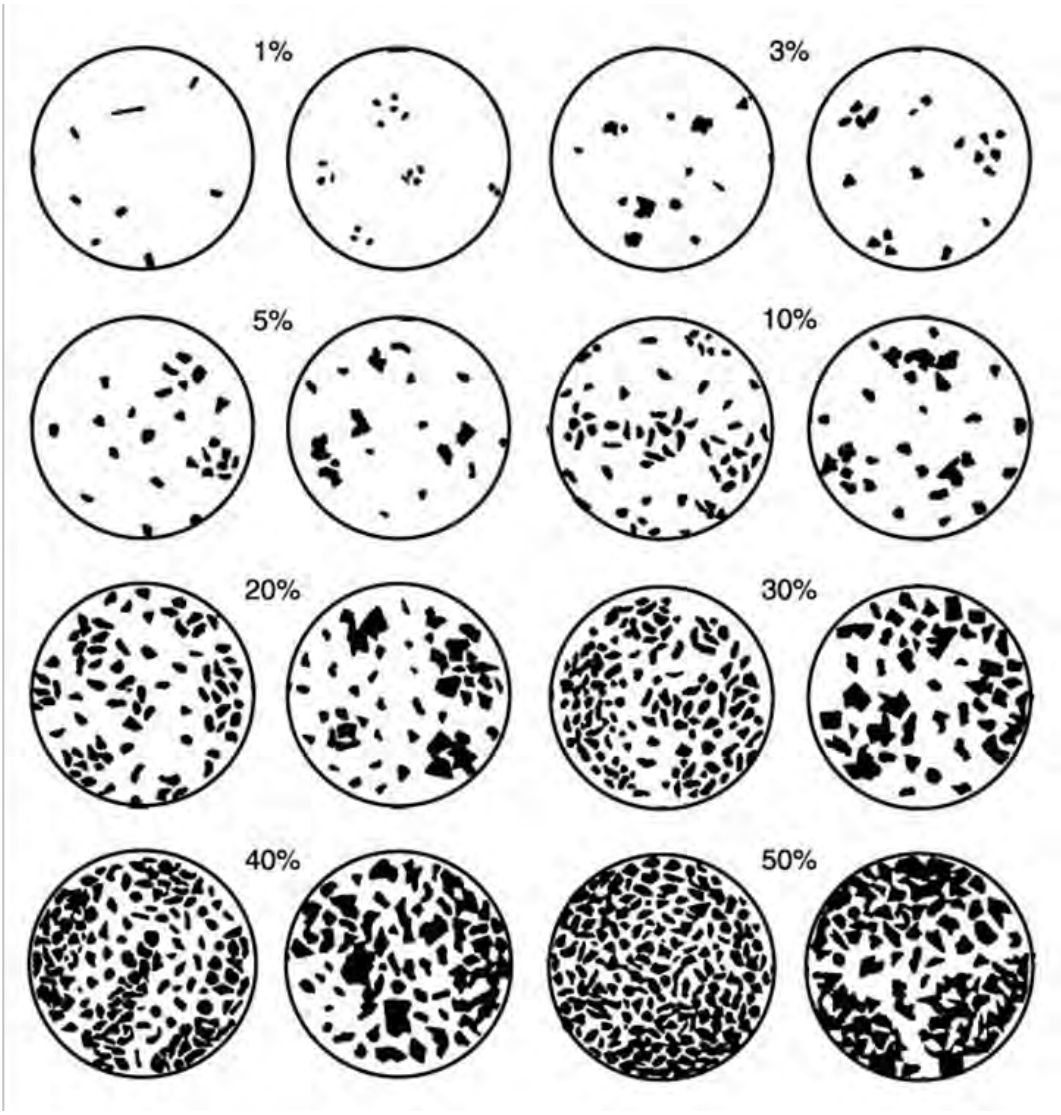
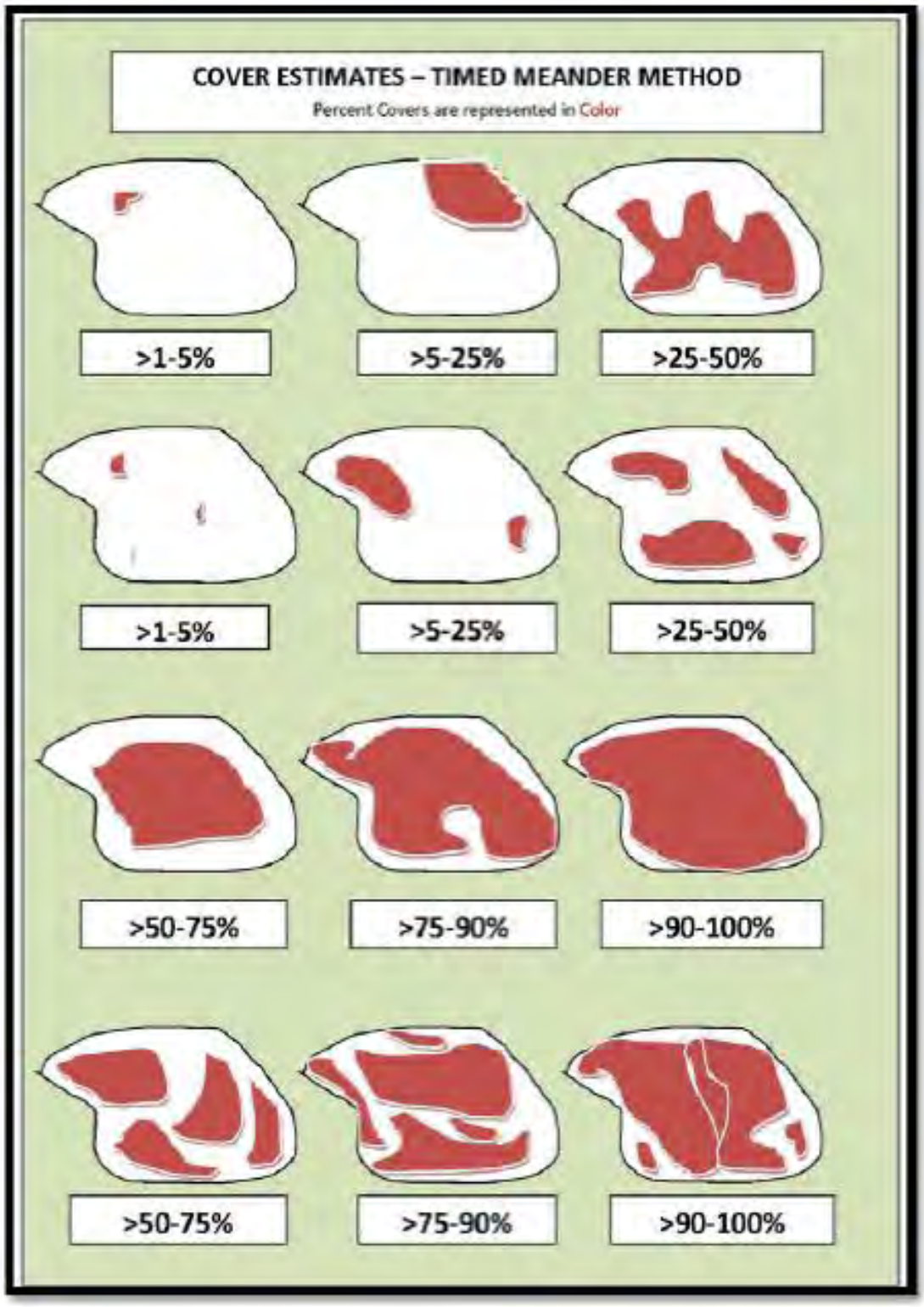


Figure 2: Cover estimates for timed meander method. LSRI 2013.



Attachment 1: WDNR Timed-Meander Survey Field Sheet, next page

WDNR Timed Meander Survey Field Sheet

Observers_____ Date_____

Property_____ Site Name_____ County_____

Access _____

Community Type _____ EOID (if existing EO) _____

GPS Used _____Start point (Dec Deg)_____ End point (Dec Deg)_____ Track Taken? Y N

Total Elapsed Search Time _____(mins) Soils & pH_____

Time		Species	%	AC	Notes	Time		Species	%	AC	Notes
0	1						36				
	2						37				
	3						38				
	4						39				
	5						40				
	6						41				
	7						42				
	8						43				
	9						44				
	10						45				
	11						46				
	12						47				
	13						48				
	14						49				
	15						50				
	16						51				
	17						52				
	18						53				
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	21						56				
	22						57				
	23						58				
	24						59				
	25						60				
	26						61				
	27						62				
	28						63				
	29						64				
	30						65				
	31						66				
	32						67				
	33						68				
	34						69				
	35						70				

Estimate % areal cover and abundance code for each species
AC: Abundance codes: A (abundant), C (common), O (occasional), U (uncommon), R (rare)

WDNR Timed Meander Survey Field Sheet

Time		Species	%	AC	Notes
	71				
	72				
	73				
	74				
	75				
	76				
	77				
	78				
	79				
	80				
	81				
	82				
	83				
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	102				
	103				
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	106				
	107				
	108				
	109				
	110				
	111				
	112				

Wetland Observation Notes
Waypoint #
Waypoint #
Waypoint #
Waypoint #
Waypoint #
Waypoint #
Animal Observations
Structural Notes
Invasive Species (note distance to AA if observed outside the AA)
Anthropogenic Disturbances
Other Notes

Estimate % areal cover and abundance code for each species
Abundance codes: A (abundant), C (common), O (occasional), U (uncommon), R (rare)

C

APPENDIX C

Photo Log

Photo 01 - Shrub-Car Wetland Restoration Facing NW 7-12-17

Photo 02 - Mesic Prairie Planting Facing NE 9-20-17

Photo 03 - Shrub-Carr Wetland Restoration & Cattail Marsh Enhancement Facing E 9-20-17

Photo 04 - Shrub-Carr Wetland Restoration & Cattail Marsh Enhancement Facing S 9-20-17

Photo 05 - Open Water Channel Facing N 9-20-17

Photo 06 - Facing SW 9-20-17

Photo 07 - Open Water Channel and Turtle Nesting Area Facing N 9-20-17

Photo 08 - Open Water Channel and Loafing Platform Facing W 9-20-17

Photo 09 - Standing Water in Shrub-Car Wetland Restoration 9-20-17

Photo 10 - Shrub-Carr Wetland Restoration Facing NE 9-20-17

Photo 11 - Mesic Prairie Planting Facing S 9-20-17

Photo 12 - Tag Alder Enhancement Facing NW 9-20-17

Photo 13 - Wet Mesic Forested Wetland Enhancement Facing E 9-20-17

Photo 14 - Mesic Prairie Planting Facing N 9-20-17

Photo 15 - Garlic Mustard Basal Leaves in Mesic Forest Restoration Facing S 9-20-17

Photo 16 - Garlic Mustard Basal Leaves in Mesic Forest Restoration Facing E 9-20-17

Photo 17 - Mesic Forest Restoration Mulch and Plant Facing E 9-20-17

Photo 18 - Facing E 9-20-17

Photo 19 - Mesic Forest Restoration Clear and Grub, Seed and Plant Facing NW 9-20-17

Photo 20 - Facing W 9-20-17

Photo 21 - Facing W 9-20-17

Photo 22 - Facing W 9-20-17

Photo 23 - Wet Mesic Forested Wetland Enhancement Facing S 9-20-17

Photo 24 - Northern Sedge Meadow Enhancement (Standing Water) Facing SW 9-20-17

Photo 25 - Northern Sedge Meadow and Wet Mesic Forest Wetland Enhancement Facing W 9-20-17

Photo 26 - Wet Mesic Forested Wetland Enhancement Facing NW 9-20-17

Photo 27 - Northern Sedge Meadow Standing Water Facing W 9-20-17

Photo 28 - Facing NW 9-20-17

Photo 29 - Wet Mesic Prairie Planting Facing N 9-20-17

Photo 30 - Mesic Prairie Planting Facing W 9-20-17

Photo 31 - Facing N 9-20-17

Photo 32 - N. Sedge Meadow Res. (Open Water) and Cattail Marsh Enh. Facing NE 9-20-17

Photo 33 - Facing E 9-20-17

Photo 34 - Facing SE 9-20-17

Photo 35 - Mesic Forest Restoration Mulch and Plant Facing E 9-20-17

Photo 36 - N. Sedge Meadow Res. (Standing Water) Cattail Marsh Enh. Facing N 9-20-17

Photo 37 - Northern Sedge Meadow Restoration (Standing Water) Facing E 9-20-17

Photo 38 - Northern Sedge Meadow Restoration Facing E 9-20-17

Photo 39 - Facing SE 9-20-17

Photo 40 - Facing S 9-20-17

Photo 41 - Facing SW 9-20-17

Photo 42 - Facing NW 9-20-17

Photo 43 - Aquatic Submergent Emergent Restoration Facing NE 9-20-17

Photo 44 - Facing W 9-20-17

Photo 45 - Northern Sedge Meadow Restoration Facing E 9-20-17

Photo 46 - Mesic Forest Restoration Mulch and Plant Facing S 9-20-17

Photo 47 - Northern Sedge Meadow Restoration Facing W 9-20-17

Photo 48 - Aquatic Submergent Emergent Restoration Facing NW 9-20-17