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
Menekaunee Harbor Restoration Project
Great Lakes Restoration Initiative Grant
Grant/Project No. GL-00E01312-0

Prepared for

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

Authored By:
NES Staff

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TABLE OF CONTENTS

Tables

Figures

Appendices

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 Menekaunee Harbor located in Sections 4 & 9, T30N, R24E, City of Marinette, Marinette County, Wisconsin (Figure 1). The City began restoration at Menekaunee Harbor (herein referred to as the "Harbor") as part of a Great Lakes Restoration Initiative (GLRI) Grant to restore the Lower Menominee River Area of Concern (AOC). In the summer of 2015 NES/REL finalized a Restoration Plan for the Harbor and the Quality Assurance Project Plan (QAPP) was signed in October 2015. The Project is approximately 9.39 acres in size and is designed to encompass 2.08 acres of emergent aquatic, 1.26 acres of emergent aquatic- wild rice, 0.05 acres of ephemeral pool, 0.32 acres of mesic to wet-mesic prairie, 0.81 acres of northern sedge meadow, 1.22 acres of wet mesic forest, 2.81 acres of open water, 0.32 acres of prairie, 0.51 acres of shrub-carr, 0.027 acres of submergent aquatic & 1.22 acres of wet mesic forest. Construction began in the late summer of 2015 and was completed in the early summer of 2016.

NES ecologists conducted the first year of monitoring on July 5 and August 22, 2016. 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 Menekaunee Harbor ecological restoration is to restore native vegetation and habitat to a degraded wetland complex. Per the QAPP, the goals of the site are as follows:

- Long-term protection is in place for natural areas and wetlands within the AOC.
- Nesting populations of a diverse array of wetland-dependent and riparian-associated birds are consistently present within the AOC.
- The lake sturgeon (*Acipenser fulvescens*) population is enhanced.
- Diverse and functional native fish and mussel assemblages are present in the AOC that sustain natural recruitment.
- A healthy and diverse native vegetation community has been restored.

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 harbor: walleye (*Sander vitreus*), yellow perch (*Perca flavescens*), muskellunge (*Esox masquinongy*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), northern pike (*Esox lucius*), and bluegill (*Lepomis macrochirus*).

    a) Eliminate contaminated sediments and establish water depths averaging 6-7 feet.
    b) Install fish sticks, log structures, woody debris and rock structures to increase cover and feeding opportunities.
    c) Establish small populations of submergent native vegetation in the harbor.
    d) 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. Wild rice (*Zizania palustris*) was historically found within the Menominee River; therefore, an attempt will be made to re-establish a viable population.
    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.

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 emergent aquatic, emergent aquatic- wild rice, open water & submergent aquatic, ephemeral pool, mesic to wet mesic prairie & prairie, northern sedge meadow, wet mesic forest, and shrub-carr 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
Aerial coverage of invasive, non-native species such as giant reed grass, reed canary grass, cattail spp., purple loosestrife and spotted knapweed will not be >5% after one year.	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	0.28	0.22	
				Reed canary grass	0.69	0.54	
				Cattail spp.	0.69	0.54	
				Purple loosestrife	0.56	0.43	
				Spotted knapweed	0	0	
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.	Y	--	--	**Species**	**Percent cover**		Vegetative cover is currently exceeding the 75% minimum native species cover after one year. *Elodea canadensis*, a submergent aquatic is accounting for the largest portion of vegetative cover of native species with 13.85% relative cover.
				Native	85.4		
				Invasive / Non-native	14.6		
Eighty percent of the site will be vegetated within one year.	Y	--	--	Sum of average percent cover across all plots = 128%			Based on the sum of average percent cover across all plots this criterion has been met. The lowest percent cover across all plots were plot 5 (Shrub-Carr) at 79% cover, plot 6 (Emergent Aquatic) at 60% cover and plot 16 (Ephemeral Pool) at 68% cover.
585 of the 650 planted shrubs within the Shrub-Carr community will be present and healthy one year after installation.	Y	--	--	Only 8 dead shrubs were observed during the vegetation survey			99% survival rate meets the performance standard
900 of the 1,000 planted trees and shrubs within the Wet-Mesic Forest community will be present and healthy after one year of installation.	Y	--	--	78 dead trees/shrubs were observed during the vegetation survey			92% survival rate meets the performance standard
The Open Water with Submergent Vegetation community shall have a minimum of 5 native, non-invasive species present.	Y			Community had 8 species identified during the vegetation survey			Planted species along with naturally occurring species allowed this performance standard to be met.
The Emergent Aquatic, Northern Sedge Meadow, Shrub-Carr, Wet-Mesic Forest and Mesic to Wet Mesic Prairie & Prairie communities shall each have a minimum of 15 native, non-invasive species present.	P	--	--	**Community**	**Number of Native, Non-invasive Species**		The Emergent Aquatic community is the only community that does not currently meet this standard. Due to an additional rise in water levels some planted species were displaced. However, as the site continues to develop additional species will likely become established in all communities including the Emergent Aquatic zone.
				Emergent Aquatic	14		
				Northern Sedge Meadow	34		
				Shrub-Carr	43		
				Wet-Mesic Forest	26		
				Mesic to Wet Mesic Prairie & Prairie	24		
To ensure the restored communities have natural significance, the floristic quality index (FQI) and Coefficient of Conservatism (Mean C) for each shall be $\geq$ 20 and $\geq$ 3.5, respectively, after one year. FQI values will be calculated utilizing all species present: non-native species will be assigned a value of zero.	P	--	--	**Community**	**FQI**	**Mean C**	Some but not all of the criteria have been met for this performance standard. Due to the site still being in the early stages of development the plant communities will likely trend in the direction of fulfilling the requirement. The most concerning community at this time are the Prairie communities; however, because they were seeded it is expected that the first few years will be dominated by annual weeds.
				Emergent Aquatic	19.78	5.29	
				Emergent Aquatic – Wild Rice	15.33	5.11	
				Northern Sedge Meadow	21.04	3.21	
				Shrub-Carr	24.18	3.32	
				Wet-Mesic Forest	18.08	2.97	
				Mesic to Wet Mesic Prairie & Prairie	11.90	1.67	
				Open Water w/Submergent Veg	15.20	5.38	

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

Summary Data

Methods

Vegetation/Floristic Diversity

Meander and plot-based vegetation surveys were conducted within the project area to gather a representative sample of the floristic diversity of each plant community. In early July a survey was conducted so a list of plant species found within each community could be compiled. The plant species list accumulated during the survey was then combined with the species list generated during the vegetation plot survey to create a comprehensive species list (Appendix A).

On August, 18 sample plots (1 Open Water/Submergent Aquatic, 4 Emergent Aquatic, 3 Emergent Aquatic- Wild Rice, 2 Northern Sedge Meadow, 3 Shrub-Carr, 2 Wet-Mesic Forest, 2 Mesic to Wet-Mesic Prairie & Prairie, 1 Ephemeral Pool (Figure 2) were randomly established in the eight community types within the project area. All plots, except Plot 18, were used as photo stations with pictures taken in each cardinal direction to document change over time. Plots were marked with a wooden stake and located with a Trimble GPS (sub-meter accuracy) unit to allow for the analysis of temporal trends within the communities. At each five-foot radius sized sample plot, the plant species present, including invasive plants, and their coverage were recorded. Coverage was determined using the perpendicular projection to the ground from the outline of the aerial parts of the plant species and reported as the percent of the total area (e.g., substrate or water surface) covered. The Daubenmire methodology will rank estimated foliage cover based on the percentages found in Table 2. By providing a range of percent foliage cover for each rank, the Daubenmire Classification Scheme will help minimize errors due to observer bias with visual estimations. Plant species dominance within each community type was determined by applying the 50/20 rule.

Table 2. Daubenmire Classification Scheme Cover Ranking System.

Percent Foliage Cover	Rank
0-5	1
5-25	2
25-50	3
50-75	4
75-95	5
95-100	6

Tree & Shrub Survey

In the fall of 2015, 15 species of native trees and 19 species of native shrubs were planted in the project area. A total of 1,000 bare-root and potted plants (600 trees and 400 shrubs) were planted throughout the Wet-Mesic Forest community, while another 650 bare-root and potted shrubs were planted in the Shrub-Carr community. Construction specifications indicated a total of 400 bare-root and potted shrubs were to be installed in the Shrub-Carr community, an increase of 150 plants from the original Restoration Plan. Live stakes (400) were also to be installed. However, a rise in water levels throughout the 2015 growing season reduced the woody species planting area within the community; therefore, the number of shrubs installed was reduced to the original quantities specified in the Restoration Plan found in Appendix C of the QAPP. Due to availability, live stakes were also replaced with bare-root and potted material. Appendix B contains a list of the species and quantities installed in the Harbor. The change in quantity is

also reflected in the warranty and Performance Standard requirements of a 90% survival rate. During the summer of 2016 a woody species survey was completed to determine these rates.

Results

Vegetation/Floristic Diversity

A list of species found during the meander survey along with the vegetation data collected at each sample plot and a summary of each community type can be found in Appendix A. These data were used to compute the information reported in Table 3 below. A total of 185 plant species were recorded during the 2016 surveys of which 130 species were recorded during the community plot survey.

Photos (Appendix C) documenting existing site conditions were taken at each sample plot, except Plot 18 (Figure 2).

Table 3. Vegetation Data Summary.

Community	# Total Species	# Native Species	FQI	Mean C	% Native Coverage	% Invasive Species Coverage
Open Water & Submergent Aquatic	8	8	15.20	5.38	100.0	0.0
Emergent Aquatic	14	14	19.78	5.29	100.0	0.0
Emergent Aquatic- Wild Rice	9	9	15.33	5.11	100.0	0.0
Northern Sedge Meadow	43	34	21.04	3.21	81.0	19.0
Shrub-Carr	53	43	24.18	3.32	92.2	7.8
Wet-Mesic Forest	37	26	18.08	2.97	73.3	26.7
Mesic to Wet-Mesic Prairie & Prairie	51	24	11.90	1.67	51.0	49.0
Ephemeral Pool	4	3	5.5	2.75	96.4	3.6
Entire Site	**130**	**96**	**35.87**	**3.15**	**85.4**	**14.6**

Native Species Dominance

All communities had a greater coverage of native plant species. All dominant species in the Open Water & Submergent Aquatic, Emergent Aquatic, Emergent Aquatic - Wild Rice, and Ephemeral Pool were native while the Northern Sedge Meadow, Shrub-Carr, Wet-Mesic Forest, and Mesic to Wet-Mesic Prairie & Prairie contained a mix of both native and non-native species. Table 4 contains a list of dominant species found within the Harbor communities. Additional information pertaining to the percent areal coverage of native and invasive species can be found in the sample plot and community summary data (Appendix A).

Table 4. Plant Species Dominance.

Community Type	**Dominant Species**
Open Water & Submergent Aquatic	*Heteranthera dubia*
	Myriophyllum sibiricum
Emergent Aquatic	*Elodea canadensis*
	Stuckenia pectinata
Emergent Aquatic- Wild Rice	*Myriophyllum sibiricum*
	Nymphaea odorata
	Potamogeton natans
Northern Sedge Meadow	*Acer negundo*
	Agrostis stolonifera
	Elodea canadensis
	Phalaris arundinacea
	Phragmites australis
	Sagittaria latifolia
Shrub-Carr	*Agrostis stolonifera*
	Bidens cernua
	Boehmeria cylindrica
	Calamagrostis canadensis
	Carex aquatilis
	Erechtities hieraciifolia
	Juncus balticus
	Juncus nodosus
	Populus deltoides
	Schoenoplectus tabernaemontani
Wet-Mesic Forest	*Agrostis stolonifera*
	Calamagrostis canadensis
	Juncus balticus
	Populus deltoides
Mesic to Wet-Mesic Prairie & Prairie	*Agrostis stolonifera*
	Calamagrostis canadensis
	Conyza canadensis
	Cyperus bipartitus
	Juncus balticus
	Juncus brevicaudatus
	Melilotus alba
	Plantago major
	Populus deltoides
	Setaria faberi
	Setaria pumila
	Trifolium repens
	Triticum aestivum
Ephemeral Pool	*Schoenoplectus tabernaemontani*

Invasive/Non-native Species

Based on the information in Table 3, there are currently 34 invasive and/or non-native species found within the plots of five of the eight communities with an overall coverage is 14.6%. An additional 13 non-native species were identified within the Harbor communities while conducting the meander survey; however, three of the communities (Open Water & Submergent Aquatic, Emergent Aquatic & Emergent Aquatic – Wild Rice) had no invasive species recorded. Please see the plot data sheets in Appendix A for specific sample plot percentages. Table 5 includes a list of those species that are either of the greatest concern for invasion or were recorded as occurring frequently within the communities. Several of the species listed below often invade newly seeded sites such as the Prairie communities which have the largest number of non-native species present; however, many of these biannual and perennial weeds, including the 2 most commone species - spreading bent grass (*Agrostis stolonifera*) and white sweetclover (*Melilotus alba*), quickly disappear with proper maintenance and native species establishment. Birdsfoot trefoil (*Lotus corniculatus*), glossy buckthorn (*Frangula alnus*), plumeless thistle (*Carduus acanthoides*), spotted knapweed (*Centaurea maculosa*) and Tartarian honeysuckle (*Lonicera tatarica*) were also found on the site but not recorded at the sample plots (Table 5). Continued monitoring and management of these species will eliminate or suppress their threat to spread throughout the site.

Table 5. Invasive/Non-native Species Coverage (%).

Species		Community				
Common Name	Scientific Name	Northern Sedge Meadow	Shrub-Carr	Wet-Mesic Forest	Mesic to Wet-Mesic Prairie & Prairie	Ephemeral Pool
Bull Thistle	*Cirsium vulgare*	-	-	-	0.69	-
Canada Thistle	*Cirsium arvense*	1.19	-	-	0.69	-
Common Reed	*Phragmites australis*	2.38	-	-	-	-
Creeping Wild Rye	*Elymus repens*	-	-	-	0.69	-
Birdsfoot Trefoil	*Lotus corniculatus*	-	-	-	-	-
Glossy Buckthorn	*Frangula alnus*	-	-	-	-	-
Narrow-Leaf Cattail	*Typha angustifolia*	1.19	0.85	0.74	0.69	3.57
Purple Loosestrife	*Lythrum salicaria*	1.19	0.85	0.74	0.69	-
Queen Anne's-Lace	*Daucus carota*	-	-	-	0.69	-
Reed Canary Grass	*Phalaris arundinacea*	2.38	-	0.74	0.69	-
Plumeless Thistle	*Carduus acanthoides*	-	-	-	-	-
Spotted Knapweed	*Centaurea maculosa*	-	-	-	-	-
Spreading Bent	*Agrostis stolonifera*	7.14	5.98	15.56	4.14	-
Tartarian Honeysuckle	*Lonicera tatarica*	-	-	-	-	-
White Sweetclover	*Melilotus alba*	-	-	0.74	10.34	-

Tree Survey

The contractor, Applied Ecological Services (AES), is responsible for replacing dead trees and shrubs during the first year after planting if mortality exceeds 90%. In the fall of 2016, NES ecologists assessed the tree & shrub plantings. All species planted within the Shrub-Carr and Wet-Mesic Forest communities (Appendix B) were observed; however, a few species, especially tamarack (*Larix laricinia*), are struggling to survive. High water levels are likely responsible. A total of 86 dead woody species were noted within the two communities. Table 6 contains a breakdown of the number of dead shrubs/trees in

each community. Based on the count, each community had >90% survival; therefore, both the contractor warranty and performance standard were met.

Table 6. Tree & Shrub Survival.

Community	Number of Shrubs/Trees Planted	Number of Dead Shrubs/Trees
Shrub-Carr	650	8
Wet-Mesic Forest	1000	78

Conclusions & Recommendations

Overall, the condition of the Harbor 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. Native species coverage has proven to be quite high at such an early stage of development in all of the planted and seeded communities with the exception of the prairie communities (51.0%). Since restoration efforts included only seeding within these communities, the number of annual, non-native species was expected to be higher during the first few years of establishment. Routine maintenance activities to be conducted by AES during the next two growing season should eliminate many of these species and encourage native species development. Although not very abundant, species such as reed canary grass, *Phragmites*, purple loosestrife, spotted knapweed and narrow-leaf & hybrid cattail will need to continue to be aggressively treated throughout the upcoming growing season. 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.

Although observations at the 18 sample plots captured a lot of good data to characterize the communities, it appears many species were not recorded. A total of 42 native and 13 non-native species were noted during the meander survey, but not observed within the sample plots. Our recommendation is to add 5 or 6 additional sample plots in 2017 to more accurately depict community types. In particular, plots should be added to the Northern Sedge Meadow, Open Water Submergent Aquatic, Prairie and Wet Mesic Forest communities. In addition to extra sample plots, we recommend re-assessing mapped community types throughout the Harbor. Sample plots established in 2016 may not represent the same habitat type in 2017 due to rising water levels that have shifted community boundaries. Sample plots established in 2016 will continue to be utilized; but some, especially those found in the Northern Sedge Meadow community, may not accurately characterize the community based on the dominant vegetation species recorded. If this is found to be correct, additional sample plots within these communities will ensure proper representation.

In an attempt to re-establish Wild rice (*Zizania aquatica*) within the Harbor, seed was sown in the fall of 2015. Plants were observed growing within the designated community zone; however, since the species is an annual plant we are concerned the limited growth will not be enough to adequately establish a permanent, robust population due to a lack of seed production. Although water levels increased after the initial seeding, we believe site conditions are still suitable for the species since some germination and growth was noted. Water depths should be re-assessed during the late summer of 2017 and additional seed sown within suitable areas to help bolster establishment of this very important species both for cultural and wildlife value.

During the 2016 growing season additional planting and invasive species control areas were added to the Harbor restoration project. Invasive species control was conducted over an additional 7 acres (Figure 3) to the south and to the west of the original project extent. Additionally, Northern Sedge Meadow and Aquatic Emergent communities were added around the northern portion of the pond that is located to the south of the original project boundary. Lastly, a shady woodland planting zone roughly 0.22 acres in size (Figure 3) was added just south of the southwest corner of the original project boundary. Because these areas are in the process of being restored and/or enhanced, it would be beneficial to add vegetation sample plots within these areas to monitor changes during the next two (2017 & 2018) growing seasons. To adequately capture the communities, we recommend adding nine sample plots as indicated in Figure 3.

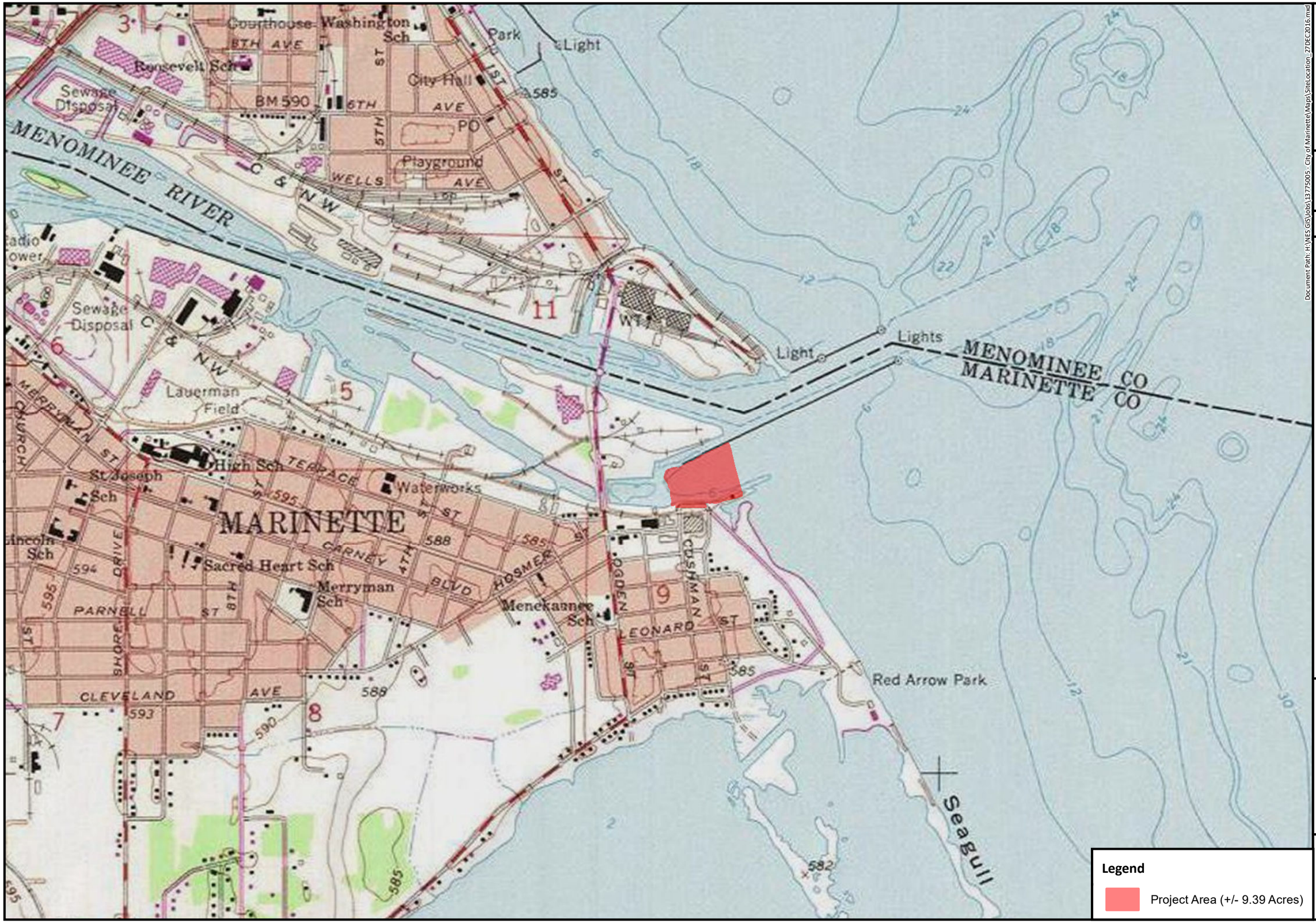

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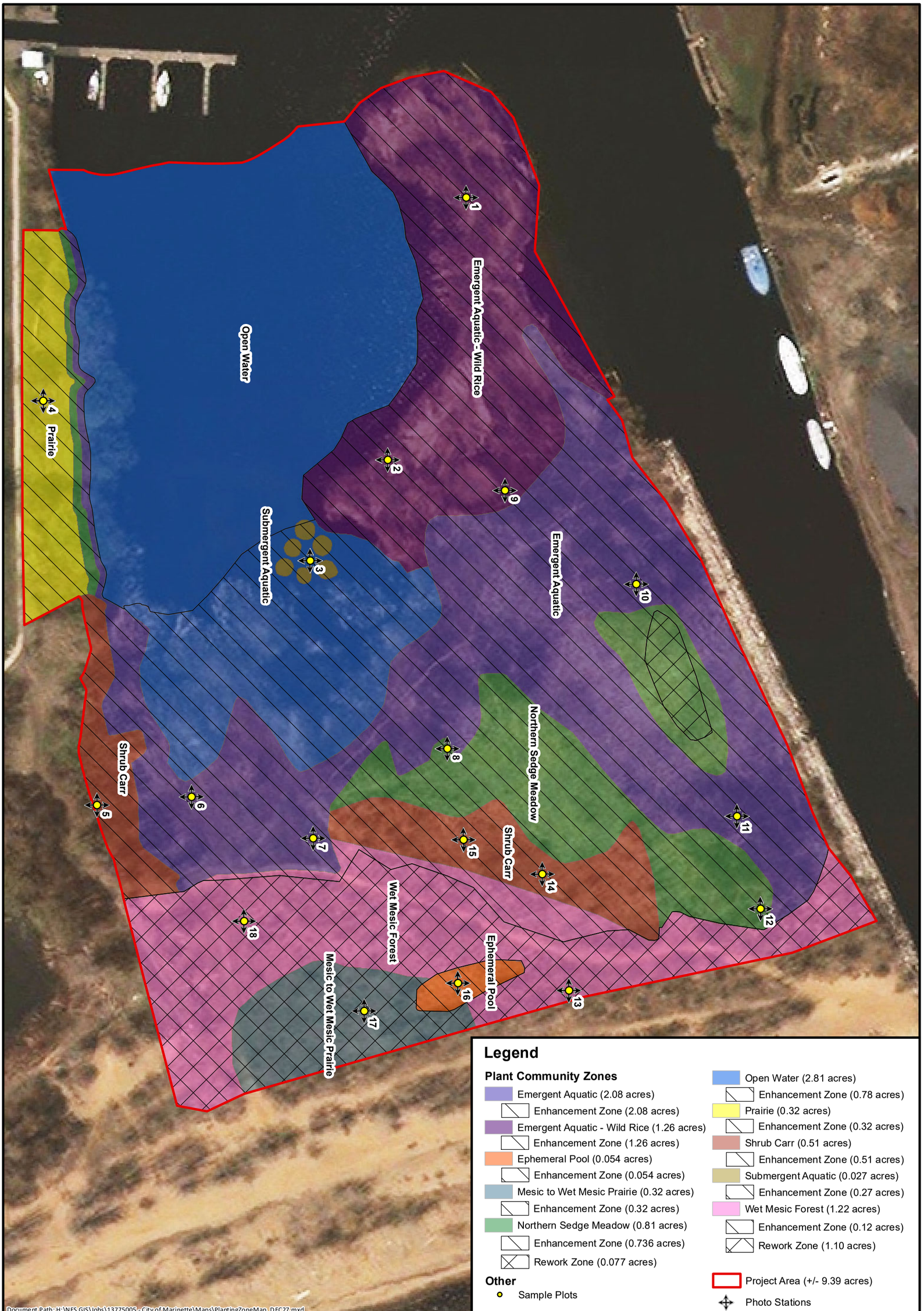
Figure 1
Site Location

1/4/2017

Lower Menominee River Area of Concern
Menekaunee Harbor Restoration Project
City of Marinette-Grant/Proj. No. GL-00E01312-0
REL Project No. 13775005
Marinette, Marinette County, WI

Located in parts of:
Section 4 & 9
T30N, R24E
City of Marinette
Marinette County
Wisconsin



Legend

Plant Community Zones

- Emergent Aquatic (2.08 acres)
- Enhancement Zone (2.08 acres)
- Emergent Aquatic - Wild Rice (1.26 acres)
- Enhancement Zone (1.26 acres)
- Ephemeral Pool (0.054 acres)
- Enhancement Zone (0.054 acres)
- Mesic to Wet Mesic Prairie (0.32 acres)
- Enhancement Zone (0.32 acres)
- Northern Sedge Meadow (0.81 acres)
- Enhancement Zone (0.736 acres)
- Rework Zone (0.077 acres)
- Open Water (2.81 acres)
- Enhancement Zone (0.78 acres)
- Prairie (0.32 acres)
- Enhancement Zone (0.32 acres)
- Shrub Carr (0.51 acres)
- Enhancement Zone (0.51 acres)
- Submergent Aquatic (0.027 acres)
- Enhancement Zone (0.27 acres)
- Wet Mesic Forest (1.22 acres)
- Enhancement Zone (0.12 acres)
- Rework Zone (1.10 acres)

Other

- Sample Plots
- Project Area (+/- 9.39 acres)
- Photo Stations

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0 10 20 40 60 80 Feet

N

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

Lower Menominee River Area of Concern
Menekaunee Harbor Restoration Project
City of Marinette-Grant/Proj. No. GL-00E01312-0
REL Project No. 13775005
Marinette, Marinette County, WI

1/4/2017

Figure 2 Plant Community Zones

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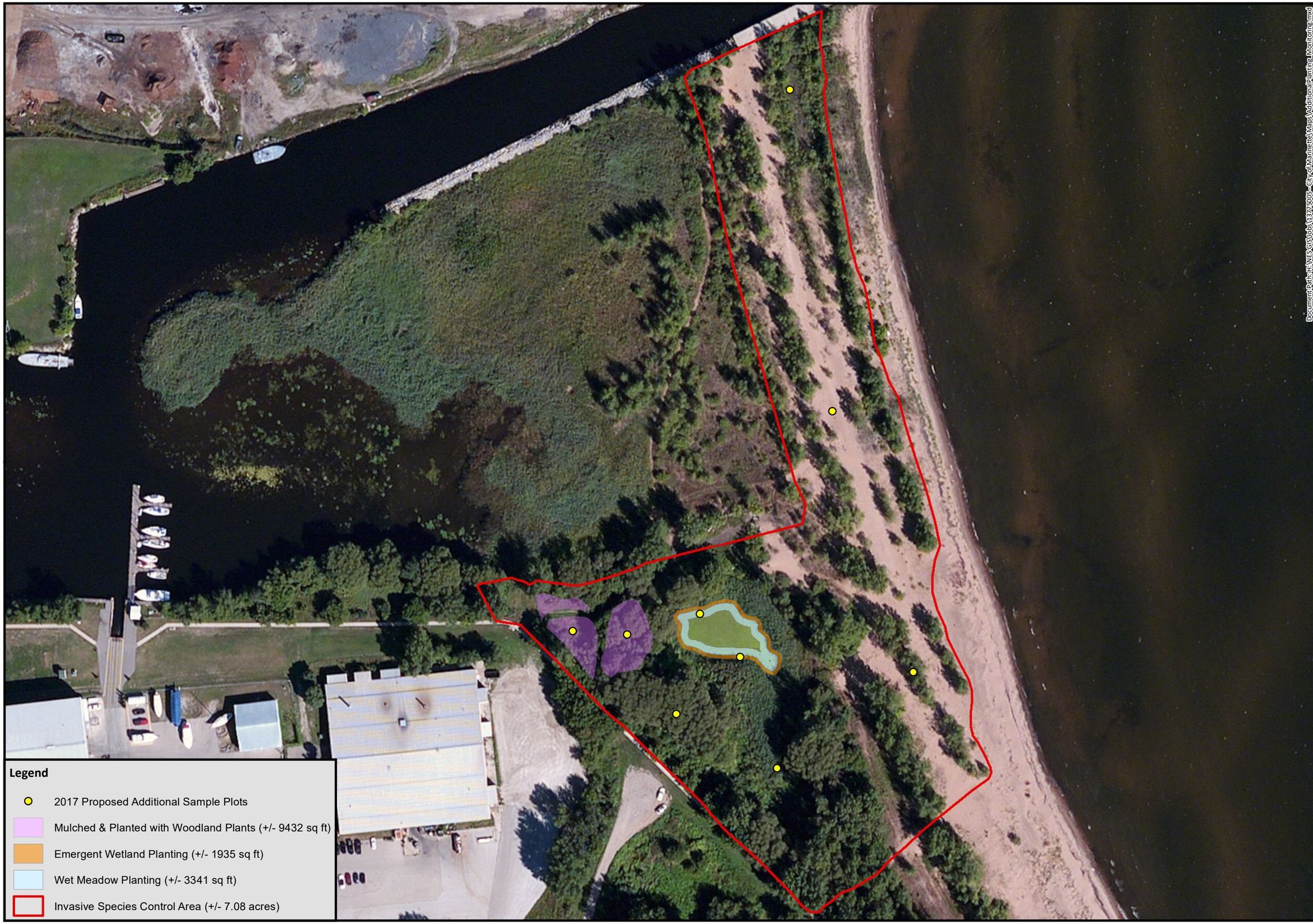

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Figure 3
Additional Habitat Work

1/4/2017

Lower Menominee River Area of Concern
Menekaunee Harbor Restoration Project
City of Marinette-Grant/Proj. No. GL-00E01312-0
REL Project No. 13775005
Marinette, Marinette County, WI

Sources: Robert E. Lee & Associates, Inc., WDNR, ESRI

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0 60 120 Feet

A

APPENDIX A

Vegetation Survey Data

Plot 1 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Heteranthera dubia	Y	6	-5	40	3	X
Myriophyllum sibiricum	Y	6	-5	20	2	
Potamogeton natans	Y	5	-5	40	3	X
Schoenoplectus tabernaemontani	Y	4	-5	2	1	

Mean C	5.25		Cover (%)	102.0%		
FQI	10.5		50%	51.0%		
Mean W	-5.00		20%	20.4%		
Native Species	4					
Native Wetland Species	4					
Total Species	4					

Plot 2 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Elodea canadensis	Y	3	-5	20	2	
Heteranthera dubia	Y	6	-5	25	2	
Myriophyllum sibiricum	Y	6	-5	35	3	X
Nymphaea odorata	Y	6	-5	70	4	X
Potamogeton natans	Y	5	-5	10	2	
Zizania palustris	Y	8	-5	1	1	

Mean C	5.67	Cover (%)	161.0%	
FQI	13.88	50%	80.5%	
Mean W	-5.00	20%	32.2%	
Native Species	6			
Native Wetland Species	6			
Total Species	6			

Plot 3 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Ceratophyllum demersum	Y	3	-5	5	1	
Elodea canadensis	Y	3	-5	10	2	
Heteranthera dubia	Y	6	-5	40	3	X
Myriophyllum sibiricum	Y	6	-5	30	3	X
Nymphaea odorata	Y	6	-5	10	2	
Potamogeton natans	Y	5	-5	5	1	
Potamogeton zosteriformis	Y	6	-5	2	1	
Ranunculus aquatilis	Y	8	-5	20	2	

Mean C	5.38	Cover (%)	122.0%
FQI	15.20	50%	61.0%
Mean W	-5.00	20%	24.4%
Native Species	8		
Native Wetland Species	8		
Total Species	8		

Plot 4 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Abutilon theophrasti	N	0	3	2	1	
Acer saccharinum	Y	2	-3	2	1	
Achillea millefolium	Y	1	5	1	1	
Ambrosia artemisiifolia	Y	0	3	5	1	
Artemisia biennis	N	0	-3	1	1	
Avena sativa	N	0	5	1	1	
Cirsium arvense	N	0	3	1	1	
Cirsium vulgare	N	0	3	5	1	
Conyza canadensis	Y	0	5	10	2	
Dalea purpurea	Y	7	5	2	1	
Daucus carota	N	0	5	1	1	
Elymus repens	N	0	3	2	1	
Erysimum cheiranthoides	N	0	3	1	1	
Matricaria discoidea	N	0	3	1	1	
Medicago lupulina	N	0	5	5	1	
Melilotus alba	N	0	5	35	3	X
Monarda punctata	N	3	5	2	1	
Nepeta cataria	N	0	3	1	1	
Parthenocissus quinquefolia	Y	5	3	2	1	
Penstemon digitalis	Y	0	0	1	1	
Persicaria pensylvanica	Y	1	-3	1	1	
Plantago major	N	0	3	15	2	X
Poa pratensis	N	0	3	5	1	
Populus deltoides	Y	2	0	1	1	
Ratibida pinnata	Y	4	5	5	1	
Rudbeckia hirta	Y	4	3	5	1	
Setaria faberi	N	0	3	10	2	
Setaria pumila	N	0	0	15	2	X
Sonchus arvensis	N	0	3	5	1	
Taraxacum officinale	N	0	3	1	1	
Trifolium aureum	N	0	5	5	1	
Trifolium repens	N	0	3	20	2	X
Triticum aestivum	N	0	5	15	2	X

Mean C	0.88	Cover (%)	184.0%	
FQI	5.05	50%	92.0%	
Mean W	2.85	20%	36.8%	
Native Species	11			
Native Wetland Species	4			
Total Species	33			

Plot 5 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Acer negundo	Y	0	0	1	1	
Arctium minus	N	0	3	5	1	
Bidens frondosa	Y	1	-3	10	2	X
Boehmeria cylindrica	Y	6	-5	25	2	X
Bromus inermis	N	0	5	2	1	
Cirsium vulgare	N	0	3	2	1	
Cornus alba	Y	3	-3	2	1	
Erechtites hieraciifolia	Y	2	5	10	2	X
Eurybia macrophylla	Y	4	5	2	1	
Fraxinus pennsylvanica	Y	2	-3	1	1	
Impatiens capensis	Y	2	-3	5	1	
Oxalis stricta	Y	0	3	5	1	
Parthenocissus quinquefolia	Y	5	3	2	1	
Phalaris arundinacea	N	0	-3	2	1	
Phleum pratense	N	0	3	2	1	
Rubus pubescens	Y	7	-3	1	1	
Taraxacum officinale	N	0	3	2	1	
Shrub						
Celtis occidentalis	Y	4	0	2	1	
Fraxinus pennsylvanica	Y	2	-3	2	1	
Sambucus racemosa	Y	5	3	5	1	X
Trees						
Acer negundo	Y	0	0	75	5	X
Fraxinus pennsylvanica	Y	2	-3	2	1	
Populus deltoides	Y	2	0	15	2	
Prunus serotina	Y	3	3	2	1	
Salix nigra	Y	4	-5	10	2	
Ulmus americana	Y	3	-3	10	2	

Herbaceous			
Mean C	1.88	Cover (%)	79.0%
FQI	7.76	50%	39.5%
Mean W	0.59	20%	15.8%
Native Species	11		
Native Wetland Species	7		
Total Species	17		
Shrub			
Mean C	3.67	Cover (%)	9.0%
FQI	6.35	50%	4.5%
Mean W	0.00	20%	1.8%
Native Species	3		
Native Wetland Species	2		
Total Species	3		
Trees			
Mean C	2.33	Cover (%)	114.0%
FQI	5.72	50%	57.0%

Plot 5			**Date - 8/22/2016**
Mean W	-1.33	20%	22.8%
Native Species	6		
Native Wetland Species	5		
Total Species	6		

Plot 6 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Elodea canadensis	Y	3	-5	25	2	X
Myriophyllum sibiricum	Y	6	-5	1	1	
Najas flexilis	Y	6	-5	25	2	X
Nuphar variegata	Y	6	-5	1	1	
Sagittaria latifolia	Y	3	-5	2	1	
Stuckenia pectinata	Y	3	-5	5	1	
Zizania palustris	Y	8	-5	1	1	

Mean C	5.00	Cover (%)	60.0%	
FQI	13.23	50%	30.0%	
Mean W	-5.00	20%	12.0%	
Native Species	7			
Native Wetland Species	7			
Total Species	7			

Plot 7 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Elodea canadensis	Y	3	-5	80	5	X
Najas flexilis	Y	6	-5	5	1	
Nuphar variegata	Y	6	-5	2	1	
Schoenoplectus pungens	Y	5	-5	2	1	
Sparganium eurycarpum	Y	5	-5	15	2	
Stuckenia pectinata	Y	3	-5	10	2	

Mean C	4.67	Cover (%)	114.0%	
FQI	11.43	50%	57.0%	
Mean W	-5.00	20%	22.8%	
Native Species	6			
Native Wetland Species	6			
Total Species	6			

Plot 8 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Carex stricta	Y	7	-5	5	1	
Elodea canadensis	Y	3	-5	90	5	X
Phalaris arundinacea	N	0	-3	1	1	
Phragmites australis	N	0	-3	2	1	
Potamogeton zosteriformis	Y	6	-5	1	1	
Sagittaria latifolia	Y	3	-5	2	1	

Mean C	3.17	Cover (%)	101.0%	
FQI	7.76	50%	50.5%	
Mean W	-4.33	20%	20.2%	
Native Species	4			
Native Wetland Species	4			
Total Species	6			

Plot 9 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Elodea canadensis	Y	3	-5	35	3	X
Heteranthera dubia	Y	6	-5	1	1	
Myriophyllum sibiricum	Y	6	-5	20	2	
Potamogeton natans	Y	5	-5	15	2	
Potamogeton richardsonii	Y	5	-5	50	3	X
Stuckenia pectinata	Y	3	-5	5	1	
Zizania palustris	Y	8	-5	1	1	

Mean C	5.14	Cover (%)	127.0%	
FQI	13.61	50%	63.5%	
Mean W	-5.00	20%	25.4%	
Native Species	7			
Native Wetland Species	7			
Total Species	7			

Plot 10 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Elodea canadensis	Y	3	-5	30	3	X
Heteranthera dubia	Y	6	-5	5	1	
Lysimachia terrestris	Y	7	-5	2	1	
Myriophyllum sibiricum	Y	6	-5	5	1	
Najas flexilis	Y	6	-5	2	1	
Potamogeton natans	Y	5	-5	5	1	
Schoenoplectus tabernaemontani	Y	4	-5	5	1	
Sparganium eurycarpum	Y	5	-5	5	1	
Stuckenia pectinata	Y	3	-5	50	3	X

Mean C	5.00	Cover (%)	109.0%	
FQI	15.00	50%	54.5%	
Mean W	-5.00	20%	21.8%	
Native Species	9			
Native Wetland Species	9			
Total Species	9			

Plot 11 **Date -8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Elodea canadensis	Y	3	-5	10	2	
Heteranthera dubia	Y	6	-5	10	2	
Myriophyllum sibiricum	Y	6	-5	1	1	
Najas flexilis	Y	6	-5	5	1	
Schoenoplectus tabernaemontani	Y	4	-5	10	1	
Sparganium eurycarpum	Y	5	-5	25	2	X
Stuckenia pectinata	Y	3	-5	10	2	
Utricularia macrorhiza	Y	7	-5	40	3	X

Mean C	5.00	Cover (%)	111.0%	
FQI	14.14	50%	55.5%	
Mean W	-5.00	20%	22.2%	
Native Species	8			
Native Wetland Species	8			
Total Species	8			

Plot 12 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Agrostis stolonifera	N	0	-3	15	2	X
Alisma triviale	Y	4	-5	2	1	
Bidens cernua	Y	4	-5	2	1	
Carex aquatilis	Y	7	-5	5	1	X
Carex hystericina	Y	3	-5	5	1	X
Carex lacustris	Y	6	-5	1	1	
Celtis occidentalis	Y	4	0	1	1	
Cirsium arvense	N	0	3	5	1	X
Conyza canadensis	Y	0	5	2	1	
Cornus alba	Y	3	-3	1	1	
Cyperus bipartitus	Y	3	-3	2	1	
Epilobium ciliatum	Y	3	-3	1	1	
Equisetum arvense	Y	1	0	5	1	X
Erechtites hieraciifolia	Y	2	5	1	1	
Eupatorium perfoliatum	Y	6	-3	1	1	
Hordeum jubatum	N	0	0	2	1	
Ilex verticillata	Y	7	-3	1	1	
Impatiens capensis	Y	2	-3	1	1	
Juncus brevicaudatus	Y	6	-5	1	1	
Juncus bufonius	Y	3	-3	5	1	X
Leersia oryzoides	Y	3	-5	2	1	
Lythrum salicaria	N	0	-5	2	1	
Persicaria amphibia	Y	5	-5	1	1	
Persicaria punctata	Y	5	-5	1	1	
Phalaris arundinacea	N	0	-3	2	1	
Phragmites australis	N	0	-3	1	1	
Quercus bicolor	Y	7	-3	1	1	
Sagittaria latifolia	Y	3	-5	2	1	
Schoenoplectus tabernaemontani	Y	4	-5	1	1	
Sium suave	Y	5	-5	2	1	
Solidago canadensis	Y	1	3	2	1	
Solidago gigantea	Y	3	-3	2	1	
Sonchus arvensis	N	0	3	1	1	
Sparganium eurycarpum	Y	5	-5	1	1	
Spartina pectinata	Y	5	-3	5	1	X
Taraxacum officinale	N	0	3	1	1	
Typha angustifolia	N	0	-5	1	1	
Verbena hastata	Y	3	-3	2	1	
Shrub						
Quercus macrocarpa	y	5	3	1	1	X
Salix nigra	Y	4	-5	1	1	X

Plot 12			**Date - 8/22/2016**
Herbaceous			
Mean C	2.97	Cover (%)	89.0%
FQI	18.33	50%	44.5%
Mean W	-2.50	20%	17.8%
Native Species	29		
Native Wetland Species	26		
Total Species	38		
Shrub			
Mean C	4.50	Cover (%)	2.0%
FQI	6.36	50%	1.0%
Mean W	-1.00	20%	0.4%
Native Species	2		
Native Wetland Species	1		
Total Species	2		

Plot 13 **Date -8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Agrostis stolonifera	N	0	-3	20	2	X
Bidens frondosa	Y	1	-3	1	1	
Calamagrostis canadensis	Y	5	-5	40	3	X
Carex stricta	Y	7	-5	5	1	
Cornus alba	Y	3	-3	5	1	
Elymus canadensis	Y	4	3	2	1	
Equisetum arvense	Y	1	0	2	1	
Equisetum hyemale	Y	3	0	2	1	
Fragaria virginiana	Y	1	3	2	1	
Hieracium aurantiacum	N	0	5	2	1	
Juncus balticus	Y	5	-3	10	2	X
Lathyrus japonicus	Y	9	3	10	2	X
Linaria vulgaris	N	0	5	2	1	
Melilotus alba	N	0	5	2	1	
Osmunda cinnamomea	Y	7	-3	2	1	
Physostegia virginiana	Y	7	-3	2	1	
Poa pratensis	N	0	3	15	2	
Quercus macrocarpa	Y	5	3	1	1	
Salix eriocephala	Y	4	-3	5	1	
Solidago canadensis	Y	1	3	5	1	
Sonchus arvensis	N	0	3	2	1	
Taraxacum officinale	N	0	3	1	1	
Triticum aestivum	N	0	5	1	1	
Shrub						
Abies balsamea	Y	5	0	2	1	
Cornus alba	Y	3	-3	25	2	X
Salix eriocephala	Y	4	-3	10	2	X
Trees						
Populus deltoides	Y	2	0	15	2	X
Populus tremuloides	Y	2	3	15	2	X

Plot 13			**Date -8/22/2016**
Herbaceous			
Mean C	2.74	Cover (%)	139.0%
FQI	13.14	50%	69.5%
Mean W	0.57	20%	27.8%
Native Species	15		
Native Wetland Species	10		
Total Species	23		
Shrub			
Mean C	4.00	Cover (%)	37.0%
FQI	6.93	50%	18.5%
Mean W	-2.00	20%	7.4%
Native Species	3		
Native Wetland Species	3		
Total Species	3		
Trees			
Mean C	2.00	Cover (%)	30.0%
FQI	2.83	50%	15.0%
Mean W	1.50	20%	6.0%
Native Species	2		
Native Wetland Species	1		
Total Species	2		

Plot 14 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Agrostis stolonifera	N	0	-3	25	2	
Bidens cernua	Y	4	-5	20	2	
Calamagrostis canadensis	Y	5	-5	45	3	X
Carex aquatilis	Y	7	-5	10	2	
Carex lacustris	Y	6	-5	2	1	
Cornus alba	Y	3	-3	1	1	
Erechtites hieraciifolia	Y	2	5	1	1	
Juncus balticus	Y	5	-3	35	3	X
Lathyrus japonicus	Y	9	3	2	1	
Lythrum salicaria	N	0	-5	2	1	
Potentilla norvegica	Y	0	0	1	1	
Salix amygdaloides	Y	4	-3	1	1	
Salix bebbiana	Y	7	-3	1	1	
Schoenoplectus tabernaemontani	Y	4	-5	5	1	
Symphyotrichum lanceolatum	Y	2	-3	2	1	
Shrub						
Salix eriocephala	Y	4	-3	10	2	X
Trees						
Populus deltoides	Y	2	0	10	2	X

Herbaceous			
Mean C	3.87	Cover (%)	153.0%
FQI	14.98	50%	76.5%
Mean W	-2.67	20%	30.6%
Native Species	13		
Native Wetland Species	11		
Total Species	15		
Shrub			
Mean C	4.00	Cover (%)	10.0%
FQI	4.00	50%	5.0%
Mean W	-3.00	20%	2.0%
Native Species	1		
Native Wetland Species	1		
Total Species	1		
Trees			
Mean C	2.00	Cover (%)	10.0%
FQI	2.00	50%	5.0%
Mean W	0.00	20%	2.0%
Native Species	1		
Native Wetland Species	1		
Total Species	1		

Plot 15 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Agrostis stolonifera	N	0	-3	5	1	
Alisma triviale	Y	4	-5	2	1	
Bidens cernua	Y	4	-5	2	1	
Carex aquatilis	Y	7	-5	5	1	
Carex lacustris	Y	6	-5	5	1	
Cicuta bulbifera	Y	7	-5	5	1	
Cornus alba	Y	3	-3	1	1	
Cyperus bipartitus	Y	3	-3	5	1	
Epilobium ciliatum	Y	3	-3	2	1	
Glyceria grandis	y	6	-5	2	1	
Iris versicolor	Y	5	-5	2	1	
Juncus balticus	Y	5	-3	2	1	
Juncus brevicaudatus	Y	6	-5	10	2	X
Juncus nodosus	Y	6	-5	30	3	X
Ludwigia palustris	Y	4	-5	5	1	
Mimulus ringens	Y	6	-5	2	1	
Persicaria hydropiper	N	0	-5	1	1	
Sagittaria latifolia	Y	3	-5	2	1	
Schoenoplectus tabernaemontani	Y	4	-5	15	2	X
Sium suave	Y	5	-5	1	1	
Typha angustifolia	N	0	-5	2	1	
Shrub						
Alnus incana	Y	4	-3	2	1	X
Spiraea alba	Y	4	-3	5	1	X

Herbaceous			
Mean C	4.14	Cover (%)	106.0%
FQI	18.98	50%	53.0%
Mean W	-4.52	20%	21.2%
Native Species	18		
Native Wetland Species	18		
Total Species	21		
Shrub			
Mean C	4.00	Cover (%)	7.0%
FQI	5.66	50%	3.5%
Mean W	-3.00	20%	1.4%
Native Species	2		
Native Wetland Species	2		
Total Species	2		

Plot 16 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Sagittaria latifolia	Y	3	-5	1	1	
Schoenoplectus tabernaemontani	Y	4	-5	65	4	X
Typha angustifolia	N	0	-5	2	1	
Shrub						
Salix eriocephala	Y	4	-3	2	1	X

Mean C	2.33	Cover (%)	68.0%
FQI	4.04	50%	34.0%
Mean W	-5.00	20%	13.6%
Native Species	3		
Native Wetland Species	2		
Total Species	3		
Shrub			
Mean C	2.75	Cover (%)	2.0%
FQI	5.50	50%	1.0%
Mean W	-3.00	20%	0.4%
Native Species	0		
Native Wetland Species	1		
Total Species	4		

Plot 17 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Agalinis paupercula	Y	7	-5	5	1	
Agrostis stolonifera	N	0	-3	25	2	X
Calamagrostis canadensis	Y	5	-5	10	2	
Cyperus bipartitus	Y	3	-3	10	2	
Cyperus esculentas	Y	0	-3	1	1	
Euthamia graminifolia	Y	4	0	2	1	
Hordeum jubatum	N	0	0	1	1	
Juncus balticus	Y	5	-3	60	4	X
Juncus brevicaudatus	Y	6	-5	15	2	
Lycopus americanus	Y	4	-5	1	1	
Lythrum salicaria	N	0	-5	1	1	
Phalaris arundinacea	N	0	-3	1	1	
Rubus pubescens	Y	7	-3	2	1	
Solidago canadensis	Y	1	3	5	1	
Typha angustifolia	N	0	-5	2	1	
Verbena hastata	Y	3	-3	1	1	
Shrub						
Cornus alba	Y	3	-3	2	1	X
Tsuga canadensis	Y	8	3	2	1	X
Trees						
Populus deltoides	Y	2	0	25	2	X

Herbaceous			
Mean C	2.81	Cover (%)	142.0%
FQI	11.25	50%	71.0%
Mean W	-3.00	20%	28.4%
Native Species	11		
Native Wetland Species	10		
Total Species	16		
Shrub			
Mean C	5.50	Cover (%)	4.0%
FQI	7.78	50%	2.0%
Mean W	0.00	20%	0.8%
Native Species	2		
Native Wetland Species	1		
Total Species	2		
Trees			
Mean C	2.00	Cover (%)	25.0%
FQI	2.00	50%	12.5%
Mean W	0.00	20%	5.0%
Native Species	1		
Native Wetland Species	1		
Total Species	1		

Plot 18 **Date - 8/22/2016**

Species	Native	C of C	W	Cover (%)	Cover Class	Dominant
Agrostis stolonifera	N	0	-3	50	3	X
Alisma triviale	Y	4	-5	2	1	
Calamagrostis canadensis	Y	5	-5	2	1	
Carex aquatilis	Y	7	-5	10	2	
Cyperus bipartitus	Y	3	-3	5	1	
Juncus balticus	Y	5	-3	30	3	X
Leersia oryzoides	Y	3	-5	2	1	
Lythrum salicaria	N	0	-5	2	1	
Phalaris arundinacea	N	0	-3	5	1	
Quercus bicolor	Y	7	-3	1	1	
Rubus pubescens	Y	7	-3	2	1	
Sagittaria latifolia	Y	3	-5	2	1	
Schoenoplectus tabernaemontani	Y	4	-5	2	1	
Typha angustifolia	N	0	-5	2	1	
Trees						
Populus deltoides	Y	2	0	10	1	X

Herbaceous			
Mean C	3.43	Cover (%)	117.0%
FQI	12.83	50%	58.5%
Mean W	-4.14	20%	23.4%
Native Species	10		
Native Wetland Species	10		
Total Species	14		
Trees			
Mean C	2.00	Cover (%)	10.0%
FQI	2.00	50%	5.0%
Mean W	0.00	20%	2.0%
Native Species	1		
Native Wetland Species	1		
Total Species	1		

2016 Comprehensive Meander & Plot Summary

Scientific Name	Common Name	Native	C of C
Abies balsamea	Balsam Fir	Y	5
Abutilon theophrasti	Velvetleaf	N	0
Acer negundo	Ash-Leaf Maple	Y	0
Acer rubrum	Red Maple	Y	3
Acer saccharinum	Silver Maple	Y	2
Achillea millefolium	Common Yarrow	Y	1
Agalinis paupercula	Small-Flower False Foxglove	Y	7
Agrostis stolonifera	Spreading Bent	N	0
Alisma triviale	Northern Water-Plantain	Y	4
Alnus incana	Speckled Alder	Y	4
Ambrosia artemisiifolia	Annual Ragweed	Y	0
Ambrosia trifida	Great Ragweed	Y	0
Arctium minus	Lesser Burrdock	N	0
Aronia melanocarpa	Black Chokeberry	Y	7
Artemisia biennis	Biennial Wormwood	N	0
Asclepias incarnata	Swamp Milkweed	Y	5
Asclepias syriaca	Common Milkweed	Y	1
Avena sativa	Oat	N	0
Betula allehaniensis	Yellow Birch	Y	7
Betula pumila	Bog Birch	Y	7
Bidens cernua	Nodding Burr-Marigold	Y	4
Bidens frondosa	Devil'S-Pitchfork	Y	1
Bidens vulgata	Tall Beggarticks	Y	1
Boehmeria cylindrica	Small-Spike False Nettle	Y	6
Bromus inermis	Smooth Brome	N	0
Calamagrostis canadensis	Bluejoint	Y	5
Carduus acanthoides	Spiny Plumeless Thistle	N	0
Carex aquatilis	Leafy Tussock Sedge	Y	7
Carex hystericina	Porcupine Sedge	Y	3
Carex lacustris	Lakebank Sedge	Y	6
Carex stricta	Uptight Sedge	Y	7
Celtis occidentalis	Common Hackberry	Y	4
Centaurea maculosa	Spotted Knapweed	N	0
Cephalanthus occidentalis	Buttonbush	Y	9
Cerastium fontanum	Common Mouse-Ear Chickweed	N	0
Ceratophyllum demersum	Coon'S-Tail	Y	3
Cicuta bulbifera	Bulblet-Bearing Water-Hemlock	Y	7
Cirsium arvense	Canadian Thistle	N	0
Cirsium vulgare	Bull Thistle	N	0
Conyza canadensis	Canadian Horseweed	Y	0
Cornus alba	Red Osier	Y	3
Cornus alternifolia	Alternateleaf Dogwood	Y	7
Cornus amomum	Silky Dogwood	Y	4
Cyperus bipartitus	Shining Flat Sedge	Y	3
Cyperus esculentas	Chufa	Y	0

2016 Comprehensive Meander & Plot Summary

Scientific Name	Common Name	Native	C of C
Dalea purpurea	Violet Prairie Clover	Y	7
Daucus carota	Queen Anne'S-Lace	N	0
Diervilla lonicera	Northern Bush Honeysuckle	Y	6
Echinochloa crus-galli	Large Barnyard Grass	N	0
Echinocystis lobata	Wild Cucumber	Y	2
Eleocharis palustris	Common Spike-Rush	Y	6
Elodea canadensis	Canadian Waterweed	Y	3
Elymus canadensis	Nodding Wild Rye	Y	4
Elymus repens	Creeping Wild Rye	N	0
Epilobium ciliatum	Fringed Willowherb	Y	3
Equisetum arvense	Field Horsetail	Y	1
Equisetum hyemale	Tall Scouring-Rush	Y	3
Erechtites hieraciifolia	American Burn	Y	2
Erysimum cheiranthoides	Worm-Seed Wallflower	N	0
Eupatorium perfoliatum	Common Boneset	Y	6
Eurybia macrophylla	Large-Leaf Wood-Aster	Y	4
Euthamia graminifolia	Flat-Top Goldentop	Y	4
Fragaria virginiana	Virginia Strawberry	Y	1
Frangula alnus	Glossy False Buckthorn	N	0
Fraxinus pennsylvanica	Green Ash	Y	2
Geum aleppicum	Yellow Avens	Y	3
Glyceria grandis	American Manna Grass	y	6
Heteranthera dubia	Grass-Leaf Mud-Plantain	Y	6
Hieracium aurantiacum	Orange Hawkweed	N	0
Hordeum jubatum	Fox-Tail Barley	N	0
Ilex verticillata	Common Winterberry	Y	7
Impatiens capensis	Spotted Touch-Me-Not	Y	2
Iris versicolor	Harlequin Blueflag	Y	5
Juncus balticus	Baltic Rush	Y	5
Juncus brevicaudatus	Narrow-Panicle Rush	Y	6
Juncus bufonius	Toad Rush	Y	3
Juncus canadensis	Canadian Rush	Y	7
Juncus nodosus	Knotted Rush	Y	6
Larix laricina	Tamarack	Y	8
Lathyrus japonicus	Sea Vetchling	Y	9
Leersia oryzoides	Rice Cut Grass	Y	3
Linaria vulgaris	Butter And Eggs	N	0
Lonicera canadensis	American Fly Honeysuckle	Y	8
Lonicera tatarica	Twinsisters	N	0
Lotus corniculatus	Garden Bird'S-Foot-Trefoil	N	0
Ludwigia palustris	Marsh Primrose-Willow	Y	4
Lycopus americanus	Cut-Leaf Water-Horehound	Y	4
Lycopus uniflorus	Northern Water-Horehound	Y	4
Lysimachia terrestris	Swampcandles	Y	7
Lythrum salicaria	Purple Loosestrife	N	0

2016 Comprehensive Meander & Plot Summary

Scientific Name	Common Name	Native	C of C
Matricaria discoidea	Pineapple-Weed	N	0
Medicago lupulina	Black Medick	N	0
Medicago sativa	Alfalfa	N	0
Melilotus alba	White Sweetclover	N	0
Melilotus officinalis	Yellow Sweet-Clover	N	0
Mimulus ringens	Allegheny Monkey-Flower	Y	6
Monarda fistulosa	Oswego-Tea	Y	3
Monarda punctata	Spotted Beebalm	N	3
Myriophyllum sibiricum	Siberian Water-Milfoil	Y	6
Najas flexilis	Wavy Waternymph	Y	6
Nepeta cataria	Catnip	N	0
Nuphar variegata	Varigated Yellow Pond-Lily	Y	6
Nymphaea odorata	American White Water-Lily	Y	6
Oenothera parviflora	Northern Evening-Primrose	Y	2
Onoclea sensibilis	Sensitive Fern	Y	5
Osmunda cinnamomea	Cinnamon Fern	Y	7
Osmunda regalis	Royal Fern	Y	7
Oxalis stricta	Upright Yellow Wood-Sorrel	Y	0
Panicum capillare	Common Panic Grass	Y	1
Parthenocissus quinquefolia	Virginia-Creeper	Y	5
Penstemon digitalis	Foxglove Beardtongue	Y	0
Persicaria amphibia	Water Smartweed	Y	5
Persicaria hydropiper	Mild Water-Pepper	N	0
Persicaria pensylvanica	Pinkweed	Y	1
Persicaria punctata	Dotted Smartweed	Y	5
Phalaris arundinacea	Reed Canary Grass	N	0
Phleum pratense	Common Timothy	N	0
Phragmites australis	Common Reed	N	0
Physocarpus opulifolius	Common Ninebark	Y	6
Physostegia virginiana	Obedient-Plant	Y	7
Picea mariana	Black Spruce	Y	8
Plantago major	Great Plantain	N	0
Poa pratensis	Kentucky Blue Grass	N	0
Polemonium reptans	Greek-Valerian	Y	6
Populus deltoides	Eastern Cottonwood	Y	2
Populus tremuloides	Quaking Aspen	Y	2
Potamogeton natans	Broad-Leaf Pondweed	Y	5
Potamogeton richardsonii	Red-Head Pondweed	Y	5
Potamogeton zosteriformis	Flat-Stem Pondweed	Y	6
Potentilla norvegica	Norwegian Cinquefoil	Y	0
Prunus serotina	Black Cherry	Y	3
Quercus bicolor	Swamp White Oak	Y	7
Quercus macrocarpa	Burr Oak	y	5
Ranunculus aquatilis	White Water-Crowfoot	Y	8
Ratibida pinnata	Pinnate Prairie Coneflower	Y	4

2016 Comprehensive Meander & Plot Summary

Scientific Name	Common Name	Native	C of C
Ribes americanum	American Black Currant	Y	4
Rosa blanda	Smooth Rose	Y	4
Rubus pubescens	Dwarf Red Raspberry	Y	7
Rudbeckia hirta	Black-Eyed-Susan	Y	4
Rumex crispus	Curly Dock	N	0
Sagittaria latifolia	Duck-Potato	Y	3
Sagittaria latifolia	Duck-Potato	Y	3
Salix amygdaloides	Peach-Leaf Willow	Y	4
Salix bebbiana	Gray Willow	Y	7
Salix eriocephala	Missouri Willow	Y	4
Salix interior	Sandbar Willow	Y	2
Salix nigra	Black Willow	Y	4
Sambucus canadensis	American Black Elderberry	Y	3
Sambucus racemosa	Red Elder	Y	5
Schoenoplectus pungens	Three-Square	Y	5
Schoenoplectus smithii	Smith'S Club-Rush	Y	4
Schoenoplectus tabernaemontani	Soft-Stem Club-Rush	Y	4
Setaria faberi	Japanese Bristle Grass	N	0
Setaria pumila	Yellow Bristle Grass	N	0
Silene pratensis	Bladder Campion	N	0
Sium suave	Hemlock Water-Parsnip	Y	5
Solanum dulcamara	Climbing Nightshade	N	0
Solidago canadensis	Canadian Goldenrod	Y	1
Solidago gigantea	Late Goldenrod	Y	3
Sonchus arvensis	Field Sow-Thistle	N	0
Sparganium eurycarpum	Broad-Fruit Burr-Reed	Y	5
Spartina pectinata	Freshwater Cord Grass	Y	5
Spiraea alba	White Meadowsweet	Y	4
Spirodela polyrhiza	Common Duckmeat	Y	5
Stachys palustris	Woundwort	Y	5
Stuckenia pectinata	Sago False Pondweed	Y	3
Symphyotrichum lanceolatum	White Panicled American-Aster	Y	2
Taraxacum officinale	Common Dandelion	N	0
Thalictrum dasycarpum	Purple Meadow-Rue	Y	4
Thuja occidentalis	Arborvitae	Y	9
Trifolium aureum	Golden Clover	N	0
Trifolium pratense	Red Clover	N	0
Trifolium repens	White Clover	N	0
Triticum aestivum	Common Wheat	N	0
Tsuga canadensis	Eastern Hemlock	Y	8
Typha angustifolia	Narrow-Leaf Cat-Tail	N	0
Ulmus americana	American Elm	Y	3
Ulmus rubra	Slippery Elm	Y	4
Utricularia macrorhiza	Greater Bladderwort	Y	7
Vallisneria americana	American Eel-Grass	Y	6

2016 Comprehensive Meander & Plot Summary

Scientific Name	Common Name	Native	C of C
Verbena hastata	Simpler'S-Joy	Y	3
Viburnum lentago	Nannyberry	Y	4
Viburnum trilobum	American Cranberrybush	Y	6
Xanthium strumarium	Rough Cockleburr	Y	1
Zizania palustris	Northern Wild Rice	Y	8

2016 Comprehensive Plot Summary **Total Plots= 18**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Abies balsamea	Y	5	0	0.14	0.11	
Abutilon theophrasti	N	0	3	0.14	0.11	
Acer negundo	Y	0	0	4.86	3.81	X
Acer saccharinum	Y	2	-3	0.14	0.11	
Achillea millefolium	Y	1	5	0.14	0.11	
Agalinis paupercula	Y	7	-5	0.14	0.11	
Agrostis stolonifera	N	0	-3	5.56	4.36	X
Alisma triviale	Y	4	-5	0.42	0.33	
Alnus incana	Y	4	-3	0.14	0.11	
Ambrosia artemisiifolia	Y	0	3	0.14	0.11	
Arctium minus	N	0	3	0.14	0.11	
Artemisia biennis	N	0	-3	0.14	0.11	
Avena sativa	N	0	5	0.14	0.11	
Bidens cernua	Y	4	-5	1.11	0.87	
Bidens frondosa	Y	1	-3	0.97	0.76	
Boehmeria cylindrica	Y	6	-5	0.83	0.65	
Bromus inermis	N	0	5	0.14	0.11	
Calamagrostis canadensis	Y	5	-5	5.14	4.03	X
Carex aquatilis	Y	7	-5	1.94	1.52	
Carex hystericina	Y	3	-5	0.14	0.11	
Carex lacustris	Y	6	-5	0.42	0.33	
Carex stricta	Y	7	-5	0.28	0.22	
Celtis occidentalis	Y	4	0	0.28	0.22	
Ceratophyllum demersum	Y	3	-5	0.14	0.11	
Cicuta bulbifera	Y	7	-5	0.14	0.11	
Cirsium arvense	N	0	3	0.28	0.22	
Cirsium vulgare	N	0	3	0.28	0.22	
Conyza canadensis	Y	0	5	0.97	0.76	
Cornus alba	Y	3	-3	1.67	1.31	
Cyperus bipartitus	Y	3	-3	1.25	0.98	
Cyperus esculentas	Y	0	-3	0.14	0.11	
Dalea purpurea	Y	7	5	0.14	0.11	
Daucus carota	N	0	5	0.14	0.11	
Elodea canadensis	Y	3	-5	16.94	13.29	X
Elymus canadensis	Y	4	3	0.14	0.11	
Elymus repens	N	0	3	0.14	0.11	
Epilobium ciliatum	Y	3	-3	0.28	0.22	
Equisetum arvense	Y	1	0	0.28	0.22	
Equisetum hyemale	Y	3	0	0.14	0.11	
Erechtites hieraciifolia	Y	2	5	1.11	0.87	
Erysimum cheiranthoides	N	0	3	0.14	0.11	
Eupatorium perfoliatum	Y	6	-3	0.14	0.11	
Eurybia macrophylla	Y	4	5	0.14	0.11	
Euthamia graminifolia	Y	4	0	0.14	0.11	
Fragaria virginiana	Y	1	3	0.14	0.11	

2016 Comprehensive Plot Summary **Total Plots= 18**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Fraxinus pennsylvanica	Y	2	-3	0.42	0.33	
Glyceria grandis	y	6	-5	0.14	0.11	
Heteranthera dubia	Y	6	-5	6.11	4.79	X
Hieracium aurantiacum	N	0	5	0.14	0.11	
Hordeum jubatum	N	0	0	0.28	0.22	
Ilex verticillata	Y	7	-3	0.14	0.11	
Impatiens capensis	Y	2	-3	0.28	0.22	
Iris versicolor	Y	5	-5	0.14	0.11	
Juncus balticus	Y	5	-3	8.61	6.75	X
Juncus brevicaudatus	Y	6	-5	1.81	1.42	
Juncus bufonius	Y	3	-3	0.14	0.11	
Juncus nodosus	Y	6	-5	2.08	1.63	X
Lathyrus japonicus	Y	9	3	0.97	0.76	
Leersia oryzoides	Y	3	-5	0.28	0.22	
Linaria vulgaris	N	0	5	0.14	0.11	
Ludwigia palustris	Y	4	-5	0.14	0.11	
Lycopus americanus	Y	4	-5	0.14	0.11	
Lysimachia terrestris	Y	7	-5	0.14	0.11	
Lythrum salicaria	N	0	-5	0.56	0.44	
Matricaria discoidea	N	0	3	0.14	0.11	
Medicago lupulina	N	0	5	0.14	0.11	
Melilotus alba	N	0	5	2.22	1.74	X
Mimulus ringens	Y	6	-5	0.14	0.11	
Monarda punctata	N	3	5	0.14	0.11	
Myriophyllum sibiricum	Y	6	-5	6.25	4.90	X
Najas flexilis	Y	6	-5	1.25	0.98	
Nepeta cataria	N	0	3	0.14	0.11	
Nuphar variegata	Y	6	-5	0.28	0.22	
Nymphaea odorata	Y	6	-5	4.31	3.38	X
Osmunda cinnamomea	Y	7	-3	0.14	0.11	
Oxalis stricta	Y	0	3	0.14	0.11	
Parthenocissus quinquefolia	Y	5	3	0.28	0.22	
Penstemon digitalis	Y	0	0	0.14	0.11	
Persicaria amphibia	Y	5	-5	0.14	0.11	
Persicaria hydropiper	N	0	-5	0.14	0.11	
Persicaria pensylvanica	Y	1	-3	0.14	0.11	
Persicaria punctata	Y	5	-5	0.14	0.11	
Phalaris arundinacea	N	0	-3	0.69	0.54	
Phleum pratense	N	0	3	0.14	0.11	
Phragmites australis	N	0	-3	0.28	0.22	
Physostegia virginiana	Y	7	-3	0.14	0.11	
Plantago major	N	0	3	0.83	0.65	
Poa pratensis	N	0	3	0.97	0.76	
Populus deltoides	Y	2	0	3.61	2.83	X
Populus tremuloides	Y	2	3	0.83	0.65	

2016 Comprehensive Plot Summary **Total Plots= 18**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Potamogeton natans	Y	5	-5	3.33	2.61	X
Potamogeton richardsonii	Y	5	-5	2.08	1.63	X
Potamogeton zosteriformis	Y	6	-5	0.28	0.22	
Potentilla norvegica	Y	0	0	0.14	0.11	
Prunus serotina	Y	3	3	0.02	0.02	
Quercus bicolor	Y	7	-3	0.28	0.22	
Quercus macrocarpa	y	5	3	0.28	0.22	
Ranunculus aquatilis	Y	8	-5	0.83	0.65	
Ratibida pinnata	Y	4	5	0.14	0.11	
Rubus pubescens	Y	7	-3	0.42	0.33	
Rudbeckia hirta	Y	4	3	0.14	0.11	
Sagittaria latifolia	Y	3	-5	0.83	0.65	
Salix amygdaloides	Y	4	-3	0.14	0.11	
Salix bebbiana	Y	7	-3	0.14	0.11	
Salix eriocephala	Y	4	-3	1.94	1.52	
Salix nigra	Y	4	-5	0.97	0.76	
Sambucus racemosa	Y	5	3	0.14	0.11	
Schoenoplectus pungens	Y	5	-5	0.14	0.11	
Schoenoplectus tabernaemontani	Y	4	-5	5.14	4.03	X
Setaria faberi	N	0	3	0.83	0.65	
Setaria pumila	N	0	0	0.83	0.65	
Sium suave	Y	5	-5	0.28	0.22	
Solidago canadensis	Y	1	3	0.42	0.33	
Solidago gigantea	Y	3	-3	0.14	0.11	
Sonchus arvensis	N	0	3	0.42	0.33	
Sparganium eurycarpum	Y	5	-5	1.94	1.52	
Spartina pectinata	Y	5	-3	0.14	0.11	
Spiraea alba	Y	4	-3	0.14	0.11	
Stuckenia pectinata	Y	3	-5	4.03	3.16	X
Symphyotrichum lanceolatum	Y	2	-3	0.14	0.11	
Taraxacum officinale	N	0	3	0.56	0.44	
Trifolium aureum	N	0	5	0.14	0.11	
Trifolium repens	N	0	3	0.83	0.65	
Triticum aestivum	N	0	5	0.15	0.12	
Tsuga canadensis	Y	8	3	0.14	0.11	
Typha angustifolia	N	0	-5	0.69	0.54	
Ulmus americana	Y	3	-3	0.83	0.65	
Utricularia macrorhiza	Y	7	-5	2.08	1.63	X
Verbena hastata	Y	3	-3	0.28	0.22	
Zizania palustris	Y	8	-5	0.42	0.33	

2016 Comprehensive Plot Summary				**Total Plots= 18**
Mean C	3.15	Cover (%)	128	
FQI	35.87	50%	63.8	
Mean W	-1.15	20%	25.5	
Native Species	96			
Native Wetland Species	77			
Total Species	130			
% Native Wetland Species	59.2%			
% Cover Native Wetland Species	80.4%			
% Cover Native	85.4%			
% Cover Non-native	14.6%			
% Native Species	73.8%			
% Cover Wetland Species	87.6%			

Open Water & Submergent Vegetation Community **Total Plots = 1**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Ceratophyllum demersum	Y	3	-5	2.5	1.96	
Elodea canadensis	Y	3	-5	15	11.76	
Heteranthera dubia	Y	6	-5	37.5	29.41	X
Myriophyllum sibiricum	Y	6	-5	37.5	29.41	X
Nymphaea odorata	Y	6	-5	15	11.76	
Potamogeton natans	Y	5	-5	2.5	1.96	
Potamogeton zosteriformis	Y	6	-5	2.5	1.96	
Ranunculus aquatilis	Y	8	-5	15	11.76	

Mean C	5.38	Cover (%)	127.5%	
FQI	15.20	50%	63.8%	
Mean W	-5.00	20%	25.5%	
Native Species	8			
Native Wetland Species	8			
Total Species	8			
% Native Wetland Species	100.0%			
% Cover Native Wetland Species	100.0%			
% Cover Native	100.0%			
% Cover Non-native	0.0%			
% Native Species	100.0%			
% Cover Wetland Species	100.0%			

Emergent Aquatic Community **Total Plots = 4**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Elodea canadensis	Y	3	-5	38.13	40.67	X
Heteranthera dubia	Y	6	-5	4.38	4.67	
Lysimachia terrestris	Y	7	-5	0.63	0.67	
Myriophyllum sibiricum	Y	6	-5	1.88	2.00	
Najas flexilis	Y	6	-5	5.63	6.00	
Nuphar variegata	Y	6	-5	1.25	1.33	
Potamogeton natans	Y	5	-5	0.63	0.67	
Sagittaria latifolia	Y	3	-5	0.63	0.67	
Schoenoplectus pungens	Y	5	-5	0.63	0.67	
Schoenoplectus tabernaemontani	Y	4	-5	4.38	4.67	
Sparganium eurycarpum	Y	5	-5	8.13	8.67	
Stuckenia pectinata	Y	3	-5	17.50	18.67	X
Utricularia macrorhiza	Y	7	-5	9.38	10.00	
Zizania palustris	Y	8	-5	0.63	0.67	

Mean C	5.29	Cover (%)	93.8%	
FQI	19.78	50%	46.9%	
Mean W	-5.00	20%	18.8%	
Native Species	14			
Native Wetland Species	14			
Total Species	14			
% Native Wetland Species	100.0%			
% Cover Native Wetland Species	100.0%			
% Cover Native	100.0%			
% Cover Non-native	0.0%			
% Native Species	100.0%			
% Cover Wetland Species	100.0%			

Emergent Aquatic- Wild Rice Community **Total Plots = 3**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Elodea canadensis	Y	3	-5	17.50	14.89	
Heteranthera dubia	Y	6	-5	18.33	15.60	
Myriophyllum sibiricum	Y	6	-5	22.50	19.15	X
Nymphaea odorata	Y	6	-5	20.83	17.73	X
Potamogeton natans	Y	5	-5	22.50	19.15	X
Potamogeton richardsonii	Y	5	-5	12.50	10.64	
Schoenoplectus tabernaemontani	Y	4	-5	0.83	0.71	
Stuckenia pectinata	Y	3	-5	0.83	0.71	
Zizania palustris	Y	8	-5	1.67	1.42	

Mean C	5.11	Cover (%)	117.5%	
FQI	15.33	50%	58.8%	
Mean W	-5.00	20%	23.5%	
Native Species	9			
Native Wetland Species	9			
Total Species	9			
% Native Wetland Species	100.0%			
% Cover Native Wetland Species	100.0%			
% Cover Native	100.0%			
% Cover Non-native	0.0%			
% Native Species	100.0%			
% Cover Wetland Species	100.0%			

Ephemeral Pool Community **Total Plots = 1**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Sagittaria latifolia	Y	3	-5	2.50	3.57	
Schoenoplectus tabernaemontani	Y	4	-5	62.50	89.29	X
Typha angustifolia	N	0	-5	2.50	3.57	
Salix eriocephala	Y	4	-3	2.50	3.57	

Mean C	2.75	Cover (%)	70.0%	
FQI	5.5	50%	35.0%	
Mean W	-4.50	20%	14.0%	
Native Species	3			
Native Wetland Species	3			
Total Species	4			
% Native Wetland Species	75.0%			
% Cover Native Wetland Species	96.4%			
% Cover Native	96.4%			
% Cover Non-native	3.6%			
% Native Species	75.0%			
% Cover Wetland Species	100.0%			

Mesis to Wet-Mesic Prairie & Prairie Community **Total Plots = 2**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Abutilon theophrasti	N	0	3	1.25	0.69	
Acer saccharinum	Y	2	-3	1.25	0.69	
Achillea millefolium	Y	1	5	1.25	0.69	
Agalinis paupercula	Y	7	-5	1.25	0.69	
Agrostis stolonifera	N	0	-3	7.50	4.14	X
Ambrosia artemisiifolia	Y	0	3	1.25	0.69	
Artemisia biennis	N	0	-3	1.25	0.69	
Avena sativa	N	0	5	1.25	0.69	
Calamagrostis canadensis	Y	5	-5	7.50	4.14	X
Cirsium arvense	N	0	3	1.25	0.69	
Cirsium vulgare	N	0	3	1.25	0.69	
Conyza canadensis	Y	0	5	7.50	4.14	X
Cornus alba	Y	3	-3	1.25	0.69	
Cyperus bipartitus	Y	3	-3	7.50	4.14	X
Cyperus esculentas	Y	0	-3	1.25	0.69	
Dalea purpurea	Y	7	5	1.25	0.69	
Daucus carota	N	0	5	1.25	0.69	
Elymus repens	N	0	3	1.25	0.69	
Erysimum cheiranthoides	N	0	3	1.25	0.69	
Euthamia graminifolia	Y	4	0	1.25	0.69	
Hordeum jubatum	N	0	0	1.25	0.69	
Juncus balticus	Y	5	-3	31.25	17.24	X
Juncus brevicaudatus	Y	6	-5	7.50	4.14	X
Lycopus americanus	Y	4	-5	1.25	0.69	
Lythrum salicaria	N	0	-5	1.25	0.69	
Matricaria discoidea	N	0	3	1.25	0.69	
Medicago lupulina	N	0	5	1.25	0.69	
Melilotus alba	N	0	5	18.75	10.34	X
Monarda punctata	N	3	5	1.25	0.69	
Nepeta cataria	N	0	3	1.25	0.69	
Parthenocissus quinquefolia	Y	5	3	1.25	0.69	
Penstemon digitalis	Y	0	0	1.25	0.69	
Persicaria pensylvanica	Y	1	-3	1.25	0.69	
Phalaris arundinacea	N	0	-3	1.25	0.69	
Plantago major	N	0	3	7.50	4.14	X
Poa pratensis	N	0	3	1.25	0.69	
Populus deltoides	Y	2	0	8.75	4.83	X
Ratibida pinnata	Y	4	5	1.25	0.69	
Rubus pubescens	Y	7	-3	1.25	0.69	
Rudbeckia hirta	Y	4	3	1.25	0.69	
Setaria faberi	N	0	3	7.50	4.14	X
Setaria pumila	N	0	0	7.50	4.14	X
Solidago canadensis	Y	1	3	1.25	0.69	
Sonchus arvensis	N	0	3	1.25	0.69	
Taraxacum officinale	N	0	3	1.25	0.69	

Mesis to Wet-Mesic Prairie & Prairie Community **Total Plots = 2**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Trifolium aureum	N	0	5	1.25	0.69	
Trifolium repens	N	0	3	7.50	4.14	X
Triticum aestivum	N	0	5	7.50	4.14	X
Tsuga canadensis	Y	8	3	1.25	0.69	
Typha angustifolia	N	0	-5	1.25	0.69	
Verbena hastata	Y	3	-3	1.25	0.69	

Mean C	1.67	Cover (%)	181.3%	
FQI	11.90	50%	90.6%	
Mean W	0.90	20%	36.3%	
Native Species	24			
Native Wetland Species	15			
Total Species	51			
% Native Wetland Species	29.4%			
% Cover Native Wetland Species	41.4%			
% Cover Native	51.0%			
% Cover Non-native	49.0%			
% Native Species	47.1%			
% Cover Wetland Species	53.1%			

Northern Sedge Meadow Community **Total Plots = 2**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Agrostis stolonifera	N	0	-3	7.50	7.14	X
Alisma triviale	Y	4	-5	1.25	1.19	
Bidens cernua	Y	4	-5	1.25	1.19	
Carex aquatilis	Y	7	-5	1.25	1.19	
Carex hystericina	Y	3	-5	1.25	1.19	
Carex lacustris	Y	6	-5	1.25	1.19	
Carex stricta	Y	7	-5	1.25	1.19	
Celtis occidentalis	Y	4	0	1.25	1.19	
Cirsium arvense	N	0	3	1.25	1.19	
Conyza canadensis	Y	0	5	1.25	1.19	
Cornus alba	Y	3	-3	1.25	1.19	
Cyperus bipartitus	Y	3	-3	1.25	1.19	
Elodea canadensis	Y	3	-5	42.50	40.48	X
Epilobium ciliatum	Y	3	-3	1.25	1.19	
Equisetum arvense	Y	1	0	1.25	1.19	
Erechtites hieraciifolia	Y	2	5	1.25	1.19	
Eupatorium perfoliatum	Y	6	-3	1.25	1.19	
Hordeum jubatum	N	0	0	1.25	1.19	
Ilex verticillata	Y	7	-3	1.25	1.19	
Impatiens capensis	Y	2	-3	1.25	1.19	
Juncus brevicaudatus	Y	6	-5	1.25	1.19	
Juncus bufonius	Y	3	-3	1.25	1.19	
Leersia oryzoides	Y	3	-5	1.25	1.19	
Lythrum salicaria	N	0	-5	1.25	1.19	
Persicaria amphibia	Y	5	-5	1.25	1.19	
Persicaria punctata	Y	5	-5	1.25	1.19	
Phalaris arundinacea	N	0	-3	2.50	2.38	X
Phragmites australis	N	0	-3	2.50	2.38	X
Potamogeton zosteriformis	Y	6	-5	1.25	1.19	
Quercus bicolor	Y	7	-3	1.25	1.19	
Quercus macrocarpa	y	5	3	1.25	1.19	
Sagittaria latifolia	Y	3	-5	2.50	2.38	X
Salix nigra	Y	4	-5	1.25	1.19	
Schoenoplectus tabernaemontani	Y	4	-5	1.25	1.19	
Sium suave	Y	5	-5	1.25	1.19	
Solidago canadensis	Y	1	3	1.25	1.19	
Solidago gigantea	Y	3	-3	1.25	1.19	
Sonchus arvensis	N	0	3	1.25	1.19	
Sparganium eurycarpum	Y	5	-5	1.25	1.19	
Spartina pectinata	Y	5	-3	1.25	1.19	
Taraxacum officinale	N	0	3	1.25	1.19	
Typha angustifolia	N	0	-5	1.25	1.19	
Verbena hastata	Y	3	-3	1.25	1.19	

Northern Sedge Meadow Community				**Total Plots = 2**
Mean C	3.21	Cover (%)	105.0%	
FQI	21.04	50%	52.5%	
Mean W	-2.60	20%	21.0%	
Native Species	34			
Native Wetland Species	30			
Total Species	43			
% Native Wetland Species	69.8%			
% Cover Native Wetland Species	76.2%			
% Cover Native	81.0%			
% Cover Non-native	19.0%			
% Native Species	79.1%			
% Cover Wetland Species	91.7%			

Wet Mesic Forest Community **Total Plots = 2**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Abies balsamea	Y	5	0	1.25	0.74	
Agrostis stolonifera	N	0	-3	26.25	15.56	X
Alisma triviale	Y	4	-5	1.25	0.74	
Bidens frondosa	Y	1	-3	1.25	0.74	
Calamagrostis canadensis	Y	5	-5	20.00	11.85	X
Carex aquatilis	Y	7	-5	7.50	4.44	
Carex stricta	Y	7	-5	1.25	0.74	
Cornus alba	Y	3	-3	8.75	5.19	
Cyperus bipartitus	Y	3	-3	1.25	0.74	
Elymus canadensis	Y	4	3	1.25	0.74	
Equisetum arvense	Y	1	0	1.25	0.74	
Equisetum hyemale	Y	3	0	1.25	0.74	
Fragaria virginiana	Y	1	3	1.25	0.74	
Hieracium aurantiacum	N	0	5	1.25	0.74	
Juncus balticus	Y	5	-3	26.25	15.56	X
Lathyrus japonicus	Y	9	3	7.50	4.44	
Leersia oryzoides	Y	3	-5	1.25	0.74	
Linaria vulgaris	N	0	5	1.25	0.74	
Lythrum salicaria	N	0	-5	1.25	0.74	
Melilotus alba	N	0	5	1.25	0.74	
Osmunda cinnamomea	Y	7	-3	1.25	0.74	
Phalaris arundinacea	N	0	-3	1.25	0.74	
Physostegia virginiana	Y	7	-3	1.25	0.74	
Poa pratensis	N	0	3	7.50	4.44	
Populus deltoides	Y	2	0	15.00	8.89	X
Populus tremuloides	Y	2	3	7.50	4.44	
Quercus bicolor	Y	7	-3	1.25	0.74	
Quercus macrocarpa	Y	5	3	1.25	0.74	
Rubus pubescens	Y	7	-3	1.25	0.74	
Sagittaria latifolia	Y	3	-5	1.25	0.74	
Salix eriocephala	Y	4	-3	8.75	5.19	
Schoenoplectus tabernaemontani	Y	4	-5	1.25	0.74	
Solidago canadensis	Y	1	3	1.25	0.74	
Sonchus arvensis	N	0	3	1.25	0.74	
Taraxacum officinale	N	0	3	1.25	0.74	
Triticum aestivum	N	0	5	1.25	0.74	
Typha angustifolia	N	0	-5	1.25	0.74	

Wet Mesic Forest Community				**Total Plots = 2**
Mean C	2.97	Cover (%)	168.8%	
FQI	18.08	50%	84.4%	
Mean W	-0.84	20%	33.8%	
Native Species	26			
Native Wetland Species	20			
Total Species	37			
% Native Wetland Species	54.1%			
% Cover Native Wetland Species	61.5%			
% Cover Native	73.3%			
% Cover Non-native	26.7%			
% Native Species	70.3%			
% Cover Wetland Species	79.3%			

Shrub-Carr Community **Total Plots = 3**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Acer negundo	Y	0	0	21.67	12.62	X
Agrostis stolonifera	N	0	-3	5.83	3.40	X
Alisma triviale	Y	4	-5	0.83	0.49	
Alnus incana	Y	4	-3	0.83	0.49	
Arctium minus	N	0	3	0.83	0.49	
Bidens cernua	Y	4	-5	5.83	3.40	X
Bidens frondosa	Y	1	-3	5.00	2.91	
Boehmeria cylindrica	Y	6	-5	12.50	7.28	X
Bromus inermis	N	0	5	0.83	0.49	
Calamagrostis canadensis	Y	5	-5	12.50	7.28	X
Carex aquatilis	Y	7	-5	5.83	3.40	X
Carex lacustris	Y	6	-5	1.67	0.97	
Celtis occidentalis	Y	4	0	0.83	0.49	
Cicuta bulbifera	Y	7	-5	0.83	0.49	
Cirsium vulgare	N	0	3	0.83	0.49	
Cornus alba	Y	3	-3	2.50	1.46	
Cyperus bipartitus	Y	3	-3	0.83	0.49	
Epilobium ciliatum	Y	3	-3	0.83	0.49	
Erechtites hieraciifolia	Y	2	5	5.83	3.40	X
Eurybia macrophylla	Y	4	5	0.83	0.49	
Fraxinus pennsylvanica	Y	2	-3	2.50	1.46	
Glyceria grandis	y	6	-5	0.83	0.49	
Impatiens capensis	Y	2	-3	0.83	0.49	
Iris versicolor	Y	5	-5	0.83	0.49	
Juncus balticus	Y	5	-3	13.33	7.77	X
Juncus brevicaudatus	Y	6	-5	5.00	2.91	
Juncus nodosus	Y	6	-5	12.50	7.28	X
Lathyrus japonicus	Y	9	3	0.83	0.49	
Ludwigia palustris	Y	4	-5	0.83	0.49	
Lythrum salicaria	N	0	-5	0.83	0.49	
Mimulus ringens	Y	6	-5	0.83	0.49	
Oxalis stricta	Y	0	3	0.83	0.49	
Parthenocissus quinquefolia	Y	5	3	0.83	0.49	
Persicaria hydropiper	N	0	-5	0.83	0.49	
Phalaris arundinacea	N	0	-3	0.83	0.49	
Phleum pratense	N	0	3	0.83	0.49	
Populus deltoides	Y	2	0	10.00	5.83	X
Potentilla norvegica	Y	0	0	0.83	0.49	
Prunus serotina	Y	3	3	0.83	0.49	
Rubus pubescens	Y	7	-3	0.83	0.49	
Sagittaria latifolia	Y	3	-5	0.83	0.49	
Salix amygdaloides	Y	4	-3	0.83	0.49	
Salix bebbiana	Y	7	-3	0.83	0.49	
Salix eriocephala	Y	4	-3	5.00	2.91	
Salix nigra	Y	4	-5	5.00	2.91	

Shrub-Carr Community **Total Plots = 3**

Species	Native	C of C	W	Average Cover (%)	Relative Cover (%)	Dom
Sambucus racemosa	Y	5	3	0.83	0.49	
Schoenoplectus tabernaemontani	Y	4	-5	5.83	3.40	X
Sium suave	Y	5	-5	0.83	0.49	
Spiraea alba	Y	4	-3	0.83	0.49	
Symphyotrichum lanceolatum	Y	2	-3	0.83	0.49	
Taraxacum officinale	N	0	3	0.83	0.49	
Typha angustifolia	N	0	-5	0.83	0.49	
Ulmus americana	Y	3	-3	5.00	2.91	

Mean C	3.32	Cover (%)	171.7%	
FQI	24.18	50%	85.8%	
Mean W	-2.06	20%	34.3%	
Native Species	43			
Native Wetland Species	36			
Total Species	53			
% Native Wetland Species	67.9%			
% Cover Native Wetland Species	85.9%			
% Cover Native	92.2%			
% Cover Non-native	7.8%			
% Native Species	81.1%			
% Cover Wetland Species	91.3%			

B

APPENDIX B

Tree & Shrub Planting List

Wet-Mesic Forest Community	
Species	Number of Species
Shrubs	
Aronia melanocarpa	25
Betula pumila	15
Cephalanthus occidentalis	10
Cornus alternifolia	15
Cornus amomum	50
Cornus stolonifera	25
Diervilla lonicera	25
Illex verticillata	10
Lonicera canadensis	15
Physocarpus opulifolius	35
Ribes americanum	25
Rosa blanda	20
Sambucus canadensis	35
Spirea alba	25
Viburnum lentago	35
Viburnum trilobum	35
Total	**400**
Trees	
Abies balsamea	25
Acer rubrum	25
Acer saccharinum	75
Butula allehaniensis	50
Carpinis caroliniana	25
Celtis occidentalis	15
Larix laricina	30
Picea mariana	25
Quercus bicolor	100
Quercus macrocarpa	50
Salix amygdaloides	50
Salix nigra	75
Thuja occidentalis	25
Tsuga canadensis	10
Ulmus rubra	20
Total	**600**

Shrub-Carr Community	
Species	Number of Species
Shrubs	
Alnus rugosa	15
Cornus amomum	110
Cornus stolonifera	125
Illex verticillata	25
Ribes americanum	20
Salix bebbiana	150
Salix discolor	150
Spirea alba	40
Viburnum trilobum	15
Total	**650**

C

APPENDIX C

Photo Log

Sample Plot 1 – Viewing North

Sample Plot 1 – Viewing East

Sample Plot 1 – Viewing South

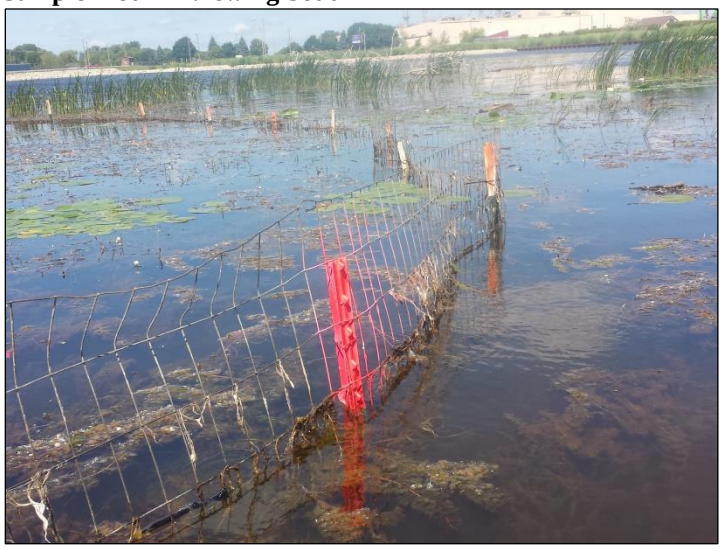
Sample Plot 1 – Viewing West

Sample Plot 2 – Viewing North

Sample Plot 2 – Viewing East

Sample Plot 2 – Viewing South

Sample Plot 2 – Viewing West



Sample Plot 3 – Viewing North

Sample Plot 3 – Viewing East

Sample Plot 3 – Viewing South

Sample Plot 3 – Viewing West

Sample Plot 4 – Viewing North

Sample Plot 4 – Viewing East

Sample Plot 4 – Viewing South

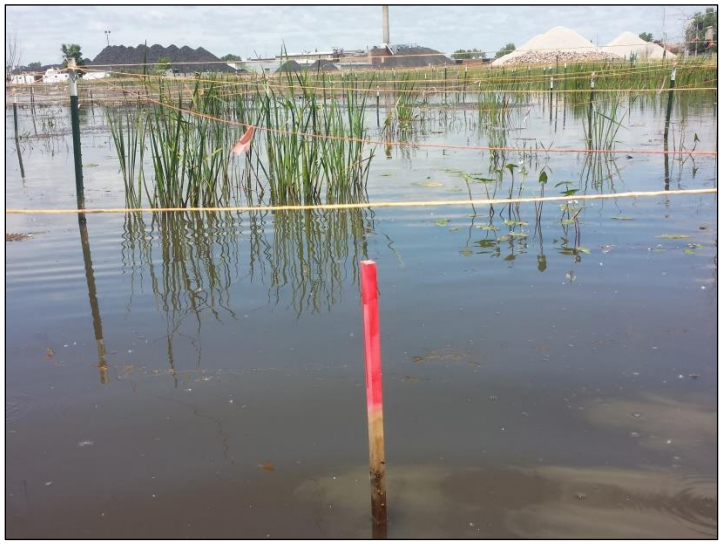
Sample Plot 4 – Viewing West

Sample Plot 5 – Viewing North

Sample Plot 5 – Viewing East

Sample Plot 5 – Viewing South

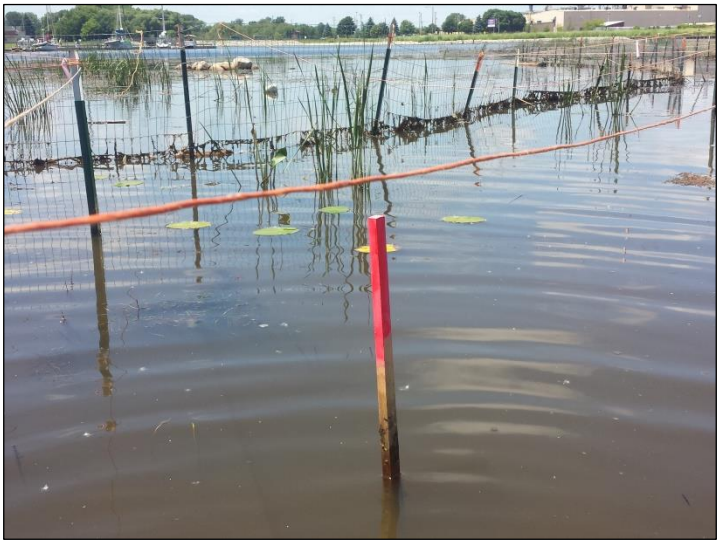
Sample Plot 5 – Viewing West



Sample Plot 6 – Viewing North

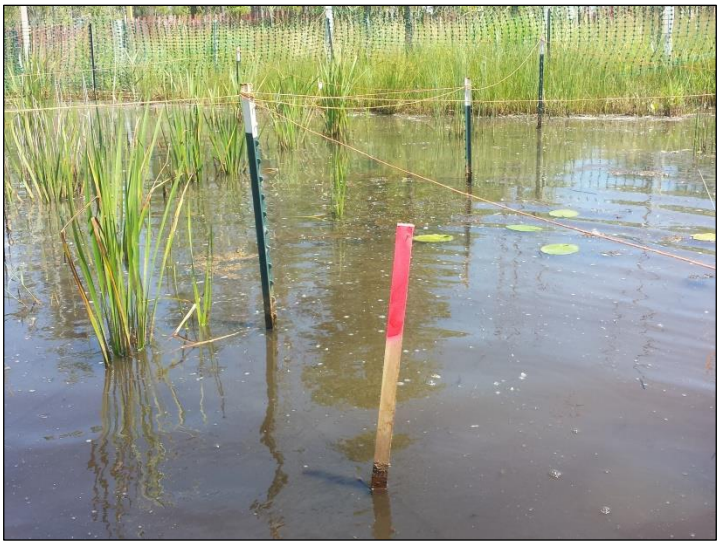
Sample Plot 6- Viewing East

Sample Plot 6 – Viewing South



Sample Plot 6 – Viewing West

Sample Plot 7 - Viewing North

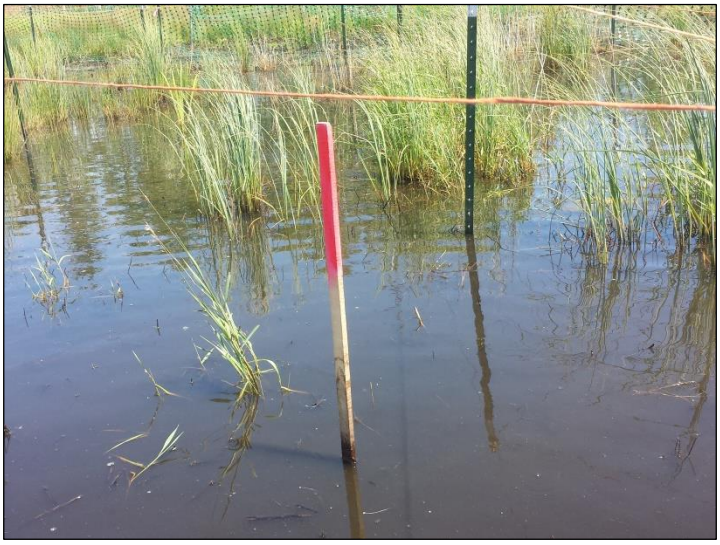


Sample Plot 7 – Viewing East

Sample Plot 7 – Viewing South

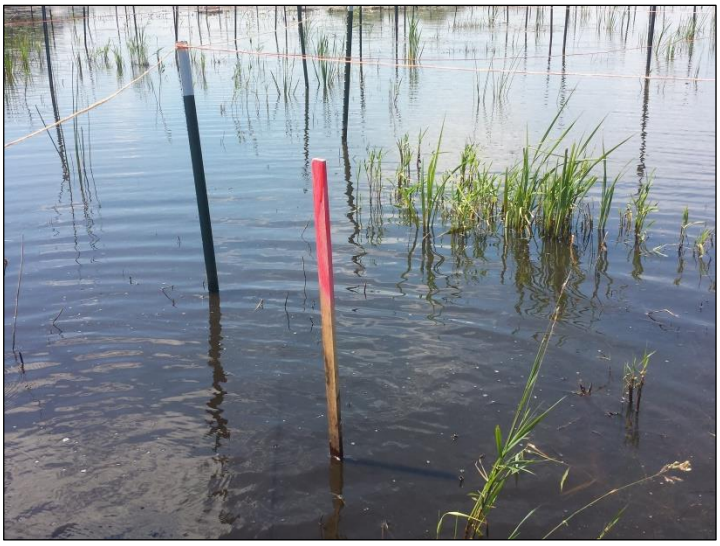
Sample Plot 7 – Viewing West

Sample Plot 8 – Viewing North



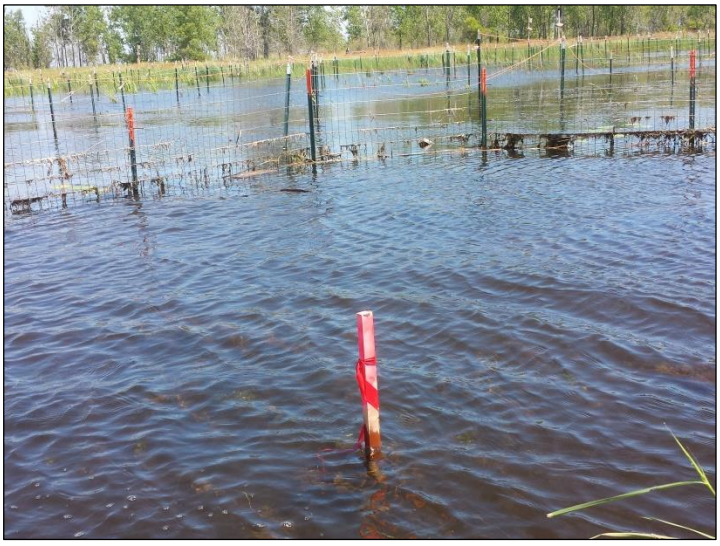
Sample Plot 8 – Viewing East

Sample Plot 8 – Viewing South

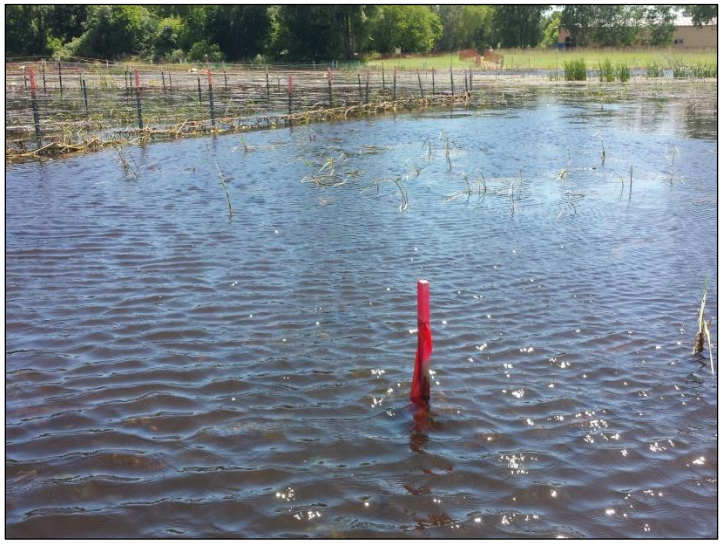


Sample Plot 8 – Viewing West

Sample Plot 9 – Viewing North

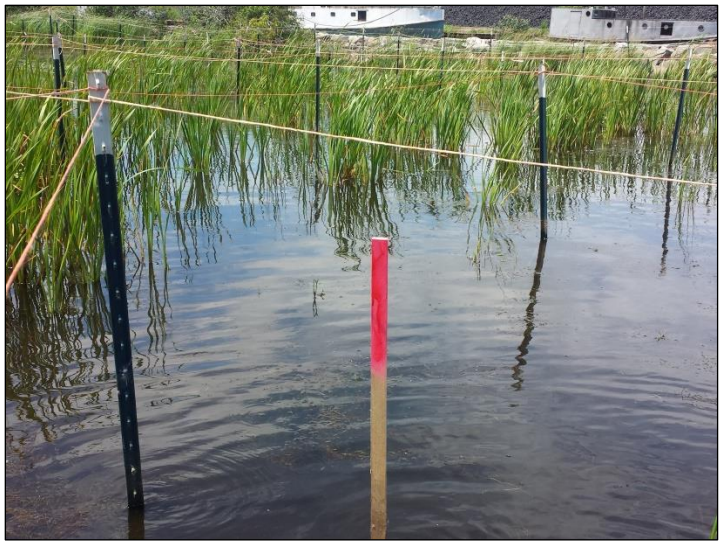


Sample Plot 9 – Viewing East

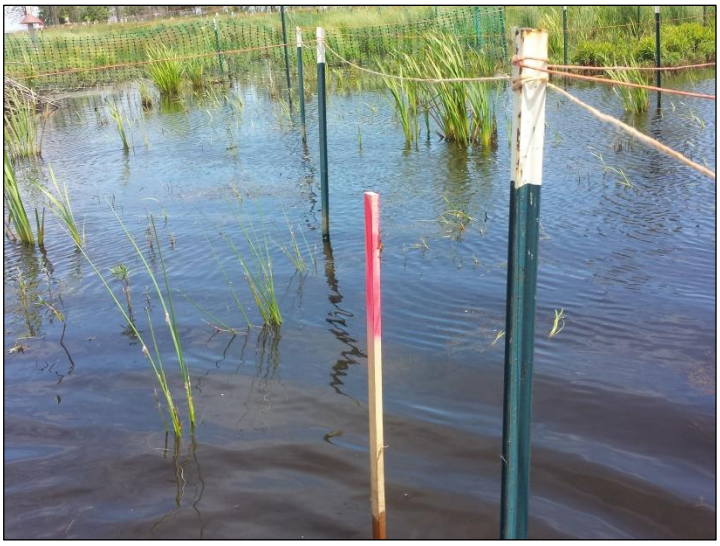


Sample Plot 9 – Viewing South

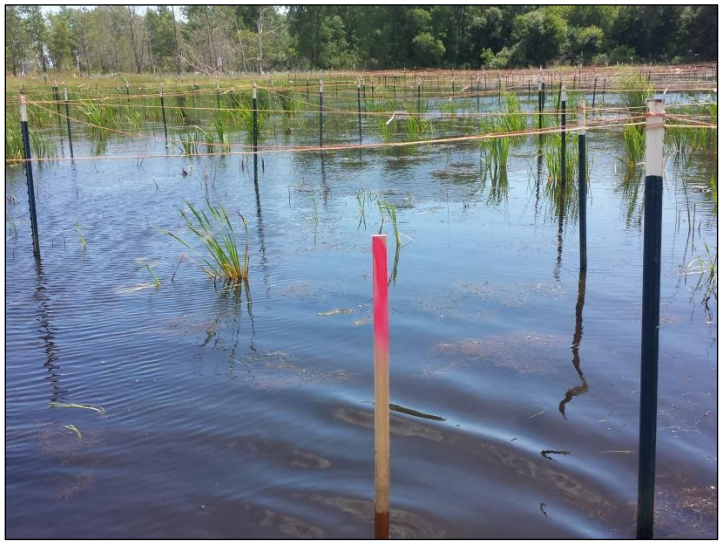
Sample Plot 9 - Viewing West



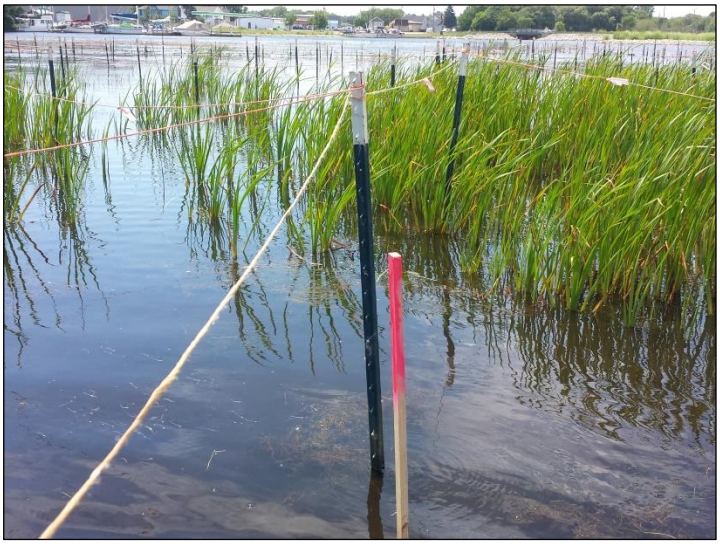
Sample Plot 10 – Viewing North



Sample Plot 10 – Viewing East

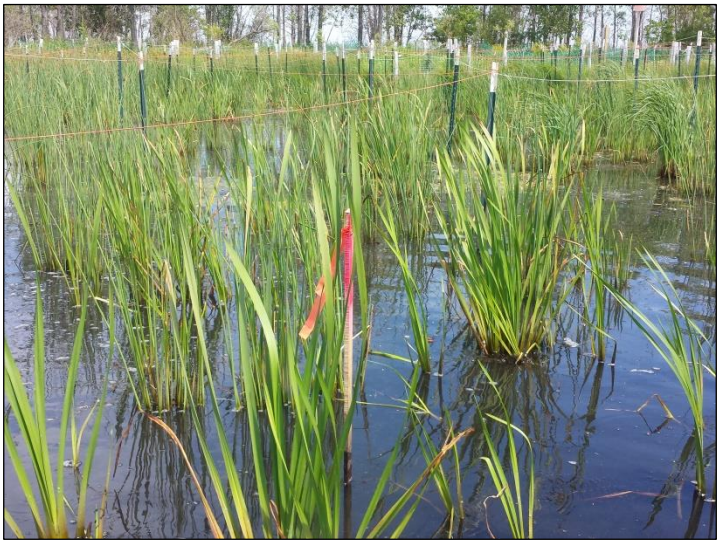


Sample Plot 10 – Viewing South



Sample Plot 10 – Viewing West

Sample Plot 11 – Viewing North



Sample Plot 11 – Viewing East

Sample Plot 11 – Viewing South

Sample Plot 11 – Viewing West

Sample Plot 12 – Viewing North

Sample Plot 12 – Viewing East

Sample Plot 12 – Viewing South

Sample Plot 12 – Viewing West

Sample Plot 13 – Viewing North

Sample Plot 13 – Viewing East

Sample Plot 13 – Viewing South

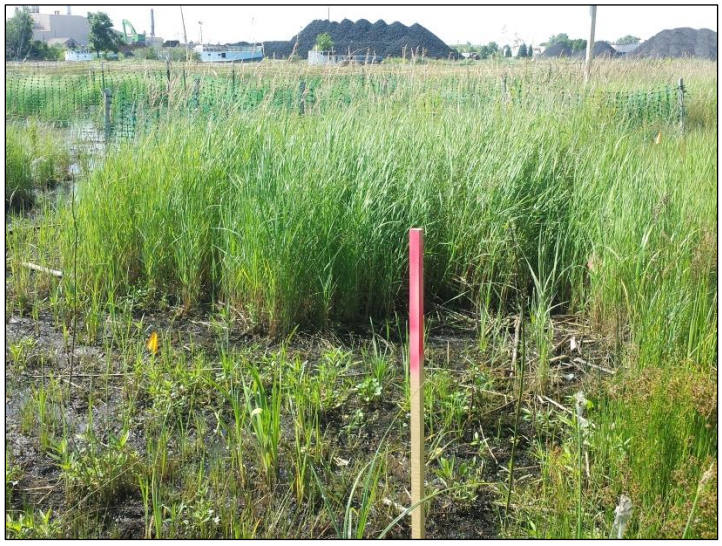
Sample Plot 13 – Viewing West

Sample Plot 14 – Viewing North

Sample Plot 14 – Viewing East

Sample Plot 14 – Viewing South

Sample Plot 14 – Viewing East

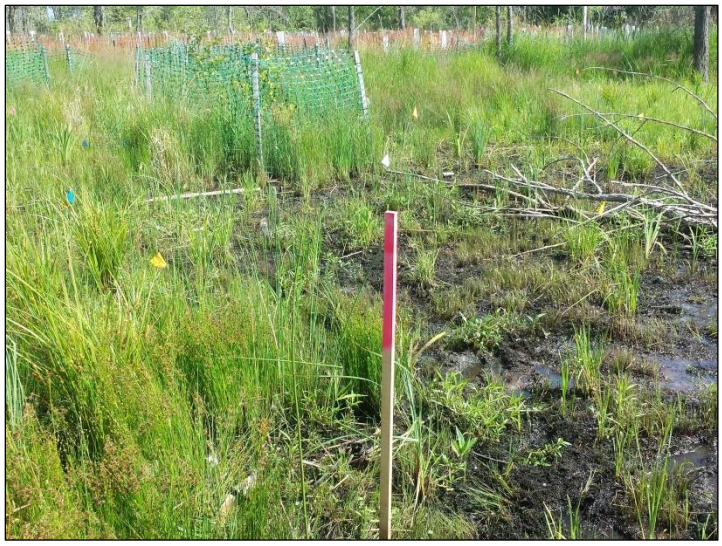


Sample Plot 14 – Viewing South

Sample Plot 14 – Viewing West

Sample Plot 15 – Viewing North

Sample Plot 15 – Viewing East



Sample Plot 15 – Viewing South

Sample Plot 15 – Viewing West

Sample Plot 16 – Viewing North

Sample Plot 16 – Viewing East

Sample Plot 16 – Viewing South

Sample Plot 16 – Viewing West

Sample Plot 17 – Viewing North

Sample Plot 17 – Viewing East

Sample Plot 17 – Viewing South

Sample Plot 17 – Viewing West