FINAL

2011 PARK MILL IMPOUNDMENT (aka UPPER SCOTT FLOWAGE) AQUATIC PLANT SURVEY FOR THE MENOMINEE/PARK MILL HYDROELECTRIC PROJECT MARINETTE COUNTY, WISCONSIN MENOMINEE COUNTY, MICHIGAN

FERC Project No. 2744

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January 2013

Prepared For
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1.0 Summary

As part of the Federal Energy Regulatory Commission (FERC) relicensing procedure for the Park Mill/Menominee Hydroelectric Project (FERC #2744) in Marinette County, Wisconsin and Menominee County, Michigan, local resource agencies requested the licensee to perform a point intercept survey (PI) in order to access aquatic plant communities within the FERC Project Boundary of the Park Mill Impoundment (a.k.a. Upper Scott Flowage). In addition, the licensee agreed to perform a survey to map occurrences of purple loosestrife (PL), curly-leaf pondweed (CLP), and Eurasian watermilfoil (EWM) within the FERC Project Boundary of the Park Mill Impoundment concurrently with the PI. In early August of 2011, the PI along with the meander surveys for PL, CLP, and EWM were performed at the Park Mill Impoundment. Survey dates were 8/1 – 8/5, 8/11 – 8/12, and 8/15 – 8/19.

PI and meander survey data was collected and compiled, and is included within this report. Both EWM and CLP were found within the survey boundary. PL was also found within the survey boundary. Upon closer investigation of a number of PL occurrences, it was discovered that Galerucella (Cella) beetles, a biological control for PL, already existed on many plants and were having a noticeable effect on their vigor.

2.0 Methods

The limits of all surveys included in this report were defined as the waters and shoreline of the Park Mill Impoundment within the FERC Project Boundary as shown on the FERC Project Boundary Map (Exhibit G, Figure G-1 dated December 9, 2009) to be included in the Draft License Application. A map showing these limits is included in Appendix A of this report.

Garmin eTrex Vista HCx handheld GPS receivers with WAAS enabled were used to locate and mark GPS points during all surveys.

A shallow draft motorboat was used to access most survey areas, however, in shallow, weed choked areas were motorboat travel was hampered, a kayak was used. It was necessary to use a kayak to survey the area of Wright Slough as there was no motorboat launch in this portion of the impoundment.

The waters between the boat barrier and spillway along with the waters of the power canal were off limits to boat traffic. No survey points were sampled in these areas; however, the shorelines were scanned for PL.

2.1 Point Intercept Survey (PI)

Procedures described in the document titled ***Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications - WIDNR – March 2010*** were followed for the PI performed at the Park Mill Impoundment. A copy of this document is included in Appendix E in this report. Data collection points were obtained from the Wisconsin Department of Natural Resources. Distance between data points was established at 60 meters. If a data point was located outside of the survey boundary, it was not sampled.

Maps and results of the PI are included in Appendix A in this report.

2.2 Eurasian Water Milfoil (EWM) and Curly-leaf Pondweed (CLP)

Occurrences of EWM and CLP were recorded during the PI. This data is included in Appendix A in this report. If an area of EWM or CLP was encountered that was considered a "mat", it was mapped by driving around the perimeter while plotting GPS points. General mat conditions were noted and inventoried. If it was not possible to circumnavigate the entire mat due to dense vegetation, shallow water, etc., the perimeter was estimated.

It should be noted that the surveys were performed at a time of year when peak growth of CLP was most likely not occurring. A second PI and meandered survey in May or early June for peak CLP detection would have been ideal, but it was not within the scope of this survey.

Maps and results of the EWM and CLP surveys are included in Appendices B and C respectively in this report. For underlying data regarding the mapped surveyed points in these Appendices, refer to the PI data in Appendix A.

2.3 Purple Loosestrife (PL)

The PL survey was accomplished by scanning the shoreline and shallow areas of the project waters from a boat. Certain areas were surveyed from land where it was not practical or possible to observe from the boat. High powered (15 x 50) image stabilization binoculars were used to facilitate the spotting of plants. When PL was identified, a GPS waypoint was created to map the location. If it wasn't possible to reach a PL location to create a waypoint, its location was estimated. Notes were taken for each occurrence.

Galerucella beetles were identified at a number of locations. Damage and presence was noted and is included in the data. In order to quantify Cella damage, the following descriptions were used:

Light – A few holes were detected in the leaves. Plants are very vigorous and damage has little effect on the plants. Beetles, eggs, and/or larvae may have been detected on one or more plants.

Medium – Many holes were detected in leaves. There is obvious "window paning" damage from larvae feeding. Some of the blooming flower heads appear to be stunted. Some stems appear to have been severed and may or may not have new growth that is undamaged. Beetles, eggs, and/or larvae may have been detected on one or more plants.

Heavy – Most leaves had severe damage and "window paning". All seed heads are stunted but still may have a few flowers. Most of the plant is damaged but is still green. Some new growth may have been seen. Beetles, eggs, and/or larvae may have been detected on one or more plants.

Very Heavy – The plant is 80% to 100% brown. Other native plants in the surrounding area are still green.

Maps and results of the PL survey are included in Appendix D in this report.

2.4 Miscellaneous

Previous to initially launching into Park Mill/Menominee Hydroelectric Project waters, the survey boats and survey equipment were treated with a bleach solution to prevent possible spread of invasive species from other locations. After the survey was completed and before launching into other waters, the survey boats and survey equipment were again treated with a bleach solution. Weeds were removed from boats and trailer after each recovery and before leaving the boat launch.

3.0 Observations

3.1 Point Intercept Survey (PI)

During the PI, 48 species were identified. Of these, 43 were by rake method and 5 were visual sightings. An additional 9 species were identified during the meander boat survey.

Most of the shallow areas (3 feet or less) of the sloughs, bays, and areas off of the main river channel had weed mats too thick to be navigated effectively with a motor boat. In a number of these areas, survey points could not be reached with a kayak. At shallower depths on the main river channel, weed growth was not as heavy and most points could be sampled. The maximum depth where plants were retrieved was 8 feet.

The most common species identified during the PI were Ceratophyllum demersum, Coontail 12.78% Relative Fequency (RF); Potamogeton zosteriformis, Flat-stem pondweed 9.20% RF; Lemna trisulca, Forked duckweed 8.94% RF; Spirodela polyrhiza, Large duckweed 8.69% (RF); Lemna minor, Small duckweed 8.60% RF; Elodea canadensis, Common waterweed 8.43% RF. The PI results indicate that these 6 species comprised a combined RF of approximately 57% of all species encountered during the survey.

Maps and results of the PI are included in Appendix A in this report.

3.2 Eurasian Water Milfoil (EWM) and Curly-leaf Pondweed (CLP)

During the PI, EWM was identified at 23 survey points by rake method and at 32 points visually while CLP was identified at 14 survey points by rake method and at 5 points visually. Additionally, the PI indicated that EWM comprised 1.96% RF of all species encountered during the survey while CLP comprised 1.19% RF of all species encountered.

During the meander survey, 9 EWM mats were identified covering an estimated area of 47.112 acres while one CLP mat was identified covering an estimated area of 6.56 acres. Most EWM occurrences were sparse and all were mixed with native plants. A couple of EWM mats had light to medium densities on the extreme upstream and downstream ends of the mats in the main river channel. Otherwise, the densest part of any mat was usually the outside perimeter. Where CLP was found, all occurrences were sparse.

Maps and results of the EWM and CLP surveys are included in Appendices B and C respectively in this report. For underlying data regarding the mapped surveyed points in these Appendices, refer to the PI data in Appendix A.

3.3 Purple Loosestrife (PL)

PL was identified at 22 locations. Most were small occurrence of 5 or less plants, but two occurrences were estimated to have over 500 plants

(PKML PL015 and PKML PL0021) and another was estimated to have about 100 – 200 plants (PKML PL0022). No PL was found on property owned by the licensee.

Cella beetles were discovered to be present at a number of PL occurrences. Beetles damage was confirmed on two of the three largest sites (PKML PL015 and PKML PL0022). The survey crew was unable to get close enough to determine if there was Cella presence at the third large site (PKML PL0021), however, due to its close proximity to a site with Medium beetle damage (PKML PL022), beetles have most likely migrated there and are established.

Although not a part of the survey, the crew searched for PL in the Lower Menominee River in order to evaluate whether the Cella beetles found in the Park Mill Impoundment were isolated populations or if beetles were more widespread within the riparian corridor. A number of PL plants were found on the north side of Stephenson Island about 1.75 miles downstream from the nearest Cella beetle sighting at the Park Mill Impoundment. Cella beetles and eggs were also found on the plants at Stephenson Island.

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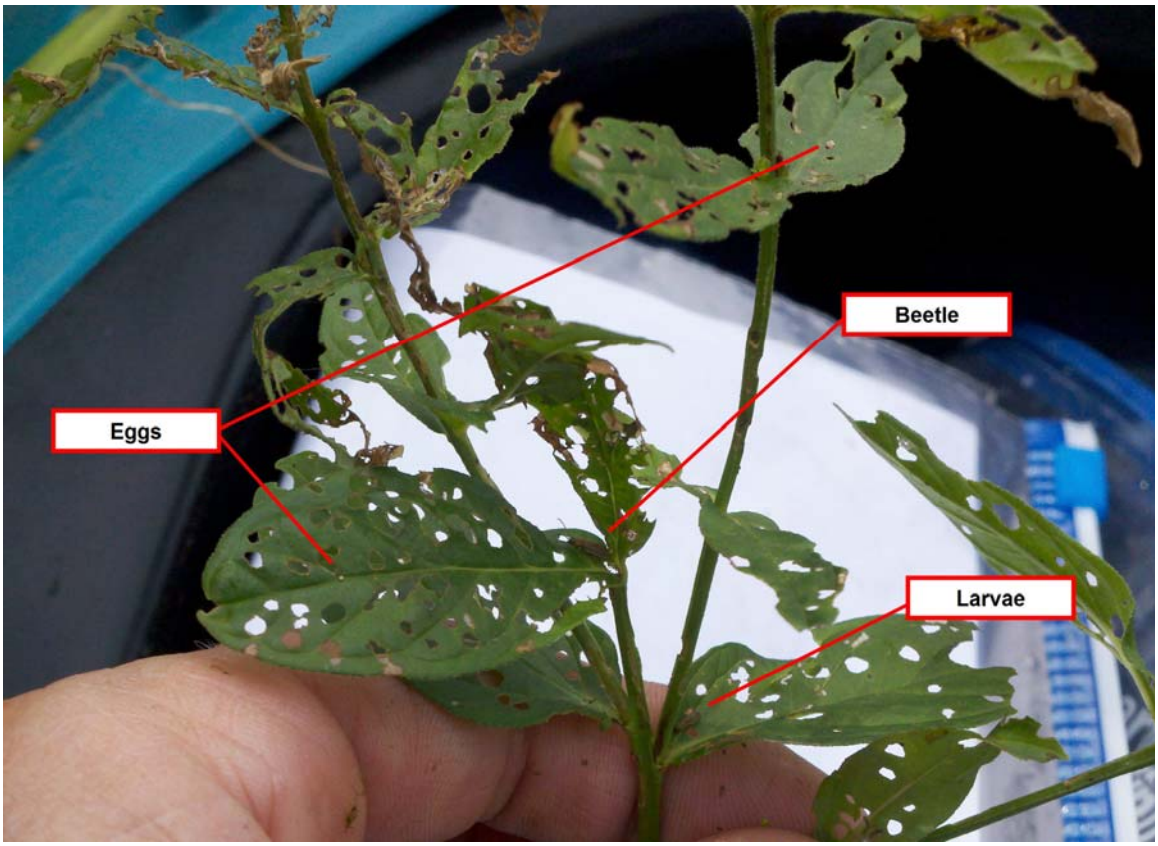
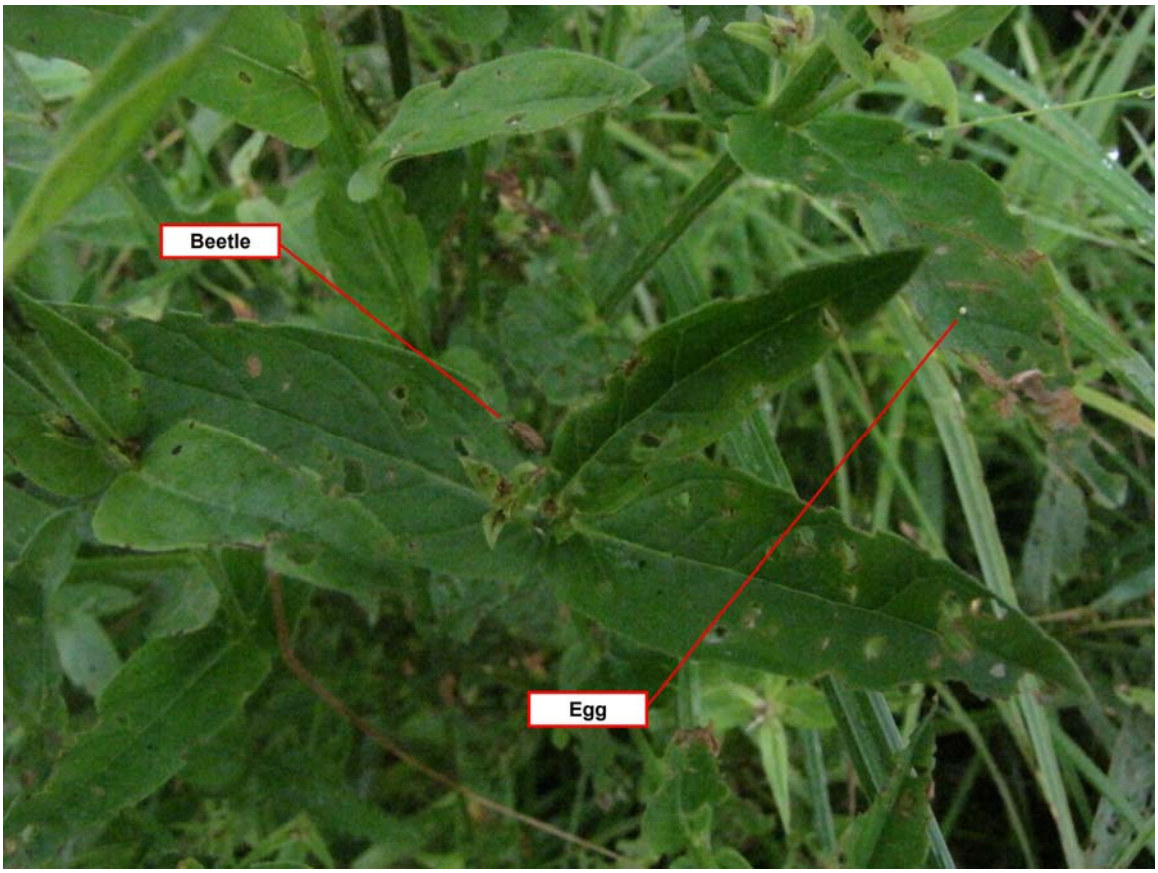


Galerucella Beetle, Egg, and Larvae on Purple Loosestrife at PKML PL014 (2011)



Galerucella Beetle and egg on Purple Loosestrife at Stephenson Island – Lower Menominee River (2011)

Maps and results of the PL survey are included in Appendix D in this report.

3.4 Miscellaneous

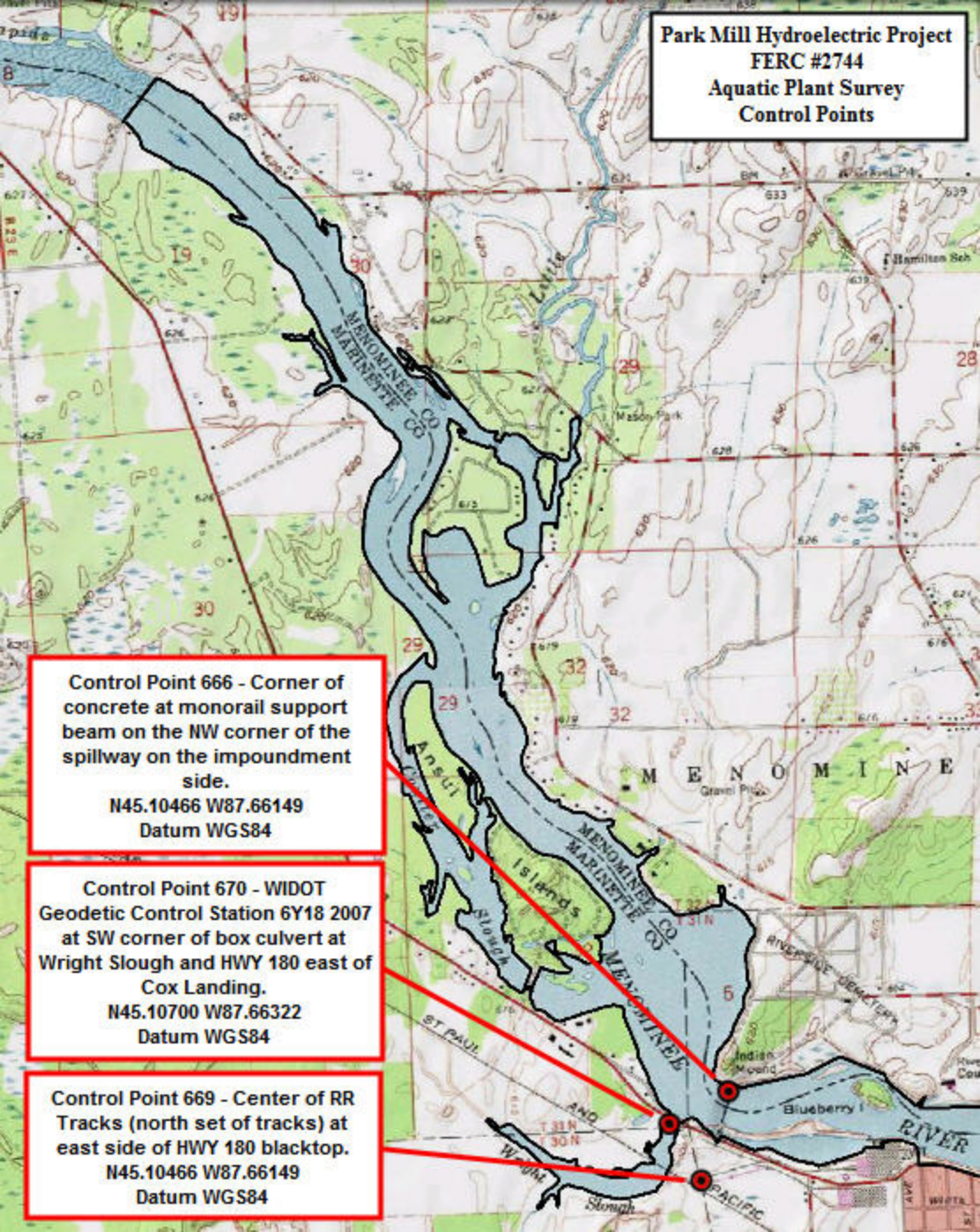
Non-native phragmites are common in the near vicinity of the Park Mill Impoundment. Although no plants were discovered within the survey boundary, heavy occurrences were spotted in road ditches within 300 yards of the impoundment.

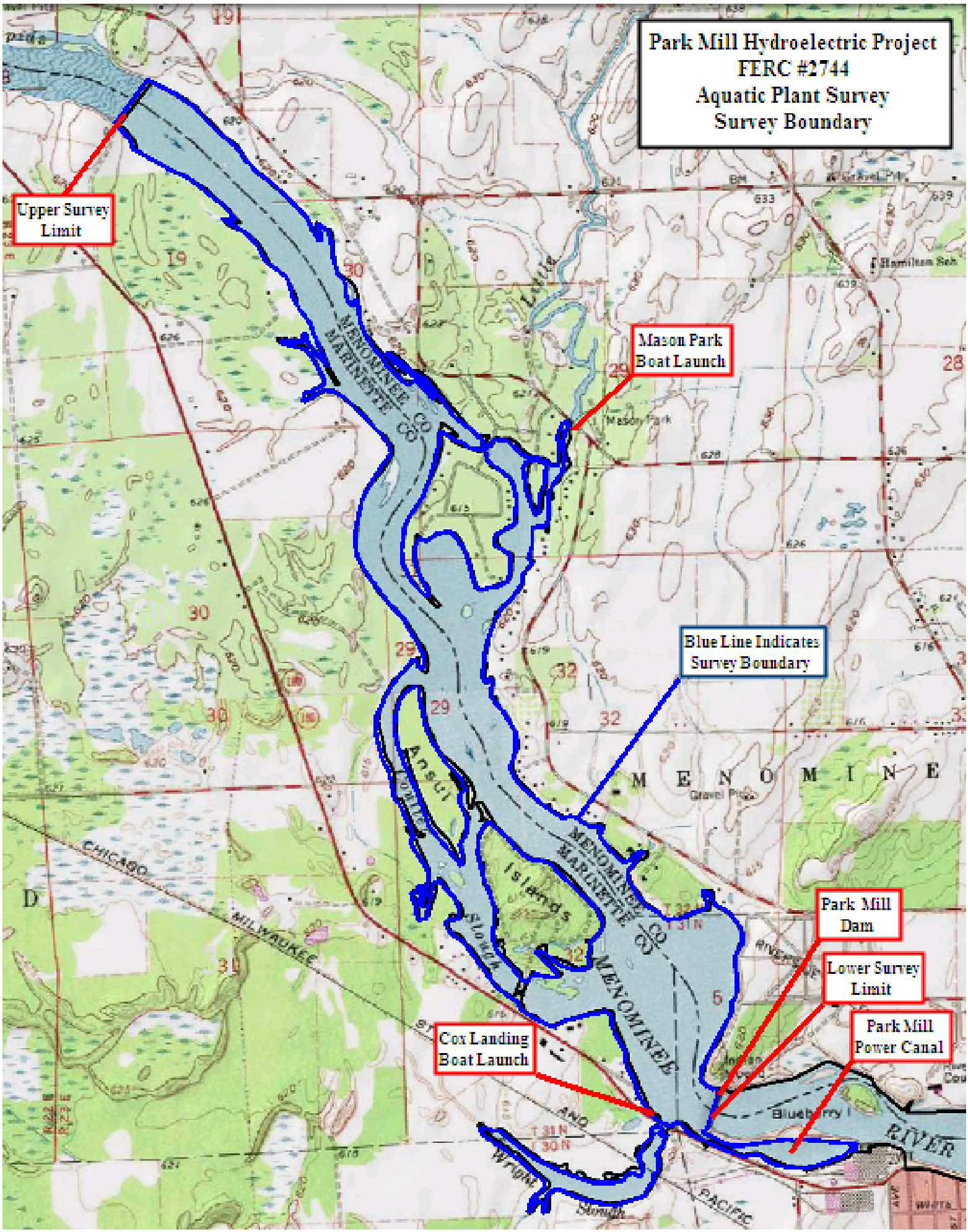
A report is available describing aquatic plant communities from a survey performed in the riparian corridor downstream from the Park Mill Impoundment. It is entitled *An Aquatic Vegetation Survey of the Lower Scott Flowage & Lower Menominee River Marinette County, Wisconsin & Menominee County, Michigan - December 2010, by Tim Hoyman & Eddie Heath - Onterra, LLC - De Pere, WI - Funded by: United States Environmental Protection Agency, Wisconsin Dept. of Natural Resources, Michigan Dept. of Natural Resources and Environment* and is a good

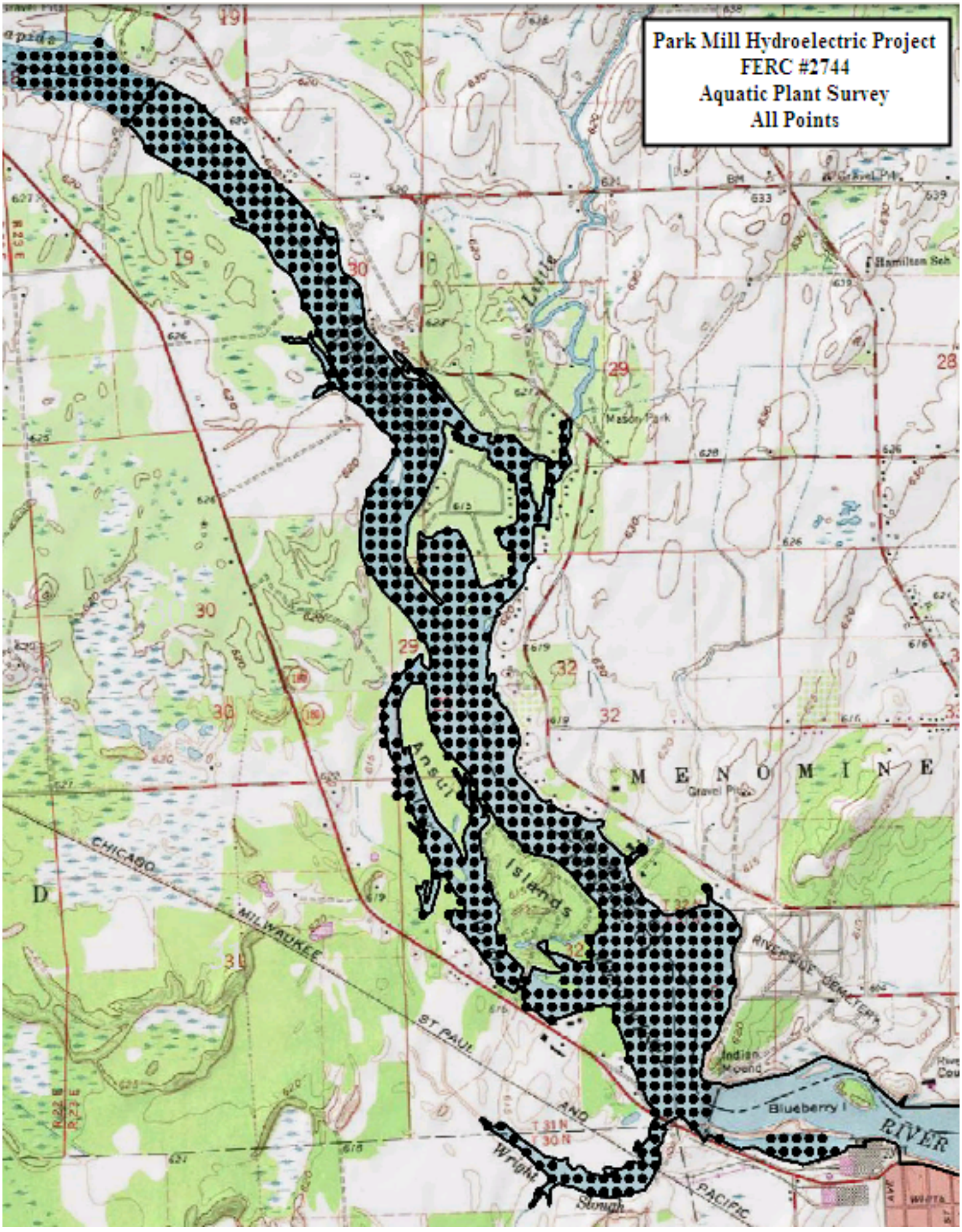
source for more information on aquatic plant conditions in the general area.

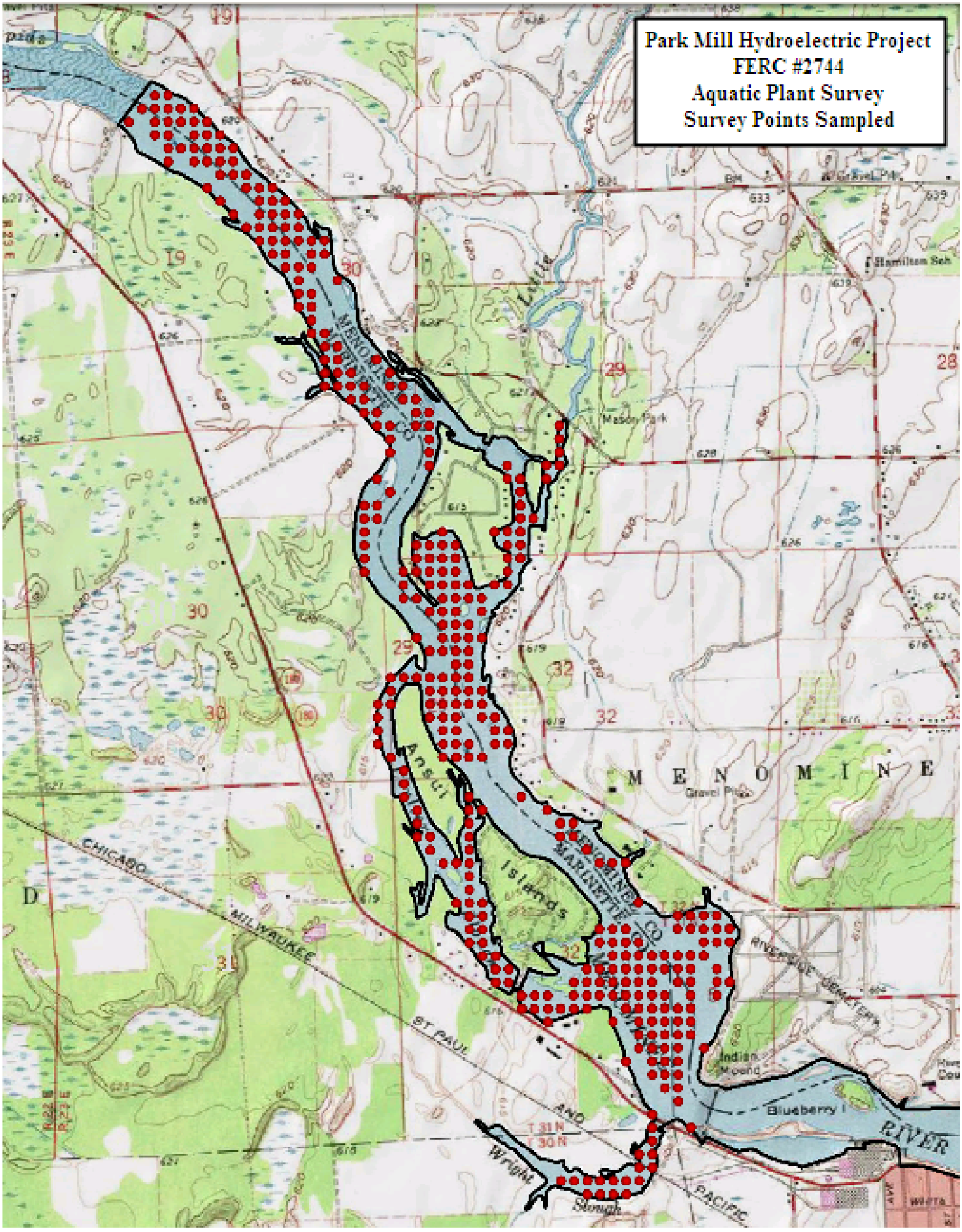
APPENDIX A

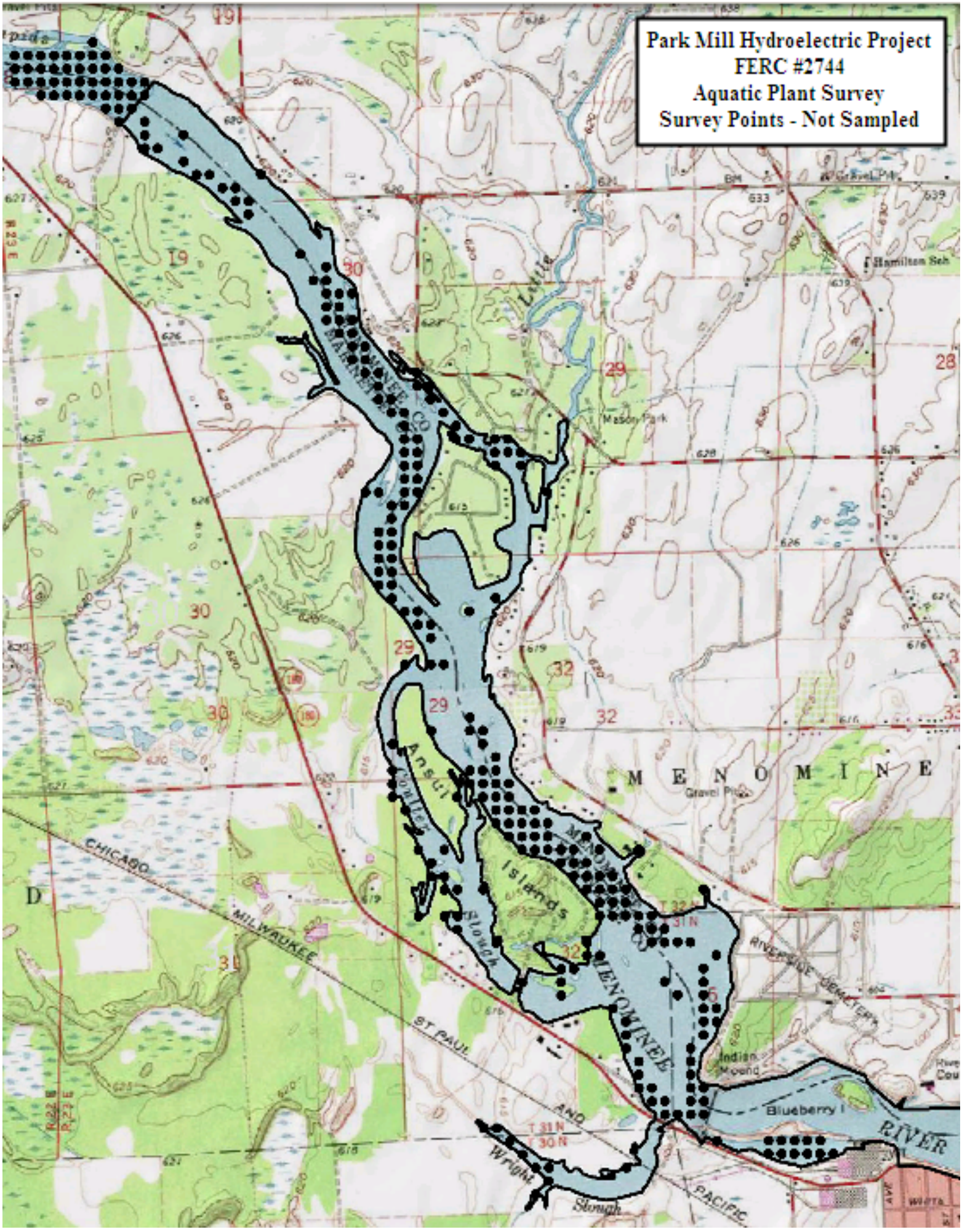
Point Intercept Survey (PI) Data and Maps


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Control Points
Control Point 666 - Corner of concrete at monorail support beam on the NW corner of the spillway on the impoundment side.
N45.10466 W87.66149
Datum WGS84
Control Point 670 - WIDOT Geodetic Control Station 6Y18 2007 at SW corner of box culvert at Wright Slough and HWY 180 east of Cox Landing.
N45.10700 W87.66322
Datum WGS84
Control Point 669 - Center of RR Tracks (north set of tracks) at east side of HWY 180 blacktop.
N45.10466 W87.66149
Datum WGS84
MENOMINEE CO
MARINETTE CO
MENOMINEE
Ansul Islands
Wright Slough
Indian Mound
Blueberry I
RIVER
ST PAUL
AND
PACIFIC


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Survey Boundary
Upper Survey Limit
Mason Park Boat Launch
Blue Line Indicates Survey Boundary
Park Mill Dam
Lower Survey Limit
Park Mill Power Canal
Cox Landing Boat Launch
MENOMINEE
MARINETTE CO
MENOMINEE
MARINETTE CO
M E N O M I N E E
Ansul Island
Ansul Island
CHICAGO
MILWAUKEE
RIVER
PACIFIC


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
All Points
MENOMINEE
Ansul Islands
CHICAGO
MILWAUKEE
ST PAUL
AND
PACIFIC
Blueberry I
RIVER
Wright
Slough
Mason Park
Hamilton Sch
Indian Mound
RIVERSIDE CEMETERY
Gravel Pits
R23E
R22E
T31N
T30N


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Survey Points Sampled
MENOMINEE
Ansel
Islands
MARINETTE CO
CHICAGO
MILWAUKEE
ST PAUL
AND
PACIFIC
RIVER
Wright
Slough
Blueberry
Indian Mound
Mason Park
Hamilton Sch
Gravel Pits
T31N
T30N
R23E
R22E


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Survey Points - Not Sampled
MENOMINEE
Gravel Pit
Mason Park
Hamilton Sch
Ansul Corners
Islands
Slough
MENOMINEE
RIVER
Indian Mound
Blueberry I
Wright Slough
CHICAGO
MILWAUKEE
ST PAUL
AND
PACIFIC
RIVERSIDE CEMETERY
BARNEVELD CO
Levee

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
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3	45.104210	-87.666620	5	M	P		3																			1	1			1				
4	45.104194	-87.665858	5	M	P		2					1						1							1		V						
5	45.104179	-87.665096	4	M	P		2			V		1			1										V		V						
6	45.104812	-87.669646				NONNAVIGABLE																												
7	45.104796	-87.668884	3	M	P		3					3						V														V		
8	45.104781	-87.668122	4	M	P		1					1													1									
9	45.104765	-87.667360	2	M	P		1							1				V			1				1							1	1	
10	45.104749	-87.666598	1	M	P		1					1		1		V			1						1							1		
11	45.104734	-87.665836	1	M	P		1	1				1		1	1		1						1		1									
12	45.104718	-87.665074	5	M	P		2								1										V		V							
13	45.104703	-87.664312	8	M	P	NO VEGETATION																												
14	45.105367	-87.670386				NONNAVIGABLE																												
15	45.105351	-87.669624				NONNAVIGABLE																												
16	45.105258	-87.665052				NONNAVIGABLE																												
17	45.105242	-87.664290	1	R	P		1					1			1				1		1			V	1									
18	45.105227	-87.663528	5	M	P		1					1								1	1				V	1								
19	45.105922	-87.671126				NONNAVIGABLE																												
20	45.105782	-87.664268	3	M	P		1											V	1		1				V		V						
21	45.105766	-87.663506	5	R	P		1					1					V			1					V								
22	45.105626	-87.656647				RESTRICTED - Power Canal																												
23	45.105610	-87.655885				RESTRICTED - Power Canal																												
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25	45.105579	-87.654361				RESTRICTED - Power Canal																												
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28	45.106477	-87.671866				NONNAVIGABLE																												
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41	45.107370	-87.662678	16			TOO DEEP																												
42	45.107354	-87.661916	16			TOO DEEP																												
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POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
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2	45.104225	-87.667382	2	M	P		1	1				1												1								
3	45.104210	-87.666620	5	M	P		3				2		V									V			V							
4	45.104194	-87.665858	5	M	P		2				1		V																			
5	45.104179	-87.665096	4	M	P		2				1											V			V	1						
6	45.104812	-87.669646				NONNAVIGABLE																										
7	45.104796	-87.668884	3	M	P		3					V	V								V											
8	45.104781	-87.668122	4	M	P		1					V	V									V			V							
9	45.104765	-87.667360	2	M	P		1	1			1		1								V		1	1								
10	45.104749	-87.666598	1	M	P		1	1				1							V					1	1	1						
11	45.104734	-87.665836	1	M	P		1	V					V						V				1						1			
12	45.104718	-87.665074	5	M	P		2				2																					
13	45.104703	-87.664312	8	M	P	NO VEGETATION																										
14	45.105367	-87.670386				NONNAVIGABLE																										
15	45.105351	-87.669624				NONNAVIGABLE																										
16	45.105258	-87.665052				NONNAVIGABLE																										
17	45.105242	-87.664290	1	R	P		1					1	1				V											V		V		
18	45.105227	-87.663528	5	M	P		1				1		V												1							
19	45.105922	-87.671126				NONNAVIGABLE																										
20	45.105782	-87.664268	3	M	P		1				1													1				V				
21	45.105766	-87.663506	5	R	P		1						1												1						1	
22	45.105626	-87.656647				RESTRICTED - Power Canal																										
23	45.105610	-87.655885				RESTRICTED - Power Canal																										
24	45.105594	-87.655123				RESTRICTED - Power Canal																										
25	45.105579	-87.654361				RESTRICTED - Power Canal																										
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30	45.106228	-87.659673				RESTRICTED - Power Canal																										
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41	45.107370	-87.662678	16			TOO DEEP																										
42	45.107354	-87.661916	16			TOO DEEP																										
43	45.107338	-87.661153	15			TOO DEEP																										
44	45.107323	-87.660391				RESTRICTED - Boat Barrier																										
45	45.107925	-87.663418	14			TOO DEEP																										
46	45.107909	-87.662656	11			TOO DEEP																										
47	45.107894	-87.661894	5	M	P		2						1																			
48	45.107878	-87.661131	15			TOO DEEP																										

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
49	45.107863	-87.660369				RESTRICTED - Boat Barrier																												
50	45.108480	-87.664158	11			TOO DEEP																												
51	45.108465	-87.663396	10			TOO DEEP																												
52	45.108449	-87.662634	7	S	P		1																											
53	45.108433	-87.661871	4	S	P		1					1						V							V								1
54	45.108418	-87.661109	17			TOO DEEP																												
55	45.108402	-87.660347	13			TOO DEEP																												
56	45.109020	-87.664136	12			TOO DEEP																												
57	45.109004	-87.663374	5	M	P	NO VEGETATION		V																										
58	45.108989	-87.662612	7	S	P	NO VEGETATION																												
59	45.108973	-87.661849	8	S	P	NO VEGETATION																												
60	45.108957	-87.661087	17			TOO DEEP																												
61	45.109575	-87.664876	6	S	P		1																											
62	45.109560	-87.664114	11			TOO DEEP																												
63	45.109544	-87.663352	3	S	P		1	1							1		1																	
64	45.109528	-87.662589	6	S	P		1	1																										
65	45.109513	-87.661827	5	M	P		2					2																						
66	45.109497	-87.661065	17			TOO DEEP																												
67	45.110115	-87.664854	11			TOO DEEP																												
68	45.110099	-87.664092	4	M	P		1	1				1					1																	
69	45.110084	-87.663330	7	S	P	NO VEGETATION																												
70	45.110068	-87.662567	2	M	P		1	V				1					1	V																
71	45.110052	-87.661805	4	M	P		2	1	1			1			1				1															
72	45.110037	-87.661043	17			TOO DEEP																												
73	45.110021	-87.660281	4	R	P	NO VEGETATION																												
74	45.110654	-87.664832	12			TOO DEEP																												
75	45.110639	-87.664070	4	M	P	NO VEGETATION		V																										
76	45.110623	-87.663308	8	S	P		1																											
77	45.110608	-87.662545	1	S	P		1										1	1	1				1											
78	45.110592	-87.661783	3	M	P		2	V	1			1			1			V	1															
79	45.110576	-87.661021	4	M	P		1					1			1		V		1						V									
80	45.110561	-87.660259	16			TOO DEEP																												
81	45.111288	-87.669382	4	M	P		1					1			1			1							V									
82	45.111210	-87.665572	5	S	P		1					1			1		1																	
83	45.111194	-87.664810	11			TOO DEEP																												
84	45.111178	-87.664048	4	M	P		1	1	1																									
85	45.111163	-87.663285	6	S	P		1	1																										
86	45.111147	-87.662523	2	M	P		1					1			1			1																
87	45.111132	-87.661761	3	M	P		1	1	V			1			1		V	1	1															
88	45.111116	-87.660999	3	M	P		2	1				1			1			1	1						V									
89	45.111100	-87.660237	18			TOO DEEP																												
90	45.111085	-87.659475	11			TOO DEEP																												
91	45.111858	-87.670885	1	M	P		1					1						1	1															
92	45.111843	-87.670123	5	M	P		1					1			1			1										1						
93	45.111827	-87.669360	5	M	P		1																		V								
94	45.111812	-87.668598	6	M	P		1					1			1																			
95	45.111796	-87.667836	8	M	P		1					1																						
96	45.111780	-87.667074	7	M	P																													

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
49	45.107863	-87.660369				RESTRICTED - Boat Barrier																											
50	45.108480	-87.664158	11			TOO DEEP																											
51	45.108465	-87.663396	10			TOO DEEP																											
52	45.108449	-87.662634	7	S	P		1																			1			1				
53	45.108433	-87.661871	4	S	P		1																										
54	45.108418	-87.661109	17			TOO DEEP																											
55	45.108402	-87.660347	13			TOO DEEP																											
56	45.109020	-87.664136	12			TOO DEEP																											
57	45.109004	-87.663374	5	M	P	NO VEGETATION																											
58	45.108989	-87.662612	7	S	P	NO VEGETATION																											
59	45.108973	-87.661849	8	S	P	NO VEGETATION																											
60	45.108957	-87.661087	17			TOO DEEP																											
61	45.109575	-87.664876	6	S	P		1																			1							
62	45.109560	-87.664114	11			TOO DEEP																											
63	45.109544	-87.663352	3	S	P		1						1																				1
64	45.109528	-87.662589	6	S	P		1																						1				1
65	45.109513	-87.661827	5	M	P		2						1																				
66	45.109497	-87.661065	17			TOO DEEP																											
67	45.110115	-87.664854	11			TOO DEEP																											
68	45.110099	-87.664092	4	M	P		1																										
69	45.110084	-87.663330	7	S	P	NO VEGETATION																											
70	45.110068	-87.662567	2	M	P		1						1								V									1			
71	45.110052	-87.661805	4	M	P		2														V												
72	45.110037	-87.661043	17			TOO DEEP																											
73	45.110021	-87.660281	4	R	P	NO VEGETATION																											
74	45.110654	-87.664832	12			TOO DEEP																											
75	45.110639	-87.664070	4	M	P	NO VEGETATION																											
76	45.110623	-87.663308	8	S	P		1		1																								
77	45.110608	-87.662545	1	S	P		1					1							V		1						1						
78	45.110592	-87.661783	3	M	P		2						V								V						1				V		
79	45.110576	-87.661021	4	M	P		1						1																				
80	45.110561	-87.660259	16			TOO DEEP																											
81	45.111288	-87.669382	4	M	P		1						1								1												
82	45.111210	-87.665572	5	S	P		1					1	1													1							
83	45.111194	-87.664810	11			TOO DEEP																											
84	45.111178	-87.664048	4	M	P		1						1																				
85	45.111163	-87.663285	6	S	P		1																										
86	45.111147	-87.662523	2	M	P		1		1			1	1	1					V		1												
87	45.111132	-87.661761	3	M	P		1		1				V								1						1			1			
88	45.111116	-87.660999	3	M	P		2														1						1			1			
89	45.111100	-87.660237	18			TOO DEEP																											
90	45.111085	-87.659475	11			TOO DEEP																											
91	45.111858	-87.670885	1	M	P		1						1								1						1			1			
92	45.111843	-87.670123	5	M	P		1						1								1												
93	45.111827	-87.669360	5	M	P		1						1								1												
94	45.111812	-87.668598	6	M	P		1						1																				
95	45.111796	-87.667836	8	M	P		1																										
96	45.111780	-87.667074	7	M	P																												

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
97	45.111749	-87.665550	10			TOO DEEP																												
98	45.111734	-87.664788	6	S	P		1																											
99	45.111718	-87.664026	5	S	P																													
100	45.111703	-87.663263	6	S	P		1																											
101	45.111687	-87.662501	2	S	P		1	1	1			1			1		1																	
102	45.111671	-87.661739	2	M	P		1	1				1						1	1						V									
103	45.111656	-87.660977	4	M	P		3					3						1	1						1									
104	45.111640	-87.660215	13			TOO DEEP																												
105	45.111624	-87.659453	10			TOO DEEP																												
106	45.112398	-87.670863	5	M	P		1					1																1						
107	45.112382	-87.670101	5	M	P		1					1						1	1						V			1						
108	45.112367	-87.669338	4	M	P		1								1			1	1					V	V									
109	45.112351	-87.668576				NONNAVIGABLE																												
110	45.112336	-87.667814	5	M	P		1		1			1			1				1								1							
111	45.112320	-87.667052	5	M	P		1					1																						
112	45.112305	-87.666290	8	S	P		1								1																			
113	45.112289	-87.665528	6	S	P		1																											
114	45.112273	-87.664766	7	S	P		1																											
115	45.112258	-87.664004	6	S	P	NO VEGETATION																												
116	45.112242	-87.663241	6	S	P		1	1																									1	
117	45.112227	-87.662479	2	S	P		1	1				1			1			V	1															
118	45.112211	-87.661717				NONNAVIGABLE																												
119	45.112195	-87.660955	8	S	P		1																											
120	45.112180	-87.660193	12			TOO DEEP																												
121	45.112164	-87.659431	7	S	P	NO VEGETATION																												
122	45.112969	-87.672365	5	M	P		1					1					1	1	1		1				V									
123	45.112953	-87.671603	5	M	P		1	1				1			1		1	1	1						V									
124	45.112938	-87.670841				NONNAVIGABLE																												
125	45.112891	-87.668554				NONNAVIGABLE																												
126	45.112875	-87.667792	1	M	P		1	1				1			1		1	1	1		1			V	V									
127	45.112860	-87.667030	5	M	P		1	1	1						1		V		1															
128	45.112844	-87.666268	4	M	P		1	V							1										V									
129	45.112829	-87.665506	5	S	P		1																											
130	45.112813	-87.664744	4	M	P		1					1			1			1	1															
131	45.112797	-87.663982	5	S	P	NO VEGETATION																												
132	45.112782	-87.663219	5	M	P		1														1													
133	45.112766	-87.662457				NONNAVIGABLE																												
134	45.112751	-87.661695	6	M	P	NO VEGETATION		V																										
135	45.112735	-87.660933	9	S	P	NO VEGETATION																												
136	45.112719	-87.660171	12			TOO DEEP																												
137	45.112704	-87.659409	5	M	P	NO VEGETATION																												
138	45.112688	-87.658647	3	S	P		1																											
139	45.113508	-87.672343	5	M	P		2					2			1			1	1						V		V							
140	45.113493	-87.671581	4	M	P		2					1			1		1	1	1						V		1							
141	45.113431	-87.668532				NONNAVIGABLE																												
142	45.113415	-87.667770				NONNAVIGABLE																												
143	45.113399	-87.667008	3	M	P		1	1	1			1			1		V	1	1						V									
144	45.113384	-87.666246	3	M	P		1	V				1			1		1	1	1															

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
97	45.111749	-87.665550	10			TOO DEEP																										
98	45.111734	-87.664788	6	S	P		1						1																			
99	45.111718	-87.664026	5	S	P																											
100	45.111703	-87.663263	6	S	P		1																			1						
101	45.111687	-87.662501	2	S	P		1					1	1					V														
102	45.111671	-87.661739	2	M	P		1						1								1						1			1		
103	45.111656	-87.660977	4	M	P		3						1								1						1			1		
104	45.111640	-87.660215	13			TOO DEEP																										
105	45.111624	-87.659453	10			TOO DEEP																										
106	45.112398	-87.670863	5	M	P		1																									
107	45.112382	-87.670101	5	M	P		1						1								1				1		1					
108	45.112367	-87.669338	4	M	P		1														1						1			V		
109	45.112351	-87.668576				NONNAVIGABLE																										
110	45.112336	-87.667814	5	M	P		1																									
111	45.112320	-87.667052	5	M	P		1						1																			
112	45.112305	-87.666290	8	S	P		1																									
113	45.112289	-87.665528	6	S	P		1																			1						
114	45.112273	-87.664766	7	S	P		1																			1						
115	45.112258	-87.664004	6	S	P	NO VEGETATION																										
116	45.112242	-87.663241	6	S	P		1					1																				
117	45.112227	-87.662479	2	S	P		1						1								V					V	1					
118	45.112211	-87.661717				NONNAVIGABLE																										
119	45.112195	-87.660955	8	S	P		1																			1						
120	45.112180	-87.660193	12			TOO DEEP																										
121	45.112164	-87.659431	7	S	P	NO VEGETATION																										
122	45.112969	-87.672365	5	M	P		1				1										1						1			1		
123	45.112953	-87.671603	5	M	P		1						1								1						1			1		
124	45.112938	-87.670841				NONNAVIGABLE																										
125	45.112891	-87.668554				NONNAVIGABLE																										
126	45.112875	-87.667792	1	M	P		1					1	1								1						1			1		
127	45.112860	-87.667030	5	M	P		1								1																	
128	45.112844	-87.666268	4	M	P		1						1		1											V						
129	45.112829	-87.665506	5	S	P		1																			1				1		
130	45.112813	-87.664744	4	M	P		1							1							1						1					
131	45.112797	-87.663982	5	S	P	NO VEGETATION																										
132	45.112782	-87.663219	5	M	P		1						1																			
133	45.112766	-87.662457				NONNAVIGABLE																										
134	45.112751	-87.661695	6	M	P	NO VEGETATION																										
135	45.112735	-87.660933	9	S	P	NO VEGETATION																										
136	45.112719	-87.660171	12			TOO DEEP																										
137	45.112704	-87.659409	5	M	P	NO VEGETATION																										
138	45.112688	-87.658647	3	S	P		1						1													1						
139	45.113508	-87.672343	5	M	P		2					V	V								1						1			1		
140	45.113493	-87.671581	4	M	P		2				1	1	1								1						1			1		
141	45.113431	-87.668532				NONNAVIGABLE																										
142	45.113415	-87.667770				NONNAVIGABLE																										
143	45.113399	-87.667008	3	M	P		1														1					V	1			1		
144	45.113384	-87.666246	3	M	P		1														1						1			1		

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
145	45.113368	-87.665484	5	S	P		1										1																
146	45.113353	-87.664722	5	S	P		1	1							1		1																
147	45.113337	-87.663959	6	S	P		1																										
148	45.113321	-87.663197	5	M	P		1	1																									
149	45.113306	-87.662435	6	S	P		3					3																					
150	45.113290	-87.661673	8	S	P	NO VEGETATION																											
151	45.113275	-87.660911	8	S	P	NO VEGETATION																											
152	45.113259	-87.660149	11			TOO DEEP																											
153	45.113243	-87.659387	4	M	P		1	1				1					1																
154	45.114064	-87.673083	4	M	P		2	V	1			1			1			1	1						V		1						
155	45.114048	-87.672321	4	M	P		2					2			1		1	1	1						V								
156	45.113939	-87.666986				NONNAVIGABLE																											
157	45.113924	-87.666224				NONNAVIGABLE																											
158	45.113908	-87.665462	5	S	P		1					1					1																
159	45.113892	-87.664700	6	S	P	NO VEGETATION																											
160	45.113877	-87.663937	6	S	P		1										1															1	
161	45.113861	-87.663175	6	S	P		1										1																
162	45.113846	-87.662413	8	S	P	NO VEGETATION																											
163	45.113830	-87.661651	8	S	P	NO VEGETATION																											
164	45.113814	-87.660889	10	S	P	NO VEGETATION																											
165	45.113799	-87.660127	6	S	P	NO VEGETATION											V																
166	45.113783	-87.659365	10			TOO DEEP																											
167	45.114619	-87.673824	5	M	P		3					3			1			1	1						1								
168	45.114603	-87.673061	3	M	P		2		1						2		1	1	1	V					V								
169	45.114588	-87.672299				NONNAVIGABLE																											
170	45.114479	-87.666964				NONNAVIGABLE																											
171	45.114463	-87.666202	4	S	P		1								V		V				V				1						V		
172	45.114448	-87.665440	6	S	P	NO VEGETATION																											
173	45.114432	-87.664678	8	S	P	NO VEGETATION																											
174	45.114416	-87.663915	8	S	P	NO VEGETATION																											
175	45.114401	-87.663153	10			TOO DEEP																											
176	45.114385	-87.662391	10			TOO DEEP																											
177	45.114370	-87.661629	10			TOO DEEP																											
178	45.114354	-87.660867	10			TOO DEEP																											
179	45.114338	-87.660105	8	S	P	NO VEGETATION																											
180	45.114323	-87.659342	5	M	P		1	V									1								V								
181	45.114307	-87.658580	6	M	P	NO VEGETATION																											
182	45.115174	-87.674564				NONNAVIGABLE																											
183	45.115158	-87.673802	3	M	P		1		V			1			V			1	1					V	V								
184	45.115143	-87.673039	3	M	P		1	V	V			1			1		V	1	1						V								
185	45.115003	-87.666180	6	S	P		1	V									V								1		V						
186	45.114987	-87.665418	9	S	P	NO VEGETATION																											
187	45.114972	-87.664656	9	S	P	NO VEGETATION																											
188	45.114956	-87.663893	11			TOO DEEP																											
189	45.114940	-87.663131	12			TOO DEEP																											
190	45.114925	-87.662369	14			TOO DEEP																											
191	45.114909	-87.661607	9	S	P	NO VEGETATION																											
192	45.114894	-87.660845	5	M	P		1	V																									

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
145	45.113368	-87.665484	5	S	P		1																									
146	45.113353	-87.664722	5	S	P		1																									
147	45.113337	-87.663959	6	S	P		1																		1							
148	45.113321	-87.663197	5	M	P		1																									
149	45.113306	-87.662435	6	S	P		3																									
150	45.113290	-87.661673	8	S	P	NO VEGETATION																										
151	45.113275	-87.660911	8	S	P	NO VEGETATION																										
152	45.113259	-87.660149	11			TOO DEEP																										
153	45.113243	-87.659387	4	M	P		1						1																			
154	45.114064	-87.673083	4	M	P		2				1		V								1				V		1			1		
155	45.114048	-87.672321	4	M	P		2						1				1										1			1		
156	45.113939	-87.666986				NONNAVIGABLE																										
157	45.113924	-87.666224				NONNAVIGABLE																										
158	45.113908	-87.665462	5	S	P		1																		1							
159	45.113892	-87.664700	6	S	P	NO VEGETATION																										
160	45.113877	-87.663937	6	S	P		1																									
161	45.113861	-87.663175	6	S	P		1																		1							
162	45.113846	-87.662413	8	S	P	NO VEGETATION																										
163	45.113830	-87.661651	8	S	P	NO VEGETATION																										
164	45.113814	-87.660889	10	S	P	NO VEGETATION																										
165	45.113799	-87.660127	6	S	P	NO VEGETATION																										
166	45.113783	-87.659365	10			TOO DEEP																										
167	45.114619	-87.673824	5	M	P		3						V								1				1		1			1		
168	45.114603	-87.673061	3	M	P		2							1							1				V		1			1		
169	45.114588	-87.672299				NONNAVIGABLE																										
170	45.114479	-87.666964				NONNAVIGABLE																										
171	45.114463	-87.666202	4	S	P		1						V														1					
172	45.114448	-87.665440	6	S	P	NO VEGETATION																										
173	45.114432	-87.664678	8	S	P	NO VEGETATION																										
174	45.114416	-87.663915	8	S	P	NO VEGETATION																										
175	45.114401	-87.663153	10			TOO DEEP																										
176	45.114385	-87.662391	10			TOO DEEP																										
177	45.114370	-87.661629	10			TOO DEEP																										
178	45.114354	-87.660867	10			TOO DEEP																										
179	45.114338	-87.660105	8	S	P	NO VEGETATION																										
180	45.114323	-87.659342	5	M	P		1						1																			
181	45.114307	-87.658580	6	M	P	NO VEGETATION																										
182	45.115174	-87.674564				NONNAVIGABLE																										
183	45.115158	-87.673802	3	M	P		1				V										1						1			1		
184	45.115143	-87.673039	3	M	P		1				1	V	V								1						1			1		
185	45.115003	-87.666180	6	S	P		1			V			1													1						
186	45.114987	-87.665418	9	S	P	NO VEGETATION																										
187	45.114972	-87.664656	9	S	P	NO VEGETATION																										
188	45.114956	-87.663893	11			TOO DEEP																										
189	45.114940	-87.663131	12			TOO DEEP																										
190	45.114925	-87.662369	14			TOO DEEP																										
191	45.114909	-87.661607	9	S	P	NO VEGETATION																										
192	45.114894	-87.660845	5	M	P		1																			1						

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
193	45.114878	-87.660083	4	M	P		1	V				1													V								
194	45.114862	-87.659320	5	M	P		1	V				1			1									V					1				
195	45.114847	-87.658558	6	M	P	NO VEGETATION																												
196	45.115760	-87.676828				NONNAVIGABLE																												
197	45.115729	-87.675304				NONNAVIGABLE																												
198	45.115714	-87.674542				NONNAVIGABLE																												
199	45.115698	-87.673780	3	M	P		1		1			1			1			1	1					V	V								
200	45.115683	-87.673017	3	M	P		1		1			1			1			1	1					V	V								
201	45.115542	-87.666158	11			TOO DEEP																												
202	45.115527	-87.665396	11			TOO DEEP																												
203	45.115511	-87.664634	11			TOO DEEP																												
204	45.115496	-87.663871	14			TOO DEEP																												
205	45.115480	-87.663109	13			TOO DEEP																												
206	45.115449	-87.661585	4	M	P		1										1				V	V										1		
207	45.115433	-87.660823	5	M	P		1					1																						
208	45.115418	-87.660061	5	M	P		1																											
209	45.115402	-87.659298	5	M	P		1					1																						
210	45.116253	-87.674520	3	M	P		2								1		1				1			V	1								
211	45.116238	-87.673758	3	M	P		2		1			2			1			1	1						1								
212	45.116222	-87.672996	2	M	P		1					1			1		1	1	1						V								
213	45.116082	-87.666136	15			TOO DEEP																												
214	45.116067	-87.665374	12			TOO DEEP																												
215	45.116051	-87.664612	12			TOO DEEP																												
216	45.116035	-87.663849	4	R	P	NO VEGETATION																												
217	45.116808	-87.675260				NONNAVIGABLE																												
218	45.116793	-87.674498				NONNAVIGABLE																												
219	45.116777	-87.673736	3	M	P		1	V	V			1					V	1	1						V								
220	45.116762	-87.672974				NONNAVIGABLE																												
221	45.116637	-87.666876	13			TOO DEEP																												
222	45.116622	-87.666114	13			TOO DEEP																												
223	45.116606	-87.665352	12			TOO DEEP																												
224	45.116591	-87.664589	16			TOO DEEP																												
225	45.116497	-87.660016				NONNAVIGABLE																												
226	45.117364	-87.676000				NONNAVIGABLE																												
227	45.117348	-87.675238				NONNAVIGABLE																												
228	45.117317	-87.673714	3	M	P		1	V				1			1			1	1									V					
229	45.117193	-87.667616	14			TOO DEEP																												
230	45.117177	-87.666854	13			TOO DEEP																												
231	45.117161	-87.666092	11			TOO DEEP																												
232	45.117146	-87.665330	11			TOO DEEP																												
233	45.117903	-87.675979				NONNAVIGABLE																												
234	45.117888	-87.675216	3	M	P		3					2					1								1								
235	45.117872	-87.674454	3	M	P		2			1		2			1		1	1	1					V	V		1						
236	45.117857	-87.673692	4	M	P		1					1			1			1	1					V	V								
237	45.117748	-87.668356	14			TOO DEEP																												
238	45.117732	-87.667594	13			TOO DEEP																												
239	45.117717	-87.666832	11			TOO DEEP																												
240	45.117701	-87.666070	8	S	P	NO VEGETATION						V			V		V	V	V														

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
193	45.114878	-87.660083	4	M	P		1						1																			
194	45.114862	-87.659320	5	M	P		1					1	1																			
195	45.114847	-87.658558	6	M	P	NO VEGETATION																										
196	45.115760	-87.676828				NONNAVIGABLE																										
197	45.115729	-87.675304				NONNAVIGABLE																										
198	45.115714	-87.674542				NONNAVIGABLE																										
199	45.115698	-87.673780	3	M	P		1						V								1				1		1			1		
200	45.115683	-87.673017	3	M	P		1														1						1			1		
201	45.115542	-87.666158	11			TOO DEEP																										
202	45.115527	-87.665396	11			TOO DEEP																										
203	45.115511	-87.664634	11			TOO DEEP																										
204	45.115496	-87.663871	14			TOO DEEP																										
205	45.115480	-87.663109	13			TOO DEEP																										
206	45.115449	-87.661585	4	M	P		1					1	1													1						
207	45.115433	-87.660823	5	M	P		1						1																			
208	45.115418	-87.660061	5	M	P		1					1																				
209	45.115402	-87.659298	5	M	P		1																			1						
210	45.116253	-87.674520	3	M	P		2				1													1								
211	45.116238	-87.673758	3	M	P		2														1						1			1		
212	45.116222	-87.672996	2	M	P		1							1							1						1			1		
213	45.116082	-87.666136	15			TOO DEEP																										
214	45.116067	-87.665374	12			TOO DEEP																										
215	45.116051	-87.664612	12			TOO DEEP																										
216	45.116035	-87.663849	4	R	P	NO VEGETATION																				V						
217	45.116808	-87.675260				NONNAVIGABLE																										
218	45.116793	-87.674498				NONNAVIGABLE																										
219	45.116777	-87.673736	3	M	P		1														1						1			1		
220	45.116762	-87.672974				NONNAVIGABLE																										
221	45.116637	-87.666876	13			TOO DEEP																										
222	45.116622	-87.666114	13			TOO DEEP																										
223	45.116606	-87.665352	12			TOO DEEP																										
224	45.116591	-87.664589	16			TOO DEEP																										
225	45.116497	-87.660016				NONNAVIGABLE																										
226	45.117364	-87.676000				NONNAVIGABLE																										
227	45.117348	-87.675238				NONNAVIGABLE																										
228	45.117317	-87.673714	3	M	P		1														1						1			1		
229	45.117193	-87.667616	14			TOO DEEP																										
230	45.117177	-87.666854	13			TOO DEEP																										
231	45.117161	-87.666092	11			TOO DEEP																										
232	45.117146	-87.665330	11			TOO DEEP																										
233	45.117903	-87.675979				NONNAVIGABLE																										
234	45.117888	-87.675216	3	M	P		3		1		1		1																			
235	45.117872	-87.674454	3	M	P		2				1										1						1			1		
236	45.117857	-87.673692	4	M	P		1														1						1			1		
237	45.117748	-87.668356	14			TOO DEEP																										
238	45.117732	-87.667594	13			TOO DEEP																										
239	45.117717	-87.666832	11			TOO DEEP																										
240	45.117701	-87.666070	8	S	P	NO VEGETATION															V						V					

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
241	45.117686	-87.665308	11	R	P	NO VEGETATION																												
242	45.117670	-87.664545	2	S	P		1																		V									
243	45.118458	-87.676719				NONNAVIGABLE																												
244	45.118443	-87.675957	3	M	P		1								V		V	1	1					V	1									
245	45.118427	-87.675194				NONNAVIGABLE																												
246	45.118396	-87.673670	2	M	P		1					1						1	1						V									
247	45.118334	-87.670621	11			TOO DEEP																												
248	45.118319	-87.669859	14			TOO DEEP																												
249	45.118303	-87.669097	14			TOO DEEP																												
250	45.118287	-87.668334	12			TOO DEEP																												
251	45.118272	-87.667572	10			TOO DEEP																												
252	45.118256	-87.666810	8	S	P	NO VEGETATION																												
253	45.118241	-87.666048	13			TOO DEEP																												
254	45.118194	-87.663761				NONNAVIGABLE																												
255	45.118998	-87.676697	2	M	P		1			V		1			1								1		1									
256	45.118983	-87.675935	3	M	P		3					1			2		1	1	1		1				V									
257	45.118936	-87.673648	3	M	P		1			1		1			V		1	1	1						1									
258	45.118889	-87.671361	14			TOO DEEP																												
259	45.118874	-87.670599	12			TOO DEEP																												
260	45.118858	-87.669837	12			TOO DEEP																												
261	45.118843	-87.669075	10			TOO DEEP																												
262	45.118827	-87.668312	9	S	P	NO VEGETATION																												
263	45.118812	-87.667550	8	S	P		1					1																						
264	45.118796	-87.666788	10			TOO DEEP																												
265	45.119538	-87.676675	2	M	P		1			V		1					1	1	1			1	1		1									
266	45.119476	-87.673626	3	M	P		2	V				1			1		V	1	1						V									
267	45.119445	-87.672102	13			TOO DEEP																												
268	45.119429	-87.671339	12			TOO DEEP																												
269	45.119413	-87.670577	12			TOO DEEP																												
270	45.119398	-87.669815	11			TOO DEEP																												
271	45.119382	-87.669053	10			TOO DEEP																												
272	45.119367	-87.668290	8	S	P	NO VEGETATION																												
273	45.119351	-87.667528	6	M	P		1					1																						
274	45.120093	-87.677415				NONNAVIGABLE																												
275	45.120077	-87.676653	3	M	P		2			V					1		V	1	1					1	1									
276	45.120015	-87.673604	4	S	P		1	V				V			1		1								1		V					1	
277	45.120000	-87.672842	4	S	P		1					1					V								V		V						
278	45.119984	-87.672080	12			TOO DEEP																												
279	45.119969	-87.671317	12			TOO DEEP																												
280	45.119953	-87.670555	10			TOO DEEP																												
281	45.119938	-87.669793	11			TOO DEEP																												
282	45.119922	-87.669031	2	S	P		1	V									1								V							1	
283	45.120648	-87.678156				NONNAVIGABLE																												
284	45.120633	-87.677393	2	M	P		3			1		1						1	1						1									
285	45.120571	-87.674344				NONNAVIGABLE																												
286	45.120555	-87.673582	2	S	P		1	V				1					1	V					1		V									
287	45.120539	-87.672820	12			TOO DEEP																												
288	45.120524	-87.672058	12			TOO DEEP																												

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
241	45.117686	-87.665308	11	R	P	NO VEGETATION																										
242	45.117670	-87.664545	2	S	P		1						1																			
243	45.118458	-87.676719				NONNAVIGABLE																										
244	45.118443	-87.675957	3	M	P		1				1										1				1		1			1		
245	45.118427	-87.675194				NONNAVIGABLE																										
246	45.118396	-87.673670	2	M	P		1						1								1						1			1		
247	45.118334	-87.670621	11			TOO DEEP																										
248	45.118319	-87.669859	14			TOO DEEP																										
249	45.118303	-87.669097	14			TOO DEEP																										
250	45.118287	-87.668334	12			TOO DEEP																										
251	45.118272	-87.667572	10			TOO DEEP																										
252	45.118256	-87.666810	8	S	P	NO VEGETATION																										
253	45.118241	-87.666048	13			TOO DEEP																										
254	45.118194	-87.663761				NONNAVIGABLE																										
255	45.118998	-87.676697	2	M	P		1				1																					
256	45.118983	-87.675935	3	M	P		3				1										1				1		1			1		
257	45.118936	-87.673648	3	M	P		1				V										1						1			1		
258	45.118889	-87.671361	14			TOO DEEP																										
259	45.118874	-87.670599	12			TOO DEEP																										
260	45.118858	-87.669837	12			TOO DEEP																										
261	45.118843	-87.669075	10			TOO DEEP																										
262	45.118827	-87.668312	9	S	P	NO VEGETATION																										
263	45.118812	-87.667550	8	S	P		1																									
264	45.118796	-87.666788	10			TOO DEEP																										
265	45.119538	-87.676675	2	M	P		1				1		V								1				1		1			1		
266	45.119476	-87.673626	3	M	P		2								1						1					1	1			1		
267	45.119445	-87.672102	13			TOO DEEP																										
268	45.119429	-87.671339	12			TOO DEEP																										
269	45.119413	-87.670577	12			TOO DEEP																										
270	45.119398	-87.669815	11			TOO DEEP																										
271	45.119382	-87.669053	10			TOO DEEP																										
272	45.119367	-87.668290	8	S	P	NO VEGETATION																										
273	45.119351	-87.667528	6	M	P		1		1				1													1						
274	45.120093	-87.677415				NONNAVIGABLE																										
275	45.120077	-87.676653	3	M	P		2				1		1								1				1		1			1		
276	45.120015	-87.673604	4	S	P		1						1																			
277	45.120000	-87.672842	4	S	P		1			V			V													1					1		
278	45.119984	-87.672080	12			TOO DEEP																										
279	45.119969	-87.671317	12			TOO DEEP																										
280	45.119953	-87.670555	10			TOO DEEP																										
281	45.119938	-87.669793	11			TOO DEEP																										
282	45.119922	-87.669031	2	S	P		1						1													1						
283	45.120648	-87.678156				NONNAVIGABLE																										
284	45.120633	-87.677393	2	M	P		3				1	1									1		1		1		1			1		
285	45.120571	-87.674344				NONNAVIGABLE																										
286	45.120555	-87.673582	2	S	P		1						1	1	1						V					1	V					
287	45.120539	-87.672820	12			TOO DEEP																										
288	45.120524	-87.672058	12			TOO DEEP																										

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
289	45.120508	-87.671295	11			TOO DEEP																											
290	45.120493	-87.670533	7	R	P	NO VEGETATION																											
291	45.121188	-87.678134				NONNAVIGABLE																											
292	45.121172	-87.677372	2	M	P		1			V		1			V			1	1						1							
293	45.121095	-87.673560	10			TOO DEEP																											
294	45.121079	-87.672798	11			TOO DEEP																											
295	45.121064	-87.672036	11			TOO DEEP																											
296	45.121048	-87.671273	15			TOO DEEP																											
297	45.121727	-87.678112				NONNAVIGABLE																											
298	45.121712	-87.677350	1	M	P		2					2			1		1	1	1						1							
299	45.121634	-87.673538	10			TOO DEEP																											
300	45.121619	-87.672776	10			TOO DEEP																											
301	45.121603	-87.672014	12			TOO DEEP																											
302	45.122267	-87.678090	2	M	P		2			V		1			1		1	1	1		V				V							
303	45.122205	-87.675041	4	S	P		1										1								V		V					
304	45.122190	-87.674279	9	S	P	NO VEGETATION																											
305	45.122174	-87.673516	9	S	P	NO VEGETATION																											
306	45.122158	-87.672754	11	S	P	NO VEGETATION																											
307	45.122143	-87.671992	10			TOO DEEP																											
308	45.122822	-87.678830	3	M	P		2			V		1			1		V	1	1				1	V	1							
309	45.122807	-87.678068				NONNAVIGABLE																											
310	45.122745	-87.675019	5	S	P		1					1													V							
311	45.122729	-87.674257	7	S	P	NO VEGETATION																										V	
312	45.122714	-87.673494	9	S	P	NO VEGETATION																											
313	45.122698	-87.672732	13			TOO DEEP																											
314	45.122683	-87.671970	3	S	P		1	1							1		V	1	1		1				V							
315	45.122667	-87.671208	6	S	P		1																									
316	45.123362	-87.678808	3	M	P		1			V		1					V	1	1					V	V		V					
317	45.123300	-87.675759	10			TOO DEEP																											
318	45.123284	-87.674997	7	S	P	NO VEGETATION																											
319	45.123269	-87.674235	8	S	P	NO VEGETATION																											
320	45.123253	-87.673472	10			TOO DEEP																											
321	45.123238	-87.672710	10			TOO DEEP																											
322	45.123222	-87.671948	7	S	P		1					1			1																	
323	45.123207	-87.671186	1	S	P		1		V			V					1	1	1						1							
324	45.123902	-87.678787	3	M	P		3								1			1	1					V	V							
325	45.123840	-87.675737	2	S	P		3	1				1			2		1				1				V						1	
326	45.123824	-87.674975	7	S	P	NO VEGETATION																											
327	45.123808	-87.674213	9	S	P	NO VEGETATION																											
328	45.123793	-87.673451	10			TOO DEEP																											
329	45.123777	-87.672688	7	R	P	NO VEGETATION																											
330	45.123762	-87.671926	7	S	P	NO VEGETATION																											
331	45.124441	-87.678765	3	M	P		2					1			1		V	1	1					V	V							
332	45.124426	-87.678002	3	M	P		2					1						1	1				1	1	V	V							
333	45.124379	-87.675715	3	S	P		1								1		1								1							
334	45.124364	-87.674953	7	S	P	NO VEGETATION																											
335	45.124348	-87.674191	10	S	P	NO VEGETATION																											
336	45.124333	-87.673429	10	S	P	NO VEGETATION																											

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
289	45.120508	-87.671295	11			TOO DEEP																										
290	45.120493	-87.670533	7	R	P	NO VEGETATION																										
291	45.121188	-87.678134				NONNAVIGABLE																										
292	45.121172	-87.677372	2	M	P		1													1						1				1		
293	45.121095	-87.673560	10			TOO DEEP																										
294	45.121079	-87.672798	11			TOO DEEP																										
295	45.121064	-87.672036	11			TOO DEEP																										
296	45.121048	-87.671273	15			TOO DEEP																										
297	45.121727	-87.678112				NONNAVIGABLE																										
298	45.121712	-87.677350	1	M	P		2				1									1						1				1		
299	45.121634	-87.673538	10			TOO DEEP																										
300	45.121619	-87.672776	10			TOO DEEP																										
301	45.121603	-87.672014	12			TOO DEEP																										
302	45.122267	-87.678090	2	M	P		2					1	1							1						1				1		
303	45.122205	-87.675041	4	S	P		1			V			1												1							
304	45.122190	-87.674279	9	S	P	NO VEGETATION																										
305	45.122174	-87.673516	9	S	P	NO VEGETATION																										
306	45.122158	-87.672754	11	S	P	NO VEGETATION																										
307	45.122143	-87.671992	10			TOO DEEP																										
308	45.122822	-87.678830	3	M	P		2				1									1				1		1				1		
309	45.122807	-87.678068				NONNAVIGABLE																										
310	45.122745	-87.675019	5	S	P		1						V															V				
311	45.122729	-87.674257	7	S	P	NO VEGETATION																										
312	45.122714	-87.673494	9	S	P	NO VEGETATION																										
313	45.122698	-87.672732	13			TOO DEEP																										
314	45.122683	-87.671970	3	S	P		1						V							1					1	1				1		
315	45.122667	-87.671208	6	S	P		1																		1							
316	45.123362	-87.678808	3	M	P		1		1		1		1							1						1				1		
317	45.123300	-87.675759	10			TOO DEEP																										
318	45.123284	-87.674997	7	S	P	NO VEGETATION																										
319	45.123269	-87.674235	8	S	P	NO VEGETATION																										
320	45.123253	-87.673472	10			TOO DEEP																										
321	45.123238	-87.672710	10			TOO DEEP																										
322	45.123222	-87.671948	7	S	P		1						1																			
323	45.123207	-87.671186	1	S	P		1						1			1				1					1	1				1		
324	45.123902	-87.678787	3	M	P		3				1		2							1						1				1		
325	45.123840	-87.675737	2	S	P		3								1					1					1							
326	45.123824	-87.674975	7	S	P	NO VEGETATION																										
327	45.123808	-87.674213	9	S	P	NO VEGETATION																										
328	45.123793	-87.673451	10			TOO DEEP																										
329	45.123777	-87.672688	7	R	P	NO VEGETATION																										
330	45.123762	-87.671926	7	S	P	NO VEGETATION																										
331	45.124441	-87.678765	3	M	P		2		1		1		1							1						1				1		
332	45.124426	-87.678002	3	M	P		2				1	1	1	1						1				1		1				1		
333	45.124379	-87.675715	3	S	P		1																		1							
334	45.124364	-87.674953	7	S	P	NO VEGETATION																										
335	45.124348	-87.674191	10	S	P	NO VEGETATION																										
336	45.124333	-87.673429	10	S	P	NO VEGETATION																										

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
337	45.124317	-87.672666	5	R	P	NO VEGETATION																											
338	45.124965	-87.677980	3	M	P		3		1			1			1			1	1						V		V						
339	45.124919	-87.675694	6	S	P		1								1																		
340	45.124903	-87.674931	10	S	P	NO VEGETATION																											
341	45.124888	-87.674169	11	S	P	NO VEGETATION																											
342	45.124872	-87.673407	12	S	P	NO VEGETATION																											
343	45.124857	-87.672644	4	M	P		1																										
344	45.125505	-87.677959	2	M	P		2			1		1			2		1	1	1					V	1								
345	45.125490	-87.677196	3	M	P		3					1			2			1	1						V								
346	45.125474	-87.676434	2	M	P		2					1			2			1	1						V							1	
347	45.125459	-87.675672	10	S	P	NO VEGETATION																											
348	45.125443	-87.674909	13	S	P	NO VEGETATION																											
349	45.125427	-87.674147	11	S	P	NO VEGETATION																											
350	45.125412	-87.673385	13	S	P	NO VEGETATION																											
351	45.126029	-87.677174				NONNAVIGABLE																											
352	45.125998	-87.675650	14			TOO DEEP																											
353	45.125983	-87.674887	13			TOO DEEP																											
354	45.125967	-87.674125	12	S	P	NO VEGETATION																											
355	45.125952	-87.673363	10	S	P	NO VEGETATION																											
356	45.126538	-87.675628	16	S	P	NO VEGETATION																											
357	45.126522	-87.674865	10	S	P	NO VEGETATION																											
358	45.126507	-87.674103	2	S	P		1	V				1			1																		
359	45.126491	-87.673341	14	R	P	NO VEGETATION																											
360	45.127093	-87.676368	12	R	P	NO VEGETATION																											
361	45.127077	-87.675606	14			TOO DEEP																											
362	45.127062	-87.674843	8	S	P	NO VEGETATION																											
363	45.127046	-87.674081	1	M	P		2								1			1	1		1			V	1								
364	45.127031	-87.673319	9	S	P	NO VEGETATION																											
365	45.127015	-87.672557	2	S	P		1								1			1	1		1				V		V						
366	45.127633	-87.676346	17			TOO DEEP																											
367	45.127617	-87.675584	13			TOO DEEP																											
368	45.127602	-87.674822	3	S	P		1					1																					
369	45.127586	-87.674059	1	M	P		1	V							1			1	1					V	V				V				
370	45.127571	-87.673297	8	S	P		1					1																					
371	45.128188	-87.677087	15			TOO DEEP																											
372	45.128172	-87.676324	15			TOO DEEP																											
373	45.128157	-87.675562	8	S	P	NO VEGETATION																											
374	45.128141	-87.674800	1	M	P		1					1			1			1	1					V	V								
375	45.128126	-87.674037	1	M	P		1					1			1			1	1					V	V								
376	45.128110	-87.673275	10			TOO DEEP												V	V						V		V						
377	45.128095	-87.672513	4	M	P		1	V				1			1		V	1	1						V				1				
378	45.128743	-87.677827	16			TOO DEEP																											
379	45.128727	-87.677065	18	S		NO VEGETATION																											
380	45.128712	-87.676302	9	S	P	NO VEGETATION																											
381	45.128681	-87.674778	1	M	P		2								2			1	1						V								
382	45.128665	-87.674015	2	M	P		2					1			1			1	1		1				V								
383	45.128650	-87.673253	6	M	P		1					1																					
384	45.128634	-87.672491	7	M	P	NO VEGETATION		V																									

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
337	45.124317	-87.672666	5	R	P	NO VEGETATION																										
338	45.124965	-87.677980	3	M	P		3				V	1	2							1						1				1			
339	45.124919	-87.675694	6	S	P		1																		1							
340	45.124903	-87.674931	10	S	P	NO VEGETATION																										
341	45.124888	-87.674169	11	S	P	NO VEGETATION																										
342	45.124872	-87.673407	12	S	P	NO VEGETATION																										
343	45.124857	-87.672644	4	M	P		1													1					1							
344	45.125505	-87.677959	2	M	P		2				1				1					1			1		1	1				1		
345	45.125490	-87.677196	3	M	P		3						1							1						1				1		
346	45.125474	-87.676434	2	M	P		2						1							1					1	1				1		
347	45.125459	-87.675672	10	S	P	NO VEGETATION																										
348	45.125443	-87.674909	13	S	P	NO VEGETATION																										
349	45.125427	-87.674147	11	S	P	NO VEGETATION																										
350	45.125412	-87.673385	13	S	P	NO VEGETATION																										
351	45.126029	-87.677174				NONNAVIGABLE																										
352	45.125998	-87.675650	14			TOO DEEP																										
353	45.125983	-87.674887	13			TOO DEEP																										
354	45.125967	-87.674125	12	S	P	NO VEGETATION																										
355	45.125952	-87.673363	10	S	P	NO VEGETATION																										
356	45.126538	-87.675628	16	S	P	NO VEGETATION																										
357	45.126522	-87.674865	10	S	P	NO VEGETATION																										
358	45.126507	-87.674103	2	S	P		1					1													1							
359	45.126491	-87.673341	14	R	P	NO VEGETATION																										
360	45.127093	-87.676368	12	R	P	NO VEGETATION																										
361	45.127077	-87.675606	14			TOO DEEP																										
362	45.127062	-87.674843	8	S	P	NO VEGETATION																										
363	45.127046	-87.674081	1	M	P		2					2	1	1		1				1	1				1	1				1		
364	45.127031	-87.673319	9	S	P	NO VEGETATION																										
365	45.127015	-87.672557	2	S	P		1					1	1							1					1	1		1		1		
366	45.127633	-87.676346	17			TOO DEEP																										
367	45.127617	-87.675584	13			TOO DEEP																										
368	45.127602	-87.674822	3	S	P		1																									
369	45.127586	-87.674059	1	M	P		1					1	V							1	1				1	1				1		
370	45.127571	-87.673297	8	S	P		1																									
371	45.128188	-87.677087	15			TOO DEEP																										
372	45.128172	-87.676324	15			TOO DEEP																										
373	45.128157	-87.675562	8	S	P	NO VEGETATION																										
374	45.128141	-87.674800	1	M	P		1					1	1		1					1						1				1		
375	45.128126	-87.674037	1	M	P		1						1							1						1				1		
376	45.128110	-87.673275	10			TOO DEEP				V			V							V					V	V				V		
377	45.128095	-87.672513	4	M	P		1					1	1							1					1	1				1		
378	45.128743	-87.677827	16			TOO DEEP																										
379	45.128727	-87.677065	18	S		NO VEGETATION																										
380	45.128712	-87.676302	9	S	P	NO VEGETATION																										
381	45.128681	-87.674778	1	M	P		2					1	1	1	1					1						1				1		
382	45.128665	-87.674015	2	M	P		2					1		1	1					1						1				1		
383	45.128650	-87.673253	6	M	P		1						1							V												
384	45.128634	-87.672491	7	M	P	NO VEGETATION																										

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
385	45.128619	-87.671728	10			TOO DEEP																												
386	45.129298	-87.678568	14			TOO DEEP																												
387	45.129283	-87.677805	16			TOO DEEP																												
388	45.129267	-87.677043	10	S	P	NO VEGETATION																												
389	45.129236	-87.675518	3	M	P		2					2					1	1	1					V	V		1							
390	45.129221	-87.674756	3	M	P		2	1				1			1		1	1	1					V	V		V							
391	45.129205	-87.673993	3	M	P		3					3			1		1	1	1								V							
392	45.129190	-87.673231	4	M	P		2					2					V	1	1						V		V							
393	45.129158	-87.671706	1	R	P		1										V	1	1						V									
394	45.129143	-87.670944	9	M	P	NO VEGETATION																												
395	45.129853	-87.679308	4	R	P		1																		V									
396	45.129838	-87.678546	15			TOO DEEP																												
397	45.129822	-87.677783	13			TOO DEEP																												
398	45.129807	-87.677021	2	S	P		1																											
399	45.129791	-87.676259	1	M	P		1					1						1	1						V									
400	45.129776	-87.675496	4	M	P		1	V				1													V		V							
401	45.129760	-87.674734	4	M	P		1	V	1			1			1		1	1	1						V									
402	45.129745	-87.673971	4	M	P		3					3					1	1	1								1							
403	45.129683	-87.670922	3	M	P		1					1			1			1	1						V							1		
404	45.130393	-87.679286	7	M	P	NO VEGETATION																												
405	45.130377	-87.678524	15			TOO DEEP																												
406	45.130362	-87.677761	14			TOO DEEP																												
407	45.130331	-87.676237	3	M	P		2					2						1	1						1									
408	45.130315	-87.675474	3	M	P		1					1			1		1	1	1						V									
409	45.130300	-87.674712	4	M	P		3					3			V			1	1															
410	45.130284	-87.673949	4	M	P		2					2						1	1								1							
411	45.130222	-87.670900	1	M	P		1					1			1			1	1					V	V									
412	45.130207	-87.670138	8	M	P		1					1																						
413	45.130933	-87.679264	8	S	P	NO VEGETATION																												
414	45.130917	-87.678502	14			TOO DEEP																												
415	45.130902	-87.677739	18			TOO DEEP																												
416	45.130871	-87.676215	2	M	P		2					2			1			1	1					V	V									
417	45.130855	-87.675452	3	M	P		3					2						1	1					1	V									
418	45.130840	-87.674690	4	M	P		3					3			1			1	1					V	V		V							
419	45.130824	-87.673928	5	M	P		1								1			1							V									
420	45.130762	-87.670878	4	M	P		1					1			1		1	1	1		1				V									
421	45.130746	-87.670116	3	M	P		1					1			1		1	1	1					V	V									
422	45.131472	-87.679242	4	R	P		1										1				1													
423	45.131457	-87.678480	14			TOO DEEP																												
424	45.131441	-87.677718	16			TOO DEEP																												
425	45.131379	-87.674668	4	M	P		1					1						1	1															
426	45.131317	-87.671618	1	S	P		1					1			1		1	1	1						V									
427	45.131302	-87.670856	3	M	P		2					2						1	1					V	V									
428	45.131286	-87.670094	3	M	P		1					1			1		V	1	1						V									
429	45.132012	-87.679220	4	M	P		1					1			1																			
430	45.131996	-87.678458	7	S	P	NO VEGETATION																												
431	45.131981	-87.677696	15			TOO DEEP																												
432	45.131826	-87.670072	3	M	P		2					2						1	1															

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
385	45.128619	-87.671728	10			TOO DEEP																										
386	45.129298	-87.678568	14			TOO DEEP																										
387	45.129283	-87.677805	16			TOO DEEP																										
388	45.129267	-87.677043	10	S	P	NO VEGETATION																										
389	45.129236	-87.675518	3	M	P		2							1						1						1				1		
390	45.129221	-87.674756	3	M	P		2													1						1				1		
391	45.129205	-87.673993	3	M	P		3													1						1				1		
392	45.129190	-87.673231	4	M	P		2						1							1						1				1		
393	45.129158	-87.671706	1	R	P		1					1		1						1					1	1				1		
394	45.129143	-87.670944	9	M	P	NO VEGETATION																										
395	45.129853	-87.679308	4	R	P		1						1																			
396	45.129838	-87.678546	15			TOO DEEP																										
397	45.129822	-87.677783	13			TOO DEEP																										
398	45.129807	-87.677021	2	S	P		1																			1				1		
399	45.129791	-87.676259	1	M	P		1													1							1			1		
400	45.129776	-87.675496	4	M	P		1																							1		
401	45.129760	-87.674734	4	M	P		1													1							1			1		
402	45.129745	-87.673971	4	M	P		3													1							1			1		
403	45.129683	-87.670922	3	M	P		1					1								1							1			1		
404	45.130393	-87.679286	7	M	P	NO VEGETATION																										
405	45.130377	-87.678524	15			TOO DEEP																										
406	45.130362	-87.677761	14			TOO DEEP																										
407	45.130331	-87.676237	3	M	P		2													1							1			1		
408	45.130315	-87.675474	3	M	P		1						1							1							1			1		
409	45.130300	-87.674712	4	M	P		3						1							1							1			1		
410	45.130284	-87.673949	4	M	P		2						1							1							1			1		
411	45.130222	-87.670900	1	M	P		1						1							1							1		1	1		
412	45.130207	-87.670138	8	M	P		1																						1			
413	45.130933	-87.679264	8	S	P	NO VEGETATION																										
414	45.130917	-87.678502	14			TOO DEEP																										
415	45.130902	-87.677739	18			TOO DEEP																										
416	45.130871	-87.676215	2	M	P		2					1	1			1				1							1			1		
417	45.130855	-87.675452	3	M	P		3						1							1							1			1		
418	45.130840	-87.674690	4	M	P		3						1							1							1			1		
419	45.130824	-87.673928	5	M	P		1						1							1							1			1		
420	45.130762	-87.670878	4	M	P		1						1							1							1			1		
421	45.130746	-87.670116	3	M	P		1						1							1	V						1			1		
422	45.131472	-87.679242	4	R	P		1						1													1						
423	45.131457	-87.678480	14			TOO DEEP																										
424	45.131441	-87.677718	16			TOO DEEP																										
425	45.131379	-87.674668	4	M	P		1						1							1							1			1		
426	45.131317	-87.671618	1	S	P		1						1							1							1			1		
427	45.131302	-87.670856	3	M	P		2						1							1							1			1		
428	45.131286	-87.670094	3	M	P		1						1							1							1			1		
429	45.132012	-87.679220	4	M	P		1						1													1						
430	45.131996	-87.678458	7	S	P	NO VEGETATION																										
431	45.131981	-87.677696	15			TOO DEEP																										
432	45.131826	-87.670072	3	M	P		2						1							1							1			1		

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
433	45.131810	-87.669309	4	S	P		1	V				1			V		V	V	1						V		V	V						
434	45.132552	-87.679199	2	M	P		1					1			V		1	V	1						V									
435	45.132536	-87.678436	2	S	P		1	V				1												V			V						V	
436	45.132521	-87.677674	14			TOO DEEP																												
437	45.132505	-87.676911	11			TOO DEEP																												
438	45.132365	-87.670050	5	M	P		3					3						1	1															
439	45.133091	-87.679177				NONNAVIGABLE																												
440	45.133076	-87.678414				NONNAVIGABLE																												
441	45.133060	-87.677652	9	S	P	NO VEGETATION																												
442	45.133045	-87.676889	14			TOO DEEP																												
443	45.133029	-87.676127	13			TOO DEEP																												
444	45.132905	-87.670028	4	M	P		3					3						1	1							V								
445	45.132874	-87.668503				NONNAVIGABLE																												
446	45.133615	-87.678392	3	M	P		1					1					1									V		V		1				
447	45.133584	-87.676867	13			TOO DEEP																												
448	45.133569	-87.676105	15			TOO DEEP																												
449	45.133460	-87.670768	2	M	P		1					1			1			1	1							1		1						
450	45.133445	-87.670006	3	M	P		2			1		1			1		1									V						1		
451	45.133413	-87.668481	3	M	P		1					1			1			1	1				1	V	V								
452	45.134124	-87.676846	17			TOO DEEP																												
453	45.134109	-87.676083	14			TOO DEEP																												
454	45.134093	-87.675321	7	R	P		1					1																						
455	45.134015	-87.671509				NO INFORMATION																												
456	45.134000	-87.670746	2	M	P		1											1	1		1			V	V								
457	45.133984	-87.669984				NONNAVIGABLE																												
458	45.133953	-87.668459	2	M	P		1					1			1			1	1				1	1										
459	45.133938	-87.667696	4	M	P		1											1	1															
460	45.134679	-87.677586	3	S	P		1																			V								
461	45.134664	-87.676824	15			TOO DEEP																												
462	45.134648	-87.676061	12			TOO DEEP																												
463	45.134633	-87.675299	6	M	P	NO VEGETATION																												
464	45.134555	-87.671487				NONNAVIGABLE																												
465	45.134539	-87.670724				NONNAVIGABLE																												
466	45.134524	-87.669962				NONNAVIGABLE																												
467	45.134477	-87.667674	2	M	P		2								1			1																
468	45.135219	-87.677564	12	R	P	NO VEGETATION																												
469	45.135203	-87.676802	12			TOO DEEP																												
470	45.135188	-87.676039	12			TOO DEEP																												
471	45.135172	-87.675277	4	S	P		1					1																						
472	45.135141	-87.673752				NONNAVIGABLE																												
473	45.135126	-87.672990				NONNAVIGABLE																												
474	45.135095	-87.671465				NONNAVIGABLE																												
475	45.135079	-87.670702				NONNAVIGABLE																												
476	45.135017	-87.667652	2	M	P		2					1			1			1	1							V								
477	45.135774	-87.678305	5	R	P	NO VEGETATION																												
478	45.135759	-87.677542	10	S	P	NO VEGETATION																												
479	45.135743	-87.676780	11			TOO DEEP																												
480	45.135728	-87.676017	9	S	P	NO VEGETATION																												

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
433	45.131810	-87.669309	4	S	P		1			V			V							V						V			1			
434	45.132552	-87.679199	2	M	P		1						1							1						1			V			
435	45.132536	-87.678436	2	S	P		1						1												1							
436	45.132521	-87.677674	14			TOO DEEP																										
437	45.132505	-87.676911	11			TOO DEEP																										
438	45.132365	-87.670050	5	M	P		3													1						1			1			
439	45.133091	-87.679177				NONNAVIGABLE																										
440	45.133076	-87.678414				NONNAVIGABLE																										
441	45.133060	-87.677652	9	S	P	NO VEGETATION																										
442	45.133045	-87.676889	14			TOO DEEP																										
443	45.133029	-87.676127	13			TOO DEEP																										
444	45.132905	-87.670028	4	M	P		3						1	1						1						1			1			
445	45.132874	-87.668503				NONNAVIGABLE																										
446	45.133615	-87.678392	3	M	P		1						1												1							
447	45.133584	-87.676867	13			TOO DEEP																										
448	45.133569	-87.676105	15			TOO DEEP																										
449	45.133460	-87.670768	2	M	P		1					1								1						1			1			
450	45.133445	-87.670006	3	M	P		2				1																			1		
451	45.133413	-87.668481	3	M	P		1						1							1					1	1			1			
452	45.134124	-87.676846	17			TOO DEEP																										
453	45.134109	-87.676083	14			TOO DEEP																										
454	45.134093	-87.675321	7	R	P		1						1																			
455	45.134015	-87.671509				NO INFORMATION																										
456	45.134000	-87.670746	2	M	P		1													1						1			1			
457	45.133984	-87.669984				NONNAVIGABLE																										
458	45.133953	-87.668459	2	M	P		1							1						1						1			1			
459	45.133938	-87.667696	4	M	P		1						1																1			
460	45.134679	-87.677586	3	S	P		1						1												1							
461	45.134664	-87.676824	15			TOO DEEP																										
462	45.134648	-87.676061	12			TOO DEEP																										
463	45.134633	-87.675299	6	M	P	NO VEGETATION																										
464	45.134555	-87.671487				NONNAVIGABLE																										
465	45.134539	-87.670724				NONNAVIGABLE																										
466	45.134524	-87.669962				NONNAVIGABLE																										
467	45.134477	-87.667674	2	M	P		2													1						1						
468	45.135219	-87.677564	12	R	P	NO VEGETATION																										
469	45.135203	-87.676802	12			TOO DEEP																										
470	45.135188	-87.676039	12			TOO DEEP																										
471	45.135172	-87.675277	4	S	P		1																		1							
472	45.135141	-87.673752				NONNAVIGABLE																										
473	45.135126	-87.672990				NONNAVIGABLE																										
474	45.135095	-87.671465				NONNAVIGABLE																										
475	45.135079	-87.670702				NONNAVIGABLE																										
476	45.135017	-87.667652	2	M	P		2													1						1			2			
477	45.135774	-87.678305	5	R	P	NO VEGETATION																										
478	45.135759	-87.677542	10	S	P	NO VEGETATION																										
479	45.135743	-87.676780	11			TOO DEEP																										
480	45.135728	-87.676017	9	S	P	NO VEGETATION																										

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
481	45.135712	-87.675255	6	M	P	NO VEGETATION																												
482	45.135681	-87.673730				NONNAVIGABLE																												
483	45.135556	-87.667630	1	M	P		2											1	1															
484	45.136329	-87.679045	4	R	P		1					1																						
485	45.136314	-87.678283	8	S	P	NO VEGETATION																												
486	45.136298	-87.677520	11			TOO DEEP																												
487	45.136283	-87.676758	11			TOO DEEP																												
488	45.136267	-87.675995	7	S	P	NO VEGETATION																												
489	45.136252	-87.675233	2	M	P		3	V				1														V		V				1		1
490	45.136236	-87.674470				NONNAVIGABLE																												
491	45.136884	-87.679786	6	M	P	NO VEGETATION																												
492	45.136869	-87.679023	6	S	P	NO VEGETATION																												
493	45.136853	-87.678261	11			TOO DEEP																												
494	45.136838	-87.677498	11			TOO DEEP																												
495	45.136822	-87.676736	8	S	P	NO VEGETATION																												
496	45.136807	-87.675973	2	S	P		1								1																			
497	45.136791	-87.675211				NONNAVIGABLE																												
498	45.137455	-87.681289	3	M	P		2					2														V								V
499	45.137440	-87.680526	3	S	P		1	V									1									1								
500	45.137424	-87.679764	5	S	P		1																											
501	45.137409	-87.679001	9	S	P	NO VEGETATION																												
502	45.137393	-87.678239	12			TOO DEEP																												
503	45.137378	-87.677476	9	S	P	NO VEGETATION																												
504	45.137362	-87.676714	5	S	P		1					1			1		1																	
505	45.137347	-87.675952				NONNAVIGABLE																												
506	45.137331	-87.675189				NONNAVIGABLE																												
507	45.137995	-87.681267	3	M	P		2					1					1	1										1						
508	45.137979	-87.680504	5	S	P		1										1																	V
509	45.137964	-87.679742	7	S	P		1																											
510	45.137948	-87.678980	12			TOO DEEP																												
511	45.137933	-87.678217	12			TOO DEEP																												
512	45.137917	-87.677455	5	S	P		1																											
513	45.137886	-87.675930				NONNAVIGABLE																												
514	45.138534	-87.681245	5	S	P		1					1					V																	V
515	45.138519	-87.680483	7	S	P	NO VEGETATION																												
516	45.138503	-87.679720	11			TOO DEEP																												
517	45.138488	-87.678958	13			TOO DEEP																												
518	45.138472	-87.678195	5	R	P	NO VEGETATION																												
519	45.139074	-87.681223	7	S	P	NO VEGETATION																												
520	45.139059	-87.680461	9	S	P	NO VEGETATION																												
521	45.139043	-87.679698	15			TOO DEEP																												
522	45.139028	-87.678936	13			TOO DEEP																												
523	45.139629	-87.681964	5	S	P		1										1																	
524	45.139614	-87.681201	8	S	P	NO VEGETATION																												
525	45.139598	-87.680439	13			TOO DEEP																												
526	45.139583	-87.679676	12			TOO DEEP																												
527	45.140169	-87.681942	6	S	P		1										1															1		
528	45.140153	-87.681179	12			TOO DEEP																												

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
481	45.135712	-87.675255	6	M	P	NO VEGETATION																										
482	45.135681	-87.673730				NONNAVIGABLE																										
483	45.135556	-87.667630	1	M	P		2													1						1			2			
484	45.136329	-87.679045	4	R	P		1																		1							
485	45.136314	-87.678283	8	S	P	NO VEGETATION																										
486	45.136298	-87.677520	11			TOO DEEP																										
487	45.136283	-87.676758	11			TOO DEEP																										
488	45.136267	-87.675995	7	S	P	NO VEGETATION																										
489	45.136252	-87.675233	2	M	P		3					1	1												1							
490	45.136236	-87.674470				NONNAVIGABLE																										
491	45.136884	-87.679786	6	M	P	NO VEGETATION																										
492	45.136869	-87.679023	6	S	P	NO VEGETATION																										
493	45.136853	-87.678261	11			TOO DEEP																										
494	45.136838	-87.677498	11			TOO DEEP																										
495	45.136822	-87.676736	8	S	P	NO VEGETATION																										
496	45.136807	-87.675973	2	S	P		1						1												1							
497	45.136791	-87.675211				NONNAVIGABLE																										
498	45.137455	-87.681289	3	M	P		2						1																			
499	45.137440	-87.680526	3	S	P		1						1																			
500	45.137424	-87.679764	5	S	P		1						1																			
501	45.137409	-87.679001	9	S	P	NO VEGETATION																										
502	45.137393	-87.678239	12			TOO DEEP																										
503	45.137378	-87.677476	9	S	P	NO VEGETATION																										
504	45.137362	-87.676714	5	S	P		1						1																			
505	45.137347	-87.675952				NONNAVIGABLE																										
506	45.137331	-87.675189				NONNAVIGABLE																										
507	45.137995	-87.681267	3	M	P		2						1							1					1							
508	45.137979	-87.680504	5	S	P		1						1								1											
509	45.137964	-87.679742	7	S	P		1																		1							1
510	45.137948	-87.678980	12			TOO DEEP																										
511	45.137933	-87.678217	12			TOO DEEP																										
512	45.137917	-87.677455	5	S	P		1			1			1												1							
513	45.137886	-87.675930				NONNAVIGABLE																										
514	45.138534	-87.681245	5	S	P		1																		1							
515	45.138519	-87.680483	7	S	P	NO VEGETATION																										
516	45.138503	-87.679720	11			TOO DEEP																										
517	45.138488	-87.678958	13			TOO DEEP																										
518	45.138472	-87.678195	5	R	P	NO VEGETATION																										
519	45.139074	-87.681223	7	S	P	NO VEGETATION																										
520	45.139059	-87.680461	9	S	P	NO VEGETATION																										
521	45.139043	-87.679698	15			TOO DEEP																										
522	45.139028	-87.678936	13			TOO DEEP																										
523	45.139629	-87.681964	5	S	P		1																		1							
524	45.139614	-87.681201	8	S	P	NO VEGETATION																										
525	45.139598	-87.680439	13			TOO DEEP																										
526	45.139583	-87.679676	12			TOO DEEP																										
527	45.140169	-87.681942	6	S	P		1																									
528	45.140153	-87.681179	12			TOO DEEP																										

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
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Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
529	45.140138	-87.680417	12			TOO DEEP																												
530	45.140122	-87.679654	11			TOO DEEP																												
531	45.140724	-87.682683	6	S	P	NO VEGETATION																												
532	45.140708	-87.681920	8	S	P	NO VEGETATION																												
533	45.140693	-87.681158	11			TOO DEEP																												
534	45.140678	-87.680395	12			TOO DEEP																												
535	45.141264	-87.682661	7	S	P	NO VEGETATION																												
536	45.141248	-87.681898	8	S	P	NO VEGETATION																												
537	45.141233	-87.681136	12			TOO DEEP																												
538	45.141217	-87.680373	11			TOO DEEP																												
539	45.141202	-87.679611				NONNAVIGABLE																												
540	45.141803	-87.682639	8	S	P	NO VEGETATION																												
541	45.141788	-87.681876	10			TOO DEEP																												
542	45.141772	-87.681114	11			TOO DEEP																												
543	45.141757	-87.680351	3	S	P		1					1			V										V								
544	45.142358	-87.683379	8	S	P	NO VEGETATION																												
545	45.142343	-87.682617	8	S	P	NO VEGETATION																												
546	45.142327	-87.681854	10	S	P	NO VEGETATION																												
547	45.142312	-87.681092	12			TOO DEEP																												
548	45.142914	-87.684120	7	S	P		1																										1	
549	45.142898	-87.683358	7	S	P	NO VEGETATION																												
550	45.142883	-87.682595	10			TOO DEEP																												
551	45.142867	-87.681833	9	S	P	NO VEGETATION																												
552	45.142852	-87.681070	2	R	P	NO VEGETATION						V			V		V								V								
553	45.143469	-87.684861	9	S	P	NO VEGETATION																												
554	45.143453	-87.684098	8	S	P	NO VEGETATION																												
555	45.143438	-87.683336	9	S	P	NO VEGETATION																												
556	45.143422	-87.682573	8	S	P	NO VEGETATION																												
557	45.143407	-87.681811	5	R	P		1																											
558	45.143391	-87.681048	3	M	P		3					3					1	1	1					V	V								
559	45.144024	-87.685602	9	S	P	NO VEGETATION																												
560	45.144008	-87.684839	9	S	P	NO VEGETATION																												
561	45.143993	-87.684076	8	S	P	NO VEGETATION																												
562	45.143977	-87.683314	10	R	P		1																											
563	45.143962	-87.682551	6	S	P		1																											
564	45.144579	-87.686342	4	S	P		1																											
565	45.144563	-87.685580	11			TOO DEEP																												
566	45.144548	-87.684817	9	S	P	NO VEGETATION																												
567	45.144533	-87.684055	9	S	P		1																											
568	45.144517	-87.683292	6	S	P		1																											
569	45.144502	-87.682529	4	S	P		1					1					1								V								
570	45.145134	-87.687083	6	R	P	NO VEGETATION																												
571	45.145119	-87.686320	12			TOO DEEP																												
572	45.145103	-87.685558	12			TOO DEEP																												
573	45.145088	-87.684795	7	S	P	NO VEGETATION																												
574	45.145072	-87.684033	7	S	P	NO VEGETATION																												
575	45.145057	-87.683270	4	S	P		1																											
576	45.145689	-87.687824	7	R	P	NO VEGETATION																												

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
529	45.140138	-87.680417	12			TOO DEEP																										
530	45.140122	-87.679654	11			TOO DEEP																										
531	45.140724	-87.682683	6	S	P	NO VEGETATION																										
532	45.140708	-87.681920	8	S	P	NO VEGETATION																										
533	45.140693	-87.681158	11			TOO DEEP																										
534	45.140678	-87.680395	12			TOO DEEP																										
535	45.141264	-87.682661	7	S	P	NO VEGETATION																										
536	45.141248	-87.681898	8	S	P	NO VEGETATION																										
537	45.141233	-87.681136	12			TOO DEEP																										
538	45.141217	-87.680373	11			TOO DEEP																										
539	45.141202	-87.679611				NONNAVIGABLE																										
540	45.141803	-87.682639	8	S	P	NO VEGETATION																										
541	45.141788	-87.681876	10			TOO DEEP																										
542	45.141772	-87.681114	11			TOO DEEP																										
543	45.141757	-87.680351	3	S	P		1			V			1									V				1						
544	45.142358	-87.683379	8	S	P	NO VEGETATION																										
545	45.142343	-87.682617	8	S	P	NO VEGETATION																										
546	45.142327	-87.681854	10	S	P	NO VEGETATION																										
547	45.142312	-87.681092	12			TOO DEEP																										
548	45.142914	-87.684120	7	S	P		1																									
549	45.142898	-87.683358	7	S	P	NO VEGETATION																										
550	45.142883	-87.682595	10			TOO DEEP																										
551	45.142867	-87.681833	9	S	P	NO VEGETATION																										
552	45.142852	-87.681070	2	R	P	NO VEGETATION																V										
553	45.143469	-87.684861	9	S	P	NO VEGETATION																										
554	45.143453	-87.684098	8	S	P	NO VEGETATION																										
555	45.143438	-87.683336	9	S	P	NO VEGETATION																										
556	45.143422	-87.682573	8	S	P	NO VEGETATION																										
557	45.143407	-87.681811	5	R	P		1																			1						
558	45.143391	-87.681048	3	M	P		3														1						1			1		
559	45.144024	-87.685602	9	S	P	NO VEGETATION																										
560	45.144008	-87.684839	9	S	P	NO VEGETATION																										
561	45.143993	-87.684076	8	S	P	NO VEGETATION																										
562	45.143977	-87.683314	10	R	P		1																						1			
563	45.143962	-87.682551	6	S	P		1																			1						
564	45.144579	-87.686342	4	S	P		1																			1						
565	45.144563	-87.685580	11			TOO DEEP																										
566	45.144548	-87.684817	9	S	P	NO VEGETATION																										
567	45.144533	-87.684055	9	S	P		1																						1			
568	45.144517	-87.683292	6	S	P		1																			1						
569	45.144502	-87.682529	4	S	P		1						1									V				1						
570	45.145134	-87.687083	6	R	P	NO VEGETATION																										
571	45.145119	-87.686320	12			TOO DEEP																										
572	45.145103	-87.685558	12			TOO DEEP																										
573	45.145088	-87.684795	7	S	P	NO VEGETATION																										
574	45.145072	-87.684033	7	S	P	NO VEGETATION																										
575	45.145057	-87.683270	4	S	P		1						1													1						
576	45.145689	-87.687824	7	R	P	NO VEGETATION																										

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
577	45.145674	-87.687061	12			TOO DEEP																												
578	45.145658	-87.686299	11			TOO DEEP																												
579	45.145643	-87.685536	6	M	P	NO VEGETATION																												
580	45.145627	-87.684773	8	S	P	NO VEGETATION																												
581	45.145612	-87.684011	5	M	P		1										1																
582	45.146244	-87.688565	14			TOO DEEP																												
583	45.146229	-87.687802	12			TOO DEEP																												
584	45.146213	-87.687039	8	S	P	NO VEGETATION																												
585	45.146198	-87.686277	5	S	P	NO VEGETATION		V																										
586	45.146182	-87.685514	7	S	P	NO VEGETATION																												
587	45.146167	-87.684752				NONNAVIGABLE																												
588	45.146815	-87.690068	9	R	P	NO VEGETATION																												
589	45.146799	-87.689305	12			TOO DEEP																												
590	45.146784	-87.688543	9	S	P	NO VEGETATION																												
591	45.146768	-87.687780	6	S	P		1																											
592	45.146753	-87.687018	5	M	P		1	V				1			1		1																
593	45.146738	-87.686255	6	M	P	NO VEGETATION																												
594	45.147385	-87.691571	11			TOO DEEP																												
595	45.147370	-87.690809	12			TOO DEEP																												
596	45.147354	-87.690046	7	S	P	NO VEGETATION																												
597	45.147339	-87.689284	9	S	P	NO VEGETATION																												
598	45.147324	-87.688521	5	S	P		1					1					1																
599	45.147308	-87.687758	5	S	P		1					1					1																
600	45.147293	-87.686996	5	M	P		1								1																		
601	45.147277	-87.686233	7	S	P	NO VEGETATION																												
602	45.147925	-87.691550	11			TOO DEEP																												
603	45.147910	-87.690787	8	S	P	NO VEGETATION																												
604	45.147894	-87.690024	7	S	P		1																											
605	45.147879	-87.689262				NONNAVIGABLE																												
606	45.147863	-87.688499	4	M	P		1					1																						
607	45.147848	-87.687736	5	S	P		1								1																		
608	45.147832	-87.686974	5	S	P		1								1																		
609	45.148495	-87.693053				BEYOND PROJECT BOUNDARY																												
610	45.148480	-87.692290	10	R	P	NO VEGETATION																												
611	45.148465	-87.691528	12			TOO DEEP																												
612	45.148449	-87.690765	6	S	P		1																											
613	45.148434	-87.690003	5	S	P		1																											
614	45.148418	-87.689240	3	S	P		1					1			1																		
615	45.148403	-87.688477	3	S	P		1																											
616	45.148387	-87.687715	5	R	P	NO VEGETATION																												
617	45.149051	-87.693794				BEYOND PROJECT BOUNDARY																												
618	45.149035	-87.693031				BEYOND PROJECT BOUNDARY																												
619	45.149020	-87.692269				BEYOND PROJECT BOUNDARY																												
620	45.149004	-87.691506	8	S	P	NO VEGETATION																												
621	45.148989	-87.690743	7	S	P	NO VEGETATION																												
622	45.148973	-87.689981	4	S	P		1																											
623	45.148958	-87.689218	4	S	P		1																											
624	45.148943	-87.688455	4	S	P		1																											

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
577	45.145674	-87.687061	12			TOO DEEP																										
578	45.145658	-87.686299	11			TOO DEEP																										
579	45.145643	-87.685536	6	M	P	NO VEGETATION																										
580	45.145627	-87.684773	8	S	P	NO VEGETATION																										
581	45.145612	-87.684011	5	M	P		1																			1						
582	45.146244	-87.688565	14			TOO DEEP																										
583	45.146229	-87.687802	12			TOO DEEP																										
584	45.146213	-87.687039	8	S	P	NO VEGETATION																										
585	45.146198	-87.686277	5	S	P	NO VEGETATION																										
586	45.146182	-87.685514	7	S	P	NO VEGETATION																										
587	45.146167	-87.684752				NONNAVIGABLE																										
588	45.146815	-87.690068	9	R	P	NO VEGETATION																										
589	45.146799	-87.689305	12			TOO DEEP																										
590	45.146784	-87.688543	9	S	P	NO VEGETATION																										
591	45.146768	-87.687780	6	S	P		1																			1						
592	45.146753	-87.687018	5	M	P		1																									
593	45.146738	-87.686255	6	M	P	NO VEGETATION																										
594	45.147385	-87.691571	11			TOO DEEP																										
595	45.147370	-87.690809	12			TOO DEEP																										
596	45.147354	-87.690046	7	S	P	NO VEGETATION																										
597	45.147339	-87.689284	9	S	P	NO VEGETATION																										
598	45.147324	-87.688521	5	S	P		1																			1						
599	45.147308	-87.687758	5	S	P		1						1																			
600	45.147293	-87.686996	5	M	P		1						1	1												1						
601	45.147277	-87.686233	7	S	P	NO VEGETATION																										
602	45.147925	-87.691550	11			TOO DEEP																										
603	45.147910	-87.690787	8	S	P	NO VEGETATION																										
604	45.147894	-87.690024	7	S	P		1																			1						
605	45.147879	-87.689262				NONNAVIGABLE																										
606	45.147863	-87.688499	4	M	P		1						1																			
607	45.147848	-87.687736	5	S	P		1																			1						
608	45.147832	-87.686974	5	S	P		1																			1						
609	45.148495	-87.693053				BEYOND PROJECT BOUNDARY																										
610	45.148480	-87.692290	10	R	P	NO VEGETATION																										
611	45.148465	-87.691528	12			TOO DEEP																										
612	45.148449	-87.690765	6	S	P		1																			1			1			
613	45.148434	-87.690003	5	S	P		1						1													1			1			
614	45.148418	-87.689240	3	S	P		1															1				1			1			
615	45.148403	-87.688477	3	S	P		1						1													1						
616	45.148387	-87.687715	5	R	P	NO VEGETATION																										
617	45.149051	-87.693794				BEYOND PROJECT BOUNDARY																										
618	45.149035	-87.693031				BEYOND PROJECT BOUNDARY																										
619	45.149020	-87.692269				BEYOND PROJECT BOUNDARY																										
620	45.149004	-87.691506	8	S	P	NO VEGETATION																										
621	45.148989	-87.690743	7	S	P	NO VEGETATION																										
622	45.148973	-87.689981	4	S	P		1						1																			
623	45.148958	-87.689218	4	S	P		1																			1						
624	45.148943	-87.688455	4	S	P		1						1																			

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus,Curly-leaf pondweed	Bidens beckii (formerly Megalodonta), Water marigold	Bolboschoenus fluviatilis, River bulrush	Ceratophyllum demersum, Coontail	Ceratophyllum echinatum, Spiny hornwort	Chara sp., Muskgrasses	Elodea canadensis, Common waterweed	Equisetum fluviatile, Water horsetail	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lemna trisulca, Forked duckweed	Myriophyllum heterophyllum, Various-leaved water-milfoil	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton alpinus, Alpine pondweed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton epihydrus, Ribbon-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton illinoensis, Illinois pondweed	Potamogeton natans, Floating-leaf pondweed	Potamogeton nodosus, Long-leaf pondweed	Potamogeton oakesianus, Oakes' pondweed
625	45.149667	-87.697585				BEYOND PROJECT BOUNDARY																												
626	45.149652	-87.696823				BEYOND PROJECT BOUNDARY																												
627	45.149636	-87.696060				BEYOND PROJECT BOUNDARY																												
628	45.149621	-87.695297				BEYOND PROJECT BOUNDARY																												
629	45.149606	-87.694535				BEYOND PROJECT BOUNDARY																												
630	45.149590	-87.693772				BEYOND PROJECT BOUNDARY																												
631	45.149575	-87.693009				BEYOND PROJECT BOUNDARY																												
632	45.149559	-87.692247				BEYOND PROJECT BOUNDARY																												
633	45.149544	-87.691484				BEYOND PROJECT BOUNDARY																												
634	45.149529	-87.690722	5	M	P	NO VEGETATION																												
635	45.149513	-87.689959	8	R	P	NO VEGETATION																												
636	45.150238	-87.699089				BEYOND PROJECT BOUNDARY																												
637	45.150222	-87.698326				BEYOND PROJECT BOUNDARY																												
638	45.150207	-87.697564				BEYOND PROJECT BOUNDARY																												
639	45.150191	-87.696801				BEYOND PROJECT BOUNDARY																												
640	45.150176	-87.696038				BEYOND PROJECT BOUNDARY																												
641	45.150161	-87.695276				BEYOND PROJECT BOUNDARY																												
642	45.150145	-87.694513				BEYOND PROJECT BOUNDARY																												
643	45.150130	-87.693750				BEYOND PROJECT BOUNDARY																												
644	45.150114	-87.692988				BEYOND PROJECT BOUNDARY																												
645	45.150099	-87.692225				BEYOND PROJECT BOUNDARY																												
646	45.150084	-87.691462				BEYOND PROJECT BOUNDARY																												
647	45.150777	-87.699067				BEYOND PROJECT BOUNDARY																												
648	45.150762	-87.698305				BEYOND PROJECT BOUNDARY																												
649	45.150747	-87.697542				BEYOND PROJECT BOUNDARY																												
650	45.150731	-87.696779				BEYOND PROJECT BOUNDARY																												
651	45.150716	-87.696017				BEYOND PROJECT BOUNDARY																												
652	45.150700	-87.695254				BEYOND PROJECT BOUNDARY																												
653	45.150685	-87.694491				BEYOND PROJECT BOUNDARY																												
654	45.150670	-87.693729				BEYOND PROJECT BOUNDARY																												
655	45.150654	-87.692966				BEYOND PROJECT BOUNDARY																												
656	45.151317	-87.699045				BEYOND PROJECT BOUNDARY																												
657	45.151302	-87.698283				BEYOND PROJECT BOUNDARY																												
658	45.151286	-87.697520				BEYOND PROJECT BOUNDARY																												
659	45.151271	-87.696757				BEYOND PROJECT BOUNDARY																												
660	45.151255	-87.695995				BEYOND PROJECT BOUNDARY																												
661	45.151240	-87.695232				BEYOND PROJECT BOUNDARY																												
662	45.151225	-87.694469				BEYOND PROJECT BOUNDARY																												
663	45.151209	-87.693707				BEYOND PROJECT BOUNDARY																												
664	45.151764	-87.694448				BEYOND PROJECT BOUNDARY																												

POINT INTERCEPT RAW DATA:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

sampling point	Latitiude (degrees)	Longitude (degrees)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Potamogeton praelongus, White-stem pondweed	Potamogeton pusillus, Small pondweed	Potamogeton richardsonii, Clasping-leaf pondweed	Potamogeton robbinsii, Fern pondweed	Potamogeton strictifolius, Stiff pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Ranunculus aquatilis, White water crowfoot	Ranunculus flabellaris, Yellow water crowfoot	Ranunculus flammula, Creeping spearwort	Sagittaria latifolia, Common arrowhead	Sparganium eurycarpum, Common bur-reed	Sparganium natans, Small bur-reed	Spirodela polyrhiza, Large duckweed	Stuckenia pectinata, Sago pondweed	Utricularia geminiscapa, Twin-stemmed bladderwort	Utricularia minor, Small bladderwort	Utricularia vulgaris, Common bladderwort	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Zizania sp., Wild rice	Aquatic moss	Filamentous algae	Riccia fluitans, Slender riccia	Sium suave, Water parsnip (Voucher RAL-2011-034)	Unidentified (Small?) Pondweed (Voucher RAL-2011-012)
625	45.149667	-87.697585				BEYOND PROJECT BOUNDARY																										
626	45.149652	-87.696823				BEYOND PROJECT BOUNDARY																										
627	45.149636	-87.696060				BEYOND PROJECT BOUNDARY																										
628	45.149621	-87.695297				BEYOND PROJECT BOUNDARY																										
629	45.149606	-87.694535				BEYOND PROJECT BOUNDARY																										
630	45.149590	-87.693772				BEYOND PROJECT BOUNDARY																										
631	45.149575	-87.693009				BEYOND PROJECT BOUNDARY																										
632	45.149559	-87.692247				BEYOND PROJECT BOUNDARY																										
633	45.149544	-87.691484				BEYOND PROJECT BOUNDARY																										
634	45.149529	-87.690722	5	M	P	NO VEGETATION																										
635	45.149513	-87.689959	8	R	P	NO VEGETATION																										
636	45.150238	-87.699089				BEYOND PROJECT BOUNDARY																										
637	45.150222	-87.698326				BEYOND PROJECT BOUNDARY																										
638	45.150207	-87.697564				BEYOND PROJECT BOUNDARY																										
639	45.150191	-87.696801				BEYOND PROJECT BOUNDARY																										
640	45.150176	-87.696038				BEYOND PROJECT BOUNDARY																										
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642	45.150145	-87.694513				BEYOND PROJECT BOUNDARY																										
643	45.150130	-87.693750				BEYOND PROJECT BOUNDARY																										
644	45.150114	-87.692988				BEYOND PROJECT BOUNDARY																										
645	45.150099	-87.692225				BEYOND PROJECT BOUNDARY																										
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647	45.150777	-87.699067				BEYOND PROJECT BOUNDARY																										
648	45.150762	-87.698305				BEYOND PROJECT BOUNDARY																										
649	45.150747	-87.697542				BEYOND PROJECT BOUNDARY																										
650	45.150731	-87.696779				BEYOND PROJECT BOUNDARY																										
651	45.150716	-87.696017				BEYOND PROJECT BOUNDARY																										
652	45.150700	-87.695254				BEYOND PROJECT BOUNDARY																										
653	45.150685	-87.694491				BEYOND PROJECT BOUNDARY																										
654	45.150670	-87.693729				BEYOND PROJECT BOUNDARY																										
655	45.150654	-87.692966				BEYOND PROJECT BOUNDARY																										
656	45.151317	-87.699045				BEYOND PROJECT BOUNDARY																										
657	45.151302	-87.698283				BEYOND PROJECT BOUNDARY																										
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659	45.151271	-87.696757				BEYOND PROJECT BOUNDARY																										
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661	45.151240	-87.695232				BEYOND PROJECT BOUNDARY																										
662	45.151225	-87.694469				BEYOND PROJECT BOUNDARY																										
663	45.151209	-87.693707				BEYOND PROJECT BOUNDARY																										
664	45.151764	-87.694448				BEYOND PROJECT BOUNDARY																										

BOAT SURVEY:

Lake	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date of Survey	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

Nearest Point	Species seen, habitat information
8	*Schoenoplectus tabernaemontani, Softstem bulrush*
13	*Carex comosa, Bottle brush sedge*
13	*Lythrum salicaria, Purple loosestrife - see comment 1*
13 & 582	*Unidentified - (possibly Iris versicolor, Northern blue flag) - see comment 2*
13	*Unidentified - (possibly Juncus effusus, soft rush) - see comment 3*
29	*Typha sp., Cattail*
38	*Scirpus atrovirens, black bulrush*
441	*Acorus americanus, Sweet-flag*
635	*Phalaris arundinacea, Reed canary grass - see comment 4*

ADDITIONAL COMMENTS
1. Lythrum salicaria, Purple loosestrife - PKML PL014, Gallerucella beetle damage, beetles, larvae, and eggs confirmed at this location, took photos
2. Unidentified - (possibly Iris versicolor, Northern blue flag) - unable to collect specimen, not blooming, took photo of plant near point 13
3. Unidentified - (possibly Juncus effusus, soft rush) - unable to collect specimen, took photo of plant
4. On shore - private property - possibly out of survey boundary - unable to collect specimen.

INDIVIDUAL SPECIES STATS:

Name	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

Species Included in Point Intercept Raw Data (does NOT include Boat Survey Data)	Frequency of occurrence within vegetated areas (%)	Frequency of occurrence at sites shallower than maximum depth of plants	Relative Frequency (%)	Relative Frequency (squared)	Number of sites where species found	Average Rake Fullness	#visual sightings
Ceratophyllum demersum, Coontail	61.48	45.18	12.78	0.02	150	1.27	4
Potamogeton zosteriformis, Flat-stem pondweed	44.26	32.53	9.20	0.01	108	1.02	21
Lemna trisulca, Forked duckweed	43.03	31.63	8.94	0.01	105	1.00	2
Spirodela polyrhiza, Large duckweed	41.80	30.72	8.69	0.01	102	1.00	11
Lemna minor, Small duckweed	41.39	30.42	8.60	0.01	101	1.00	12
Elodea canadensis, Common waterweed	40.57	29.82	8.43	0.01	99	1.07	11
Filamentous algae	40.16	29.52			98	1.02	5
Wolffia columbiana, Common watermeal	39.75	29.22	8.26	0.01	97	1.00	4
Vallisneria americana, Wild celery	30.74	22.59	6.39	0.00	75	1.00	5
Heteranthera dubia, Water star-grass	26.23	19.28	5.45	0.00	64	1.00	26
Nymphaea odorata, White water lily	12.70	9.34	2.64	0.00	31	1.00	95
Potamogeton strictifolius, Stiff pondweed	12.30	9.04	2.56	0.00	30	1.03	4
Potamogeton robbinsii, Fern pondweed	11.48	8.43	2.39	0.00	28	1.07	3
Myriophyllum spicatum,Eurasian water milfoil	9.43	6.93	1.96	0.00	23	1.00	32
Myriophyllum sibiricum, Northern water-milfoil	7.38	5.42	1.53	0.00	18	1.00	3
Potamogeton crispus,Curly-leaf pondweed	5.74	4.22	1.19	0.00	14	1.00	5
Ranunculus aquatilis, White water crowfoot	5.74	4.22	1.19	0.00	14	1.00	
Potamogeton amplifolius, Large-leaf pondweed	5.33	3.92	1.11	0.00	13	1.00	24
Utricularia vulgaris, Common bladderwort	5.33	3.92	1.11	0.00	13	1.00	5
Aquatic moss	4.51	3.31			11	1.00	
Potamogeton nodosus, Long-leaf pondweed	3.69	2.71	0.77	0.00	9	1.00	2
Ranunculus flabellaris, Yellow water crowfoot	3.69	2.71	0.77	0.00	9	1.00	
Nitella sp., Nitella	3.28	2.41	0.68	0.00	8	1.00	1
Potamogeton pusillus, Small pondweed	2.87	2.11	0.60	0.00	7	1.00	
Utricularia minor, Small bladderwort	2.46	1.81	0.51	0.00	6	1.00	
Bidens beckii (formerly Megalodonta), Water marigold	2.05	1.51	0.43	0.00	5	1.00	8
Stuckenia pectinata, Sago pondweed	2.05	1.51	0.43	0.00	5	1.00	7
Potamogeton foliosus, Leafy pondweed	1.64	1.20	0.34	0.00	4	1.00	1
Potamogeton natans, Floating-leaf pondweed	1.64	1.20	0.34	0.00	4	1.00	2
Chara sp., Muskgrasses	1.23	0.90	0.26	0.00	3	1.00	
Najas flexilis, Slender naiad	1.23	0.90	0.26	0.00	3	1.00	1
Nuphar variegata, Spatterdock	1.23	0.90	0.26	0.00	3	1.00	31
Potamogeton praelongus, White-stem pondweed	1.23	0.90	0.26	0.00	3	1.00	1
Ranunculus flammula, Creeping spearwort	1.23	0.90	0.26	0.00	3	1.00	
Utricularia geminiscapa, Twin-stemmed bladderwort	1.23	0.90	0.26	0.00	3	1.00	
Unidentified (Small?) Pondweed (Voucher RAL-2011-012)	1.23	0.90	0.26	0.00	3	1.00	
Myriophyllum heterophyllum, Various-leaved water-milfoil	0.82	0.60	0.17	0.00	2	1.00	1
Potamogeton alpinus, Alpine pondweed	0.82	0.60	0.17	0.00	2	1.00	
Potamogeton illinoensis, Illinois pondweed	0.82	0.60	0.17	0.00	2	1.00	
Potamogeton oakesianus, Oakes' pondweed	0.82	0.60	0.17	0.00	2	1.00	3
Potamogeton richardsonii, Clasping-leaf pondweed	0.41	0.30	0.09	0.00	1	1.00	6
Sagittaria latifolia, Common arrowhead	0.41	0.30	0.09	0.00	1	1.00	1
Riccia fluitans, Slender riccia	0.41	0.30			1	1.00	
Sium suave, Water parsnip (Voucher RAL-2011-034)	0.41	0.30	0.09	0.00	1	1.00	
Sparganium eurycarpum, Common bur-reed							3
Zizania sp., Wild rice							3
Sparganium natans, Small bur-reed							2
Equisetum fluviatile, Water horsetail							1
Potamogeton epihydrus, Ribbon-leaf pondweed							1
Total vegetation				0.07		1.35	
Acorus americanus, Sweet-flag							Boat Survey
Carex comosa, Bottle brush sedge							Boat Survey
Unidentified - (possibly Iris versicolor, Northern blue flag)							Boat Survey
Unidentified - (possibly Juncus effusus, soft rush)							Boat Survey
Lythrum salicaria, Purple loosestrife							Boat Survey
Phalaris arundinacea, Reed canary grass							Boat Survey
Schoenoplectus tabernaemontani, Softstem bulrush							Boat Survey
Scirpus atrovirens, black bulrush							Boat Survey
Typha sp., Cattail							Boat Survey

SUMMARY STATS:

Lake	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date of Survey	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

Total number of sites visited	546
Total number of sites with vegetation	244
Total number of sites shallower than maximum depth of plants	332
Frequency of occurrence at sites shallower than maximum depth of plants	73.49
Simpson Diversity Index	0.93
Maximum depth of plants (ft)**	8
Number of sites sampled using rake on Rope (R)	0
Number of sites sampled using rake on Pole (P)	385
Average number of all species per site (shallower than max depth)	3.54
Average number of all species per site (veg. sites only)	4.81
Average number of native species per site (shallower than max depth)	3.42
Average number of native species per site (veg. sites only)	4.70
Species Richness	41
Species Richness (including visuals)	46

****SEE "MAX DEPTH GRAPH" WORKSHEET TO CONFIRM**

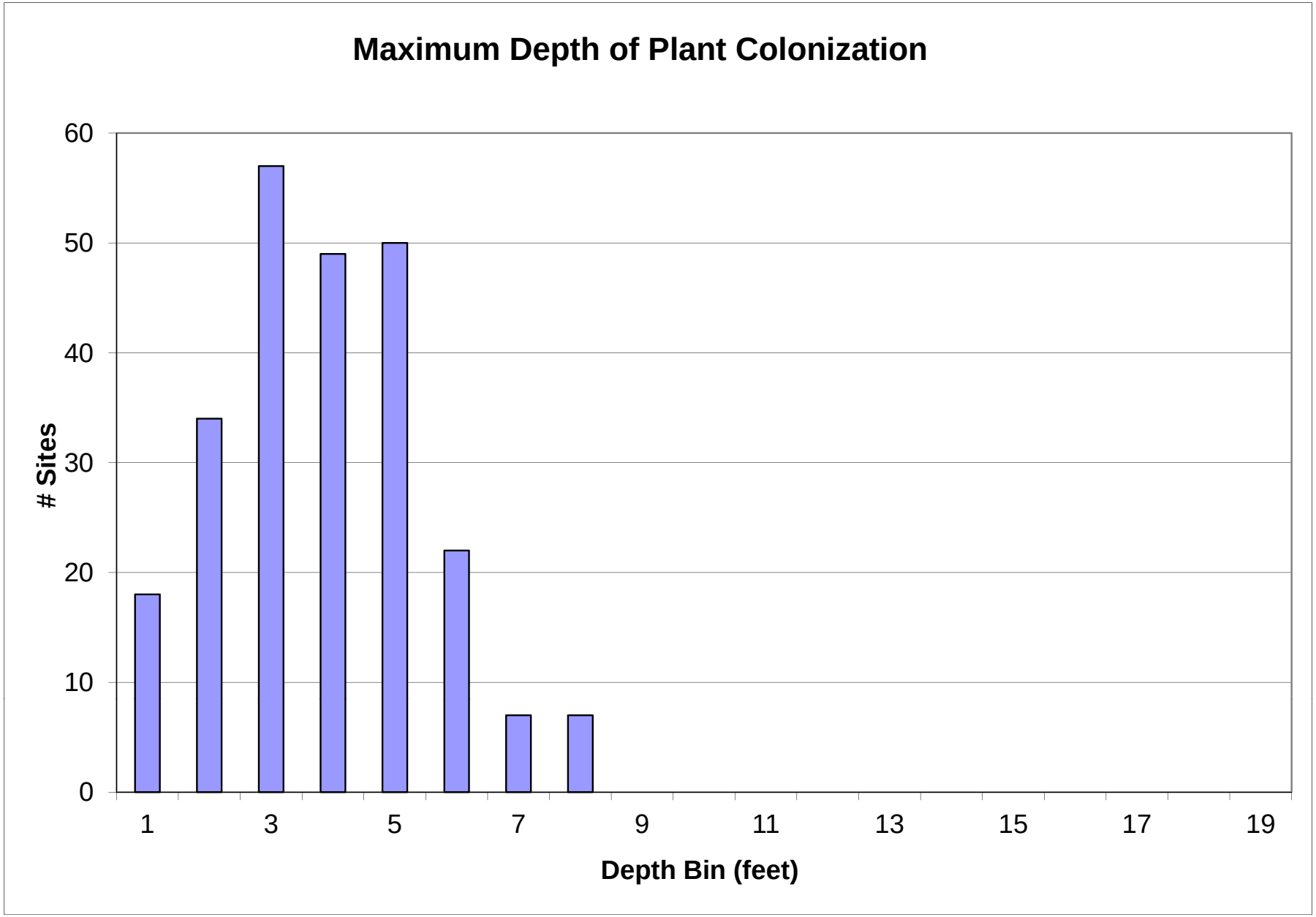
FLORISTIC QUALITY INDEX

Lake	Upper Scott Flowage (a.k.a. Park Mill Impoundment)
County	Marinette County, WI & Menominee County, MI
WBIC	609400
Date	8/1/2011 - 8/19/2011
Field Crew	RICK LOEFFLER & CORWIN MIRR

Species	Common Name	C	species present=1	
Bidens beckii	**Water marigold**	8	1	8
Ceratophyllum demersum	**Coontail**	3	1	3
Chara	**Muskgrasses**	7	1	7
Elodea canadensis	**Common waterweed**	3	1	3
Heteranthera dubia	**Water star-grass**	6	1	6
Lemna minor	**Small duckweed**	4	1	4
Lemna trisulca	**Forked duckweed**	6	1	6
Myriophyllum heterophyllu	**Various-leaved water-milfoi**	7	1	7
Myriophyllum sibiricum	**Northern water-milfoil**	6	1	6
Najas flexilis	**Slender naiad**	6	1	6
Nitella	**Nitella**	7	1	7
Nuphar variegata	**Spatterdock**	6	1	6
Nymphaea odorata	**White water lily**	6	1	6
Potamogeton alpinus	**Alpine pondweed**	9	1	9
Potamogeton amplifolius	**Large-leaf pondweed**	7	1	7
Potamogeton foliosus	**Leafy pondweed**	6	1	6
Potamogeton illinoensis	**Illinois pondweed**	6	1	6
Potamogeton natans	**Floating-leaf pondweed**	5	1	5
Potamogeton nodosus	**Long-leaf pondweed**	7	1	7
Potamogeton oakesianus	**Oakes' pondweed**	10	1	10
Potamogeton praelongus	**White-stem pondweed**	8	1	8
Potamogeton pusillus	**Small pondweed**	7	1	7
Potamogeton richardsonii	**Clasping-leaf pondweed**	5	1	5
Potamogeton robbinsii	**Fern pondweed**	8	1	8
Potamogeton strictifolius	**Stiff pondweed**	8	1	8
Potamogeton zosteriformis	**Flat-stem pondweed**	6	1	6
Ranunculus aquatilis	**White water crowfoot**	8	1	8
Ranunculus flabellaris	**Yellow water crowfoot**	8	1	8
Ranunculus flammula	**Creeping spearwort**	9	1	9
Riccia fluitans	**Slender riccia**	7	1	7
Sagittaria latifolia	**Common arrowhead**	3	1	3
Spirodela polyrhiza	**Large duckweed**	5	1	5
Stuckenia pectinata	**Sago pondweed**	3	1	3
Utricularia geminiscapa	**Twin-stemmed bladderwort**	9	1	9
Utricularia minor	**Small bladderwort**	10	1	10
Utricularia vulgaris	**Common bladderwort**	7	1	7
Vallisneria americana	**Wild celery**	6	1	6
Wolffia columbiana	**Common watermeal**	5	1	5
N			38	
mean C				6.5
FQI				40.06869102

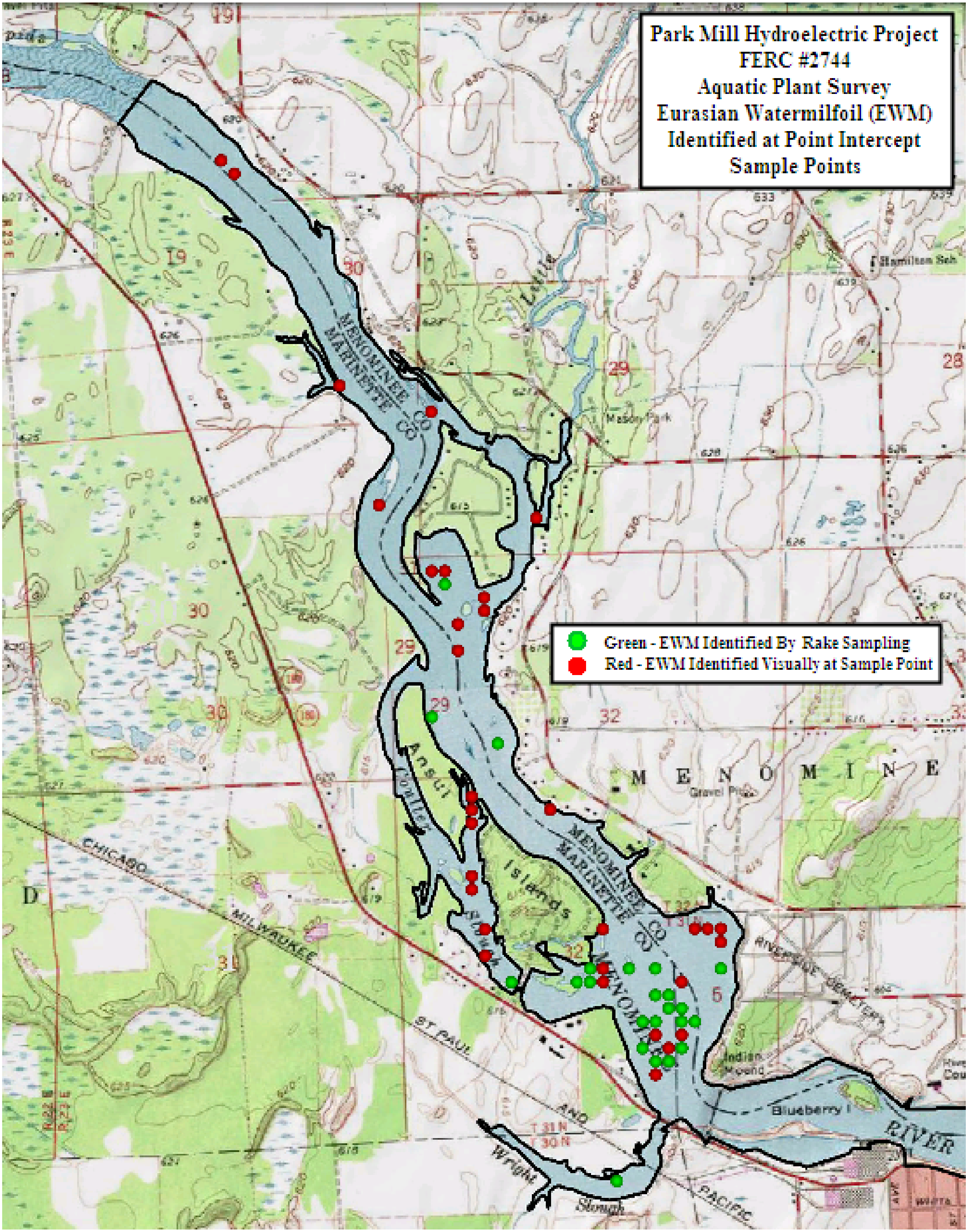
CITATION: Nichols, SA. 1999. Floristic Quality Assessment of Wisconsin Lake Plant Communities with Example Applications. Journal of Lake and Reservoir Management, 15(2):133-141.

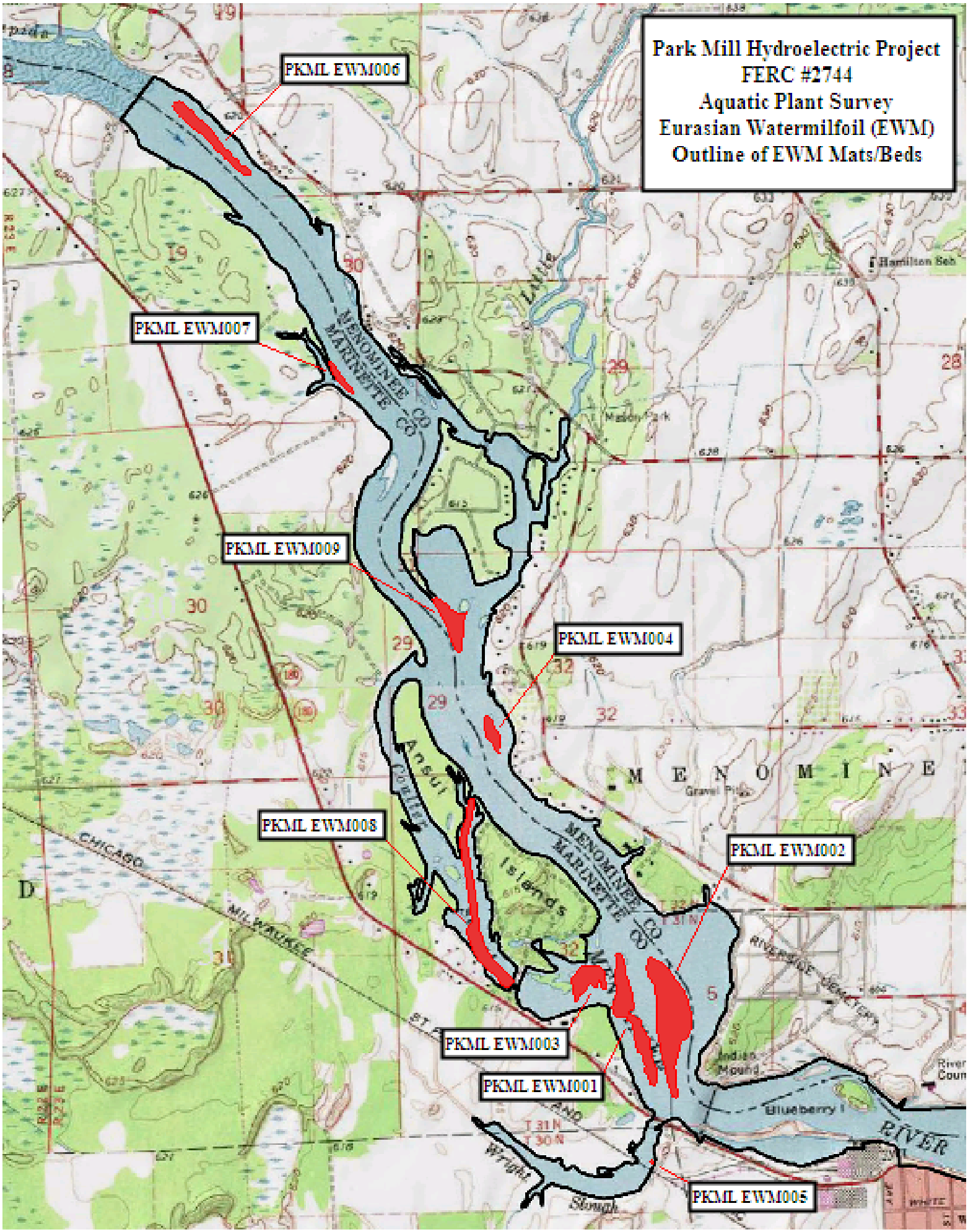
CITATION: University of Wisconsin-Madison, 2001. Wisconsin Floristic Quality Assessment (WFQA). Retrived October 27, 2009 from: http://www.botany.wisc.edu/WFQA.asp


Maximum Depth of Plant Colonization
60
50
40
30
20
10
0
Sites
1
3
5
7
9
11
13
15
17
19
Depth Bin (feet)

APPENDIX B

Eurasian Water Milfoil (EWM)
Survey Data and Maps


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Eurasian Watermilfoil (EWM)
Identified at Point Intercept
Sample Points
Green - EWM Identified By Rake Sampling
Red - EWM Identified Visually at Sample Point
MENOMINEE
MARINETTE
MENOMINE
Mason Park
Islands
Blueberry I
RIVER
CHICAGO
MILWAUKEE
ST PAUL
AND
PACIFIC
Wright
Slough
Indian Mound
Gravel Pit
Hamilton Sch


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Eurasian Watermilfoil (EWM)
Outline of EWM Mats/Beds
PKML EWM006
PKML EWM007
PKML EWM009
PKML EWM004
PKML EWM008
PKML EWM002
PKML EWM003
PKML EWM001
PKML EWM005
MENOMINEE
MARINETTE
CO
CO
Ansul
Corner
Islands
CHICAGO
MILWAUKEE
RIVER
Indian Mound
Blueberry I
Wright
Slough
Hamilton Sch
Menominee Park
Gravel Pits

Eurasian Watermilfoil Mat Information

Project: Park Mill Impoundment (aka Upper Scott Flowage) #2744

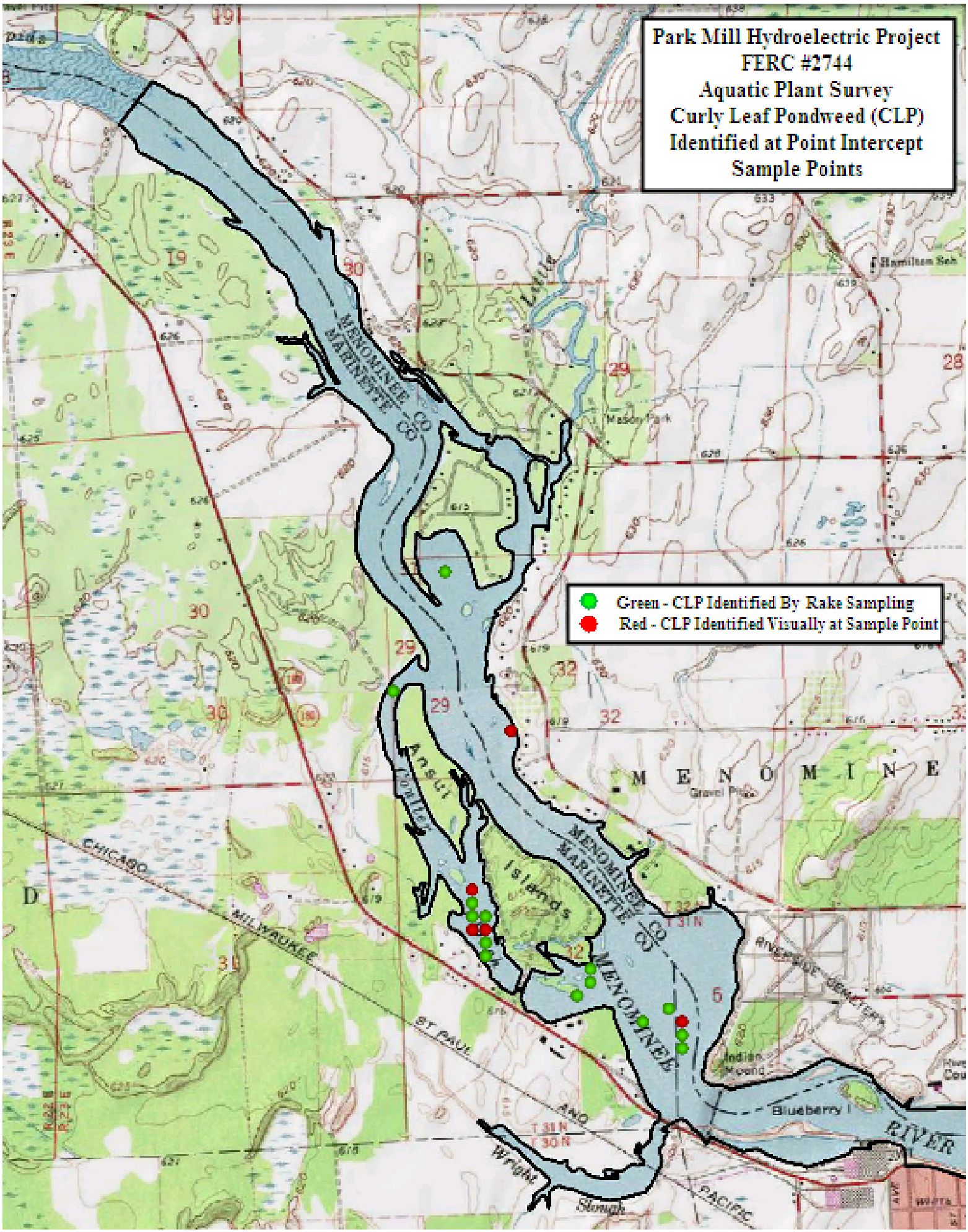
Date: 8/1/2011 - 8/19/2011

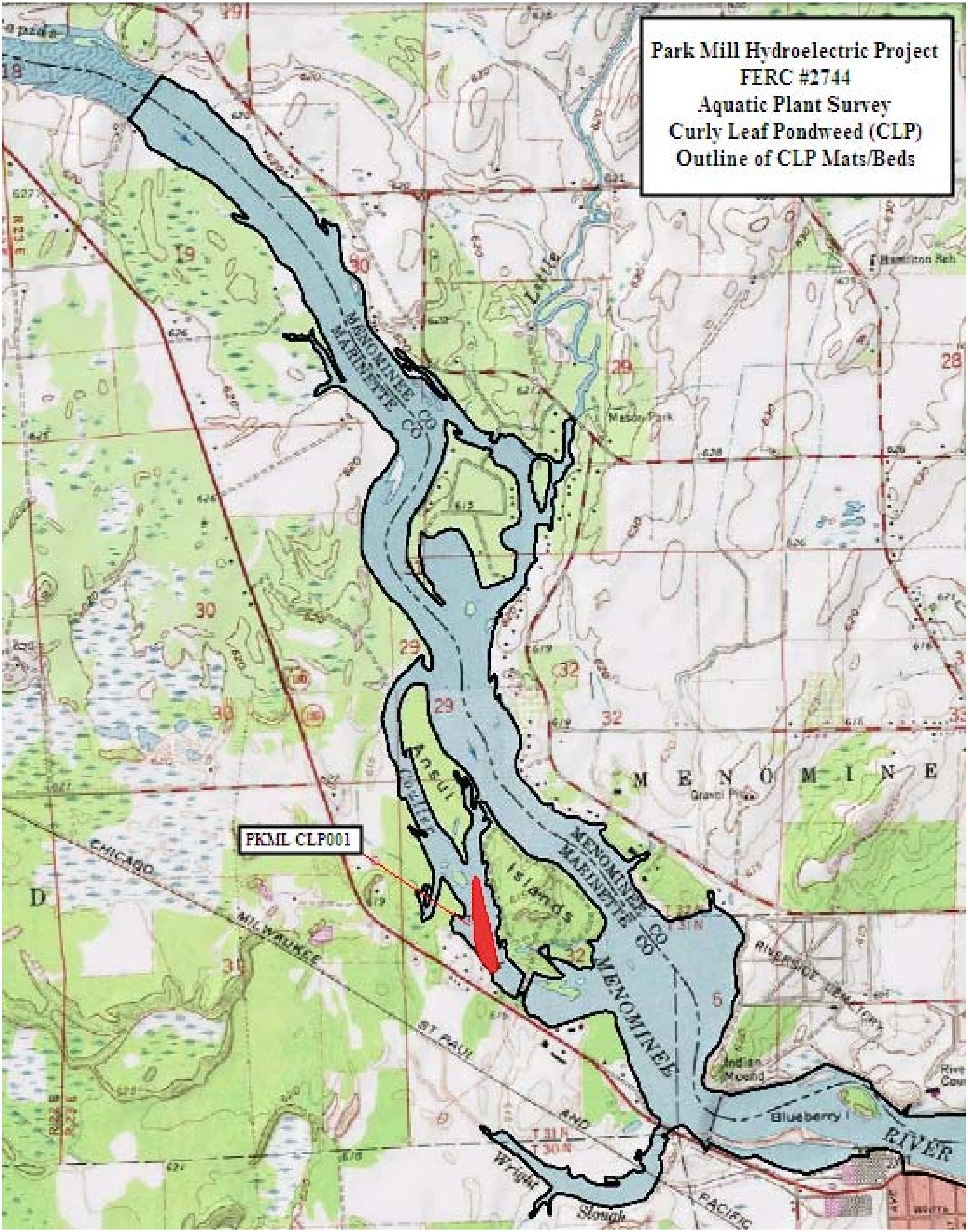
Crew: RAL & CTM **Datum:** WGS 84

MAT Number	Latitude	Longitude	Survey GPS Point	Mat Acreage		Comments
PKML EWM001	N45.11153	W87.66462	#984	8.18		First observed in 2011. Scattered plants on edge and center with medium density on upstream and downstream ends. Mixed with native plants and some CLP.
PKML EWM002	N45.11355	W87.66282	#676	15.37		First observed in 2011. Scattered plants on edge and center with medium density on upstream and downstream ends. Mixed with native plants and some CLP.
PKML EWM003	N45.11235 N45.11324	W87.66775 W87.66596	#673 & #674	3.59		First observed in 2011. Scattered plants on edge and center. Mixed with native plants and some CLP.
PKML EWM004	N45.12319	W87.67190	#716	1.68		First observed in 2011. Scattered plants on edge and center with medium density on east side and downstream end. Mixed with native plants and some CLP.
PKML EWM005	N45.10538	W87.66336	#691	0.002		First observed in 2011. Scattered plants entire mat 30' in diameter. Mixed with native plants.
PKML EWM006	N45.14757	W87.68736	#671	4.75		First observed in 2011. Scattered plants entire mat. Mixed with native plants.
PKML EWM007	N45.13798	W87.68050	#508	0.93		First observed in 2011. Scattered plants entire mat. Mixed with native plants.
PKML EWM008	N45.11405 N45.11732	W87.67232 W87.67371	#155 & #228	8.77		First observed in 2011. Scattered plants entire mat. Mixed with native plants and some CLP.
PKML EWM009	N45.12651 N45.12811	W87.67410 W87.67327	#358 - #376	3.84		First observed in 2011. Scattered plants entire mat. Mixed with native plants.

APPENDIX C

Curly Leaf Pondweed (CLP)
Survey Data and Maps


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Curly Leaf Pondweed (CLP)
Identified at Point Intercept
Sample Points
Green - CLP Identified By Rake Sampling
Red - CLP Identified Visually at Sample Point
MENOMINEE
MARINETTE CO
ANGUS
PORTER
ISLANDS
CHICAGO
MILWAUKEE
ST PAUL
AND
PACIFIC
Slough
Wright
Blueberry I
Indian Mound
Masley Park
Hamilton Sch
Gravel Pits
RIVER


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Curly Leaf Pondweed (CLP)
Outline of CLP Mats/Beds
PKML CLP001
MENOMINEE CO
MARINETTE CO
MENOMINEE
RIVER
Ansul
Islands
Blueberry I
Indian Mound
Wright Slough
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
RIVERSIDE CEMETERY
Gravel Pits
Hamilton Sch

Curly Leaf Pondweed Survey

Project: Park Mill Impoundment (aka Upper Scott Flowage) #2744

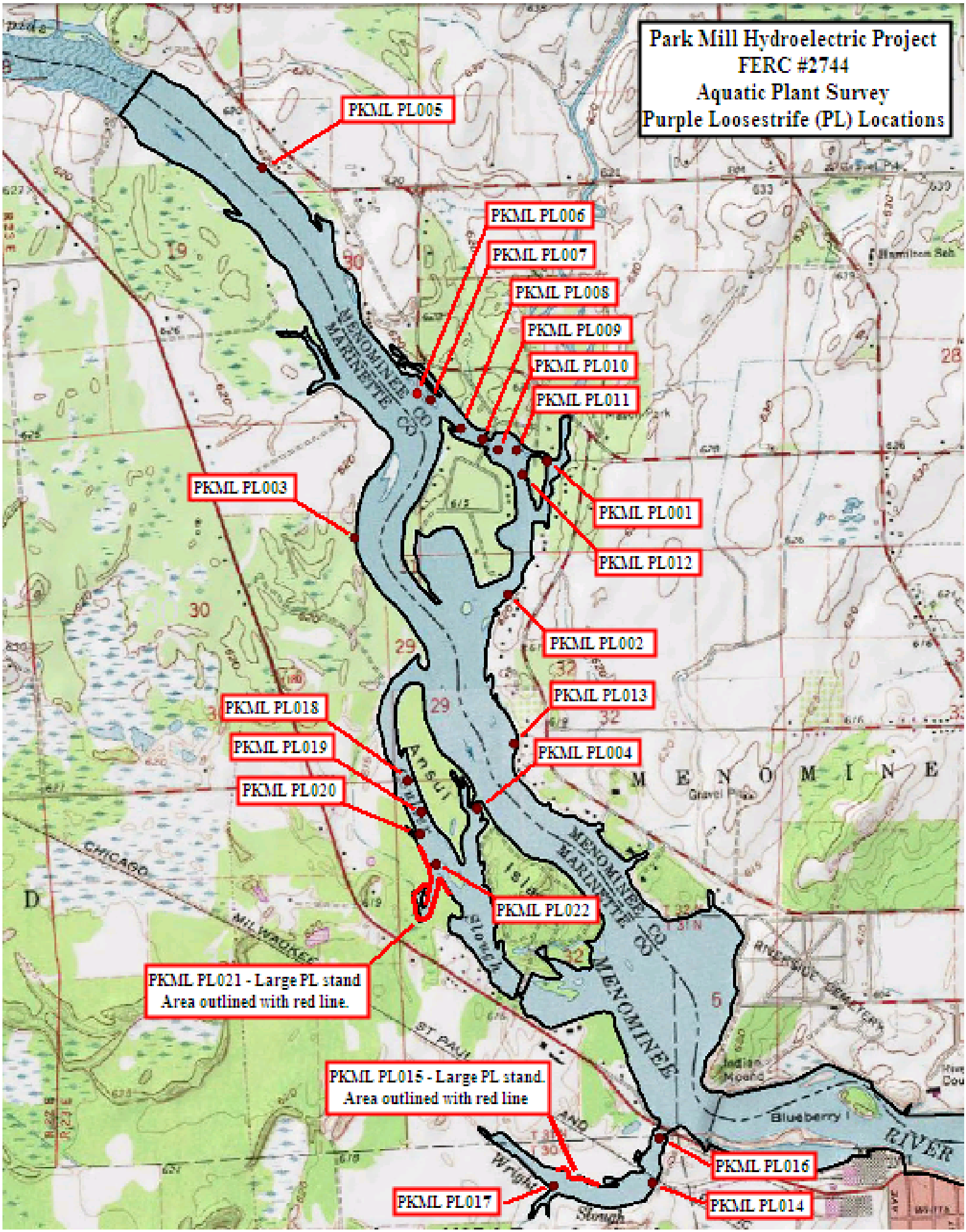
Date: 8/1/2011 - 8/19/2011

Crew: RAL & CTM **Datum:** WGS 84

MAT Number	Latitude	Longitude	Survey GPS Point	Mat Acreage		Comments
PKML CLP001	N45.11405 N45.11732	W87.67232 W87.67371	#155 & #228	6.56		Sparce plants mixed with native aquatics and Eurasian Watermilfoil

APPENDIX D

Purple Loosestrife (PL)
Survey Data and Maps


Park Mill Hydroelectric Project
FERC #2744
Aquatic Plant Survey
Purple Loosestrife (PL) Locations
PKML PL005
PKML PL006
PKML PL007
PKML PL008
PKML PL009
PKML PL010
PKML PL011
PKML PL003
PKML PL001
PKML PL012
PKML PL002
PKML PL013
PKML PL018
PKML PL019
PKML PL004
PKML PL020
PKML PL022
PKML PL021 - Large PL stand
Area outlined with red line.
PKML PL015 - Large PL stand.
Area outlined with red line
PKML PL016
PKML PL017
PKML PL014
MENOMINEE
MARINETTE CO
MENOMINEE
MARINETTE CO
MENOMINEE
RIVER
Ansul
Isle
Slough
CHICAGO
MILWAUKEE
ST PAUL
Blueberry
Indian
Mound
Hamilton Sch
Gravel Pit
Wright
Slough

Purple Loosestrife Survey

Project: Park Mill Impoundment (aka Upper Scott Flowage) #2744

Date: 8/1/2011 - 8/19/2011

Crew: RAL & CTM **Datum:** WGS 84

GPS point	Latitude	Longitude	Plant Height	Stand Area	Beetle Damage	Comments
PKML PL001	N45.13396	W87.66858	3' - 6'	3 plants	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. - 50' west of original WPT 665.
PKML PL002	N45.12867	W87.67110	4' - 5'	1 plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011.
PKML PL003	N45.13115	W87.67996	4'	1 plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011.
PKML PL004	N45.12015	W87.67330	3'	1 plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011.
PKML PL005	N45.14609	W87.68470	5'	1 plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011.
PKML PL006	N45.13684	W87.67604	5'	1 plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011.
PKML PL007	N45.13657	W87.67526	4' - 5'	4 plants	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. Estimated location.
PKML PL008	N45.13539	W87.67354	4'	4 plants	Unknown	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. Estimated location.
PKML PL009	N45.13492	W87.67230	5'	1 plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. Estimated location. (NW corner of culvert at Fairland Rd.
PKML PL010	N45.13449	W87.67140	4' - 5'	5 plants	Unknown	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. Estimated location.
PKML PL011	N45.13445	W87.67033	4' - 5'	2 plants	Unknown	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. Estimated location.
PKML PL012	N45.13346	W87.67005	2' - 4'	5 plants	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. On stump in water.
PKML PL013	N45.12270	W87.67102	4'	1 plant	Light	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. Old cane.

Purple Loosestrife Survey

Project: Park Mill Impoundment (aka Upper Scott Flowage) #2744

Date: 8/1/2011 - 8/19/2011

Crew: RAL & CTM **Datum:** WGS 84

GPS point	Latitude	Longitude	Plant Height	Stand Area	Beetle Damage	Comments
PKML PL014	N45.10493	W87.66375	2' - 3'	2 plants	Heavy	First observed in 2011. Not blooming. Photos in 2011. No treatment in 2011. Beetles, eggs, and larve confirmed in 2011. All plants stunted.
PKML PL015	N45.10503	W87.66779	1' - 6'	>500 Plants Shorline ~220 meters x 10 meters	Light/Heavy	First observed in 2011. Blooming. Photos in 2011. No treatment in 2011. Some plants stunted.
PKML PL016	N45.10671	W87.66325	4' - 5'	2 plants	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011.
PKML PL017	N45.10494	W87.66953	1'	1 Plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. On floating root mass.
PKML PL018	N45.12137	W87.67730	3'	1 Plant	None	First observed in 2011. Blooming. No photos in 2011. No treatment in 2011. On log.
PKML PL019	N45.12009	W87.67656	4' - 5'	1 Plant	None	First observed in 2011. Blooming. Photos in 2011. No treatment in 2011. On stump.
PKML PL020	N45.11921	W87.67668	3'	1 Plant	None	First observed in 2011. Blooming. Photos in 2011. No treatment in 2011. On log near duck blinds.
PKML PL021	N45.11738	W87.67624	1' - 6'	>500 Plants Shorline ~900 meters x 10 meters	Unknown	First observed in 2011. Some plants blooming. No photos in 2011. No treatment in 2011. Near duck blinds.
PKML PL022	N45.11798	W87.67580	1' - 5'	100 - 200 Plants On Small Island ~30 meters x 10 meters	Light/Medium	First observed in 2011. Some plants blooming. Photos in 2011. No treatment in 2011. Some plants stunted. Old cane. On small island.

APPENDIX E

Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications - WIDNR – March 2010

Recommended Baseline Monitoring of Aquatic Plants in Wisconsin:
Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications

Jennifer Hauxwell, Susan Knight, Kelly Wagner, Alison Mikulyuk, Michelle Nault, Meghan Porzky and Shaunna Chase

March 2010

Document citation:
Hauxwell, J., S. Knight, K. Wagner, A. Mikulyuk, M. Nault, M. Porzky and S. Chase. 2010. Recommended baseline monitoring of aquatic plants in Wisconsin: sampling design, field and laboratory procedures, data entry and analysis, and applications. Wisconsin Department of Natural Resources Bureau of Science Services, PUB-SS-1068 2010. Madison, Wisconsin, USA.

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B. Korth, University of Wisconsin-Extension
F. Koshere, Wisconsin Department of Natural Resources
A. Mikulyuk, Wisconsin Department of Natural Resources

Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications

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Boulder Junction, WI 54512

Last Updated:
March 2010

EXECUTIVE SUMMARY

We outline a baseline monitoring protocol designed to quantitatively assess the distribution and abundance of aquatic plants in lake ecosystems. This protocol employs a point-intercept sampling design, with sites located on a geo-referenced sampling grid placed over the entire lake. At each site, the aquatic plant community is surveyed from a boat with a rake sampler to characterize species presence and rake fullness. In addition, a qualitative survey is recommended to map obvious species and augment the species list generated through quantitative sampling. Application of this methodology allows: 1) assessment of the frequencies of occurrence of different plant species, as well as estimates of species richness, abundance, and maximum depth of plant colonization; and 2) comparisons of aquatic plant variables over time and among lakes. This document contains complete instructions for conducting a baseline aquatic plant survey, including details on obtaining an electronic file of site coordinates, uploading site coordinates into a Global Positioning System (GPS) receiver, conducting field work, entering data, working with data summaries, processing voucher specimens, and provides example applications of the collected data. Final products from each baseline survey will include: 1) raw data from the quantitative survey which provides individual site-by-site species distribution and rake fullness data, 2) summary statistics useful in characterizing and comparing populations, 3) additional species observations from the general qualitative survey, and 4) voucher specimens cataloguing species presence. All electronic data should be sent for long-term record-keeping to the WDNR (DNRBaselineAquaticPlants@wisconsin.gov).

CONTENTS

INTRODUCTION

In lake ecosystems, the aquatic plant community serves as critical habitat and nursery for fish and other animals, a source of oxygen for all organisms, a refuge for prey as well as a foraging area for predators, a buffer against erosion and sediment resuspension from both waves and shoreline inputs, and can significantly contribute to overall lake primary productivity. Over the past several decades, losses of or changes in assemblages of native submersed aquatic vegetation has been a reoccurring phenomenon due to a relatively limited number of factors. Repeatedly, changes in landscapes and atmospheric conditions as a result of human activities have increasingly affected the ecology of adjacent aquatic systems, including aquatic plant communities. In addition, in-lake aquatic plant management activities have increased due to the increasing spread of invasive exotic plants[1].

The Wisconsin Department of Natural Resources (WDNR) is charged with protecting and enhancing the state's natural resources, including lake ecosystems. Given the many ecosystem services associated with aquatic plant communities as well as the recent threats to native species, it has become increasingly important to develop monitoring techniques to support science-based decision-making for effectively managing lake ecosystems. In this document, we present a quantitative, replicable monitoring protocol. Standardized, quantitative and replicable data are an essential part of strategic lake management for three reasons. First, good data allows us to better understand each individual lake; we can use survey data to produce detailed lake maps that show the locations of native, rare, or exotic plant species. Data can then be used as a baseline against which any changes in a lake associated with water clarity, exotic species introduction, water level, or lake management activity can be compared. Second, good data helps direct management by taking the conflict and guesswork out of planning. Aquatic plant management requires weighing a number of potential management options, some of which can be very costly or extensive. Baseline data allows lake groups to identify the most appropriate management options and design the best possible management plan. Additionally, by conducting quantitative comparisons between the aquatic plant communities before and after management actions, lake groups and managers may evaluate whether or not management goals were achieved. Third, by compiling and comparing survey information on lakes statewide, we are able to identify regional trends and refine our understanding of aquatic plant populations on a broader scale in both space and time.

SURVEY OBJECTIVE

In this document, we outline a baseline monitoring protocol designed to assess aquatic plant communities on a whole-lake scale. We recommend a formal quantitative survey conducted at pre-determined sampling locations distributed evenly throughout the lake, accompanied by a general qualitative survey to map obvious species and augment the species list generated through the quantitative survey. Our primary goals in adopting this methodology are to:

[1] Knight, S., and J. Hauxwell. 2009. Distribution and abundance of aquatic plants- human impacts. *In*: G. Likens (editor-in-chief), *Encyclopedia of Inland Waters*. Elsevier, Oxford, United Kingdom.

1) Collect quantitative data describing the frequencies of occurrence of different plant species, as well as estimates of species richness, abundance, and maximum depth of plant colonization for use in developing various management plans; and

2) Use the data to statistically compare aquatic plant variables over time and among lakes.

The importance of a statewide standardized protocol is that observed differences in a lake's plant community can be attributed to actual changes in the community over time, without the confounding variation that results from different field workers employing different sampling techniques.

The quantitative survey employs a point-intercept sampling design, adapted from terrestrial methods, with sites located on a geo-referenced sampling grid placed over the entire lake. At each site, the aquatic plant community is surveyed from a boat with a rake sampler to characterize species presence and rake fullness ratings. Although the presence/absence data cannot be used to estimate biomass or percent cover, it is less sensitive to interannual or seasonal variations in plant abundance[2]. The method is also relatively rapid and cost-effective and can be used on the large scale to collect baseline data and statistically compare communities over time[2,3]. In summary, it has the following attributes for estimation of aquatic plant distribution and abundance:

- Systematic, quantitative, and replicable
- Appropriate for lakes that vary in depth, size, region, shoreline complexity, and vegetation distribution
- Evenly spaced distribution of sites results in a good coverage of the entire lake, precluding the random exclusion of niche habitats
- Procedural simplicity
- Inexpensive implementation
- Results are easily analyzed with scientifically rigorous statistical methods
- Spatial data preserved and can be mapped for both the managers' use and for clearly communicating distributional data with the public

These guidelines are intended to work on most lakes. However, modifications may be required if a lake is uniquely shaped so that a uniform distribution of points isn't representative (long, skinny lake shape), or if obtaining rake samples is difficult due to substrate (rocky/cobble bottom).

Please note that these are "baseline" recommendations. Additional monitoring activities may be warranted if the goal is to assess a specific management activity. For example, to gauge the ability of chemical spot-treatments to control relatively small stands of an exotic species in a

[2] Madsen, J.D. 1999. Point intercept and line intercept methods for aquatic plant management. Aquatic plant control technical note MI-02. Army Engineer Waterways Experiment Station, Vicksburg, MS.

[3] Dodd-Williams, L., G.O. Dick, R.M. Smart and C.S. Owens. 2008. Point Intercept and Surface Observation GPS (SOG): A Comparison of Survey Methods – Lake Gaston, NC/VA. ERDC/TN APCRP-EA-19. Vicksburg, MS: U.S. Army Engineer Research and Development Center

relatively large lake, we recommend additional mapping of the beds following the pre- and post-treatment protocol available in Appendix D of the Aquatic Plant Management guide[4].

Unlike the procedures used by the Citizen-Based Lake Monitoring Network, this protocol is not designed for most volunteers. The protocol requires at least one of the field workers be an experienced plant taxonomist and able to identify most plant species in the field. Less experienced volunteers may be able to help with data recording and navigation, but without the help of a professional aquatic ecologist, volunteers may not be able to conduct an entire plant survey without a significant degree of training or study.

SURVEY OVERVIEW

Sampling Sites

This method employs a point-intercept design in which a grid of sampling sites is distributed evenly over the entire lake surface (Figure 1). Lake organizations or individuals can request an electronic file of survey sites by contacting the WDNR Lake Coordinator from their region (see Appendix 1) with the lake name and county, as well as the town, range and section (TRS) or water body identification code (WBIC). Please make requests well in advance of planned field work to allow WDNR staff sufficient time for map creation (recommend at least 1 month). WDNR staff will determine the number of sites and grid resolution based on the estimated size of the littoral zone (the area in which plants grow) and shape of the lake. Grids will be scaled to produce a greater number of sites on lakes that are larger and have more complex shorelines. Lakes with a narrow littoral zone may be assigned a comparatively high number of sampling sites to achieve sufficient survey coverage. Once created, the sampling map (Figure 1) and an associated GPS text file containing the latitude and longitude information associated with each sample site will be provided electronically by the WDNR.

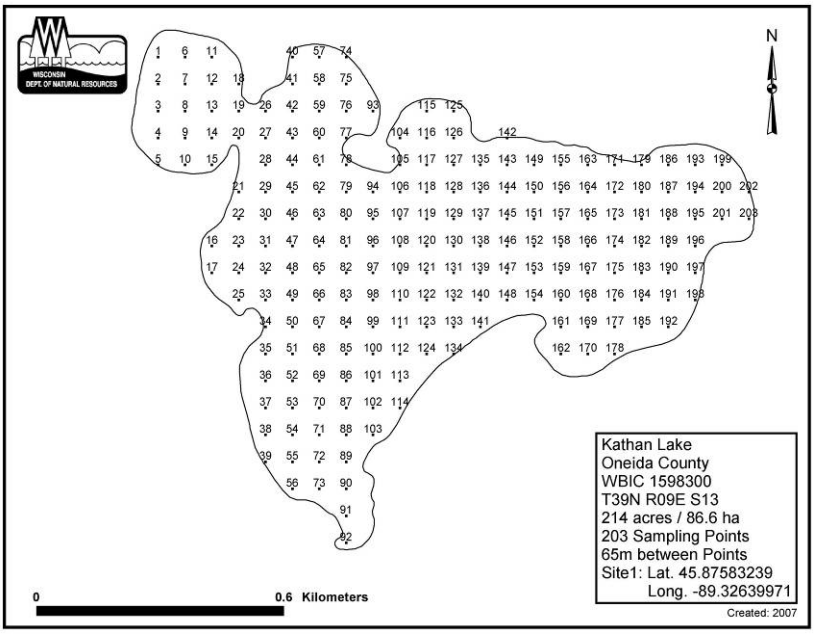


Figure 1: The point-intercept grid for Kathan Lake, Oneida County, WI, with 203 sampling sites.

Timing of Sampling

Surveys should be conducted between early July and mid August. Although certain plant community parameters (such as rake fullness and biomass) can change over the course of the

[4] Aquatic Plant Treatment Evaluation. http://www.uwsp.edu/cnr/uwexlakes/ecology/APM/Appendix-D.pdf

growing season, presence/absence data is less sensitive to seasonal variation[2]; presence can often be detected throughout the season. For many species, including Eurasian water milfoil (EWM), plant biomass and density may increase as the season progresses, whereas some species like curly-leaf pondweed (CLP), senesce much earlier in the sampling season. Rake fullness data for these species must be interpreted carefully with the sampling date in mind. If early-senescing species such as CLP are targets of management actions, please contact the WDNR Lake Coordinator in your region to coordinate the best possible sampling time.

Time Spent Sampling

Depending on the size of the lake, a survey may be completed in a few hours, or it may take several days. Ideally, a crew spends one-half to three minutes per sample site; however, this may vary depending on the following factors:

- Distance between sample sites
- Weather (i.e. wind, rain, etc.)
- Rake fullness
- Ease of navigation
- Experience; less experienced field workers may take longer to identify unfamiliar plants. However, most field workers have found that the time spent per site drops dramatically with experience. Others have reported their speed increasing greatly with a few hours of training.

PREPARING FOR FIELD WORK

Field Gear

Necessary equipment:

- Appropriate watercraft and all equipment required by state law
- Double-sided sampling rake attached to a 15-ft (4.6m) pole
- Weighted sampling rake attached to a 40-ft (12m) rope
- Handheld GPS receiver with WDNR sample sites loaded
- Print-out of lake map with WDNR sample sites
- Print-out of WDNR field datasheets on waterproof paper
- Pencils
- Sealable storage bags for voucher specimens
- Waterproof voucher sample labels
- Cooler(s) with ice for storing voucher specimens
- Depth finder

Helpful, but not required:

- Trolling motor for reaching shallow sites
- Bathymetric map
- Plant ID references or guides to aid in plant identification
- Hand lens to aid in plant identification
- Digital camera for plant specimens or field pictures
- Underwater video camera for viewing the maximum depth of plant colonization

Loading Sample Site Locations onto the GPS Receiver

Detailed instructions on loading sample site locations onto the GPS receiver depend greatly on the type of GPS receiver as well as the software used to translate site location from the text file to "waypoints" in the receiver. The WDNR commonly utilizes Garmin 76 model GPS receivers and the WDNR Garmin GPS Standalone Tool software. The WDNR Standalone Tool is only available to WDNR employees, and only works with Garmin GPS receivers. The Minnesota Garmin GPS Tool and appropriate guidance documents are available to the public and can be found online at the Minnesota DNR internet site[5]. The two programs are similar; their chief difference is that the Minnesota tool requires the GPS text file to be comma-delimited instead of tab-delimited. Procedures for other GPS models with a Wide Area Augmentation System (WAAS-capability) may be used; please refer to the manufacturer's instructions for details on uploading site locations.

Please note that storage capability varies by GPS model. Some GPS receivers are unable to store the large numbers of data sites required in some surveys. In the event that the number of sampling sites exceeds your receiver's storage capacity, the text file containing the survey site information can be split into smaller text files. You will then be able to upload successive files of sites as needed or work from multiple receivers in the field.

The instructions below describe how WDNR employees can use the WDNR Garmin Standalone Tool software to load sample site locations, or "waypoints," onto a Garmin 76 model GPS receiver.

To upload waypoints from a GPS text file to the GPS receiver, you will need:

- **PC/laptop with WDNR Garmin GPS Tool.** Your IT administrator can help you obtain and install the software.

- **GPS text file (.txt extension).** A tab-delimited text file containing the sample sites and their geographical information.

- **A Garmin 76 model GPS receiver with external data port.**

[5] Available online at: http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html (accessed September, 2009)

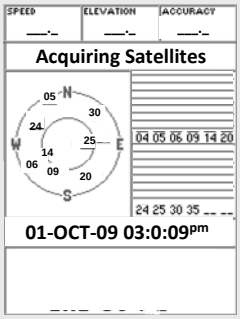
- **PC interface cable (with USB or 9-pin serial connector).** Can be purchased online at http://www.garmin.com

Step 1: Set GPS to the "Simulating GPS" Mode

Operating the receiver in "Simulating GPS" mode prevents the GPS receiver from trying to acquire a satellite signal indoors.

1. Press and hold the red [ON/OFF] button for two seconds to turn the GPS receiver on.

2. Press [PAGE] to navigate through the welcome screens until the "Acquiring Satellites" page is visible.



3. Press the [MENU] button, select "Start Simulator", and press [ENTER]; the screen heading should now read "Simulating GPS."

Step 2: Set Serial Data Format (this setting will **not** have to be re-set upon each use)

Set the serial data format on the Garmin 76 receiver to GARMIN prior to transferring data. Failure to set the serial data format to GARMIN will cause a communication error.

1. Press the [MENU] button twice to reach the main menu, use the rocker key to select "Setup", and then press [ENTER].

2. Use the rocker key to scroll left or right until the "Interface" tab is highlighted. Use the rocker key to scroll down to highlight the drop-down box and press [ENTER].

3. A menu will appear; select "GARMIN" and press [ENTER]. Press [QUIT] twice to exit the menu.

Step 3: Plug in the PC Interface Cable

1. The GPS receiver should be on and in simulation mode.

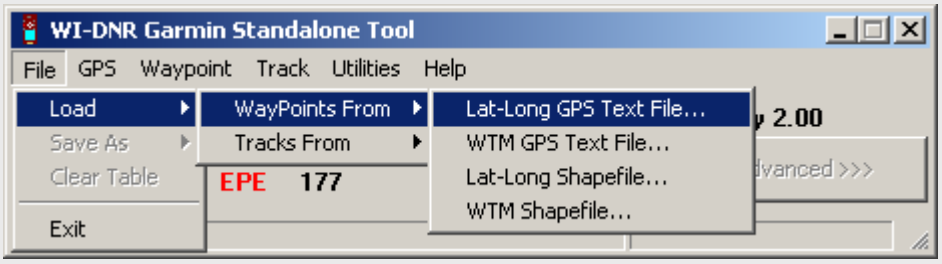
2. Plug the 9-pin serial connector cable into COM port #1 on your PC. If port #1 is in use, plug into the next available port and note the port number. The newest version of the WDNR Garmin GPS Tool (ver. 8.2.8) supports USB connectivity as an alternate to COM port connection.

3. Plug the round end of the PC interface cable into the external data/auxiliary power port under the rubber panel on the back of the GPS receiver.

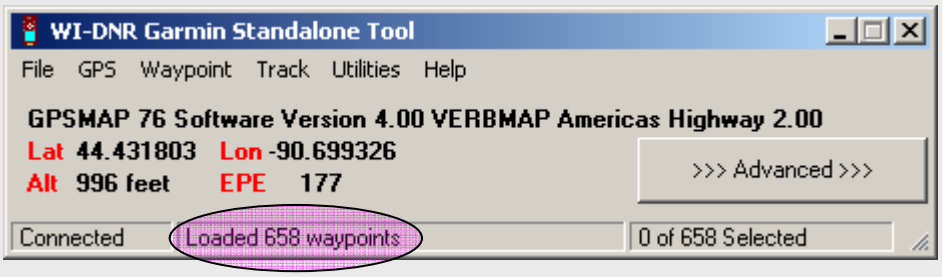
Step 4: Load the GPS text file into the WDNR Garmin Standalone Tool

1. Open the WDNR Garmin GPS Tool file on your computer. Select:

   File > Load > Waypoints From > Lat-Long GPS Text File.



2. Navigate to and select the appropriate GPS text file and select OK. The waypoints will be visible in the Tool's status bar.



3. If necessary, you can view and edit waypoints by clicking the [Advanced] button on the WDNR Garmin GPS Tool.

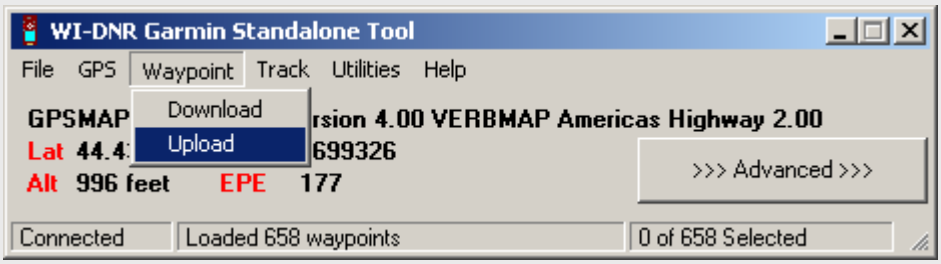
4. Troubleshooting COM-enabled setups
   - **a.** Check that the correct COM port is selected in the WDNR Garmin GPS tool.
     - **i.** GPS > Assign Port > select correct port #
   - **b.** Check that the baud rate matches that of the GPS receiver.
     - **i.** GPS > Assign Port >Baud Rate > 9600
     - **ii.** A Garmin 76 receiver will transfer at 9600 bits per second

c. Check that the serial data format is set to "GARMIN" (see Step 2).

d. If your problem persists, please consult your GPS unit's user's manual.

Step 5: Upload Waypoint Data from the WDNR Garmin GPS Tool to the GPS receiver

1. In the menu bar, select: Waypoint > Upload



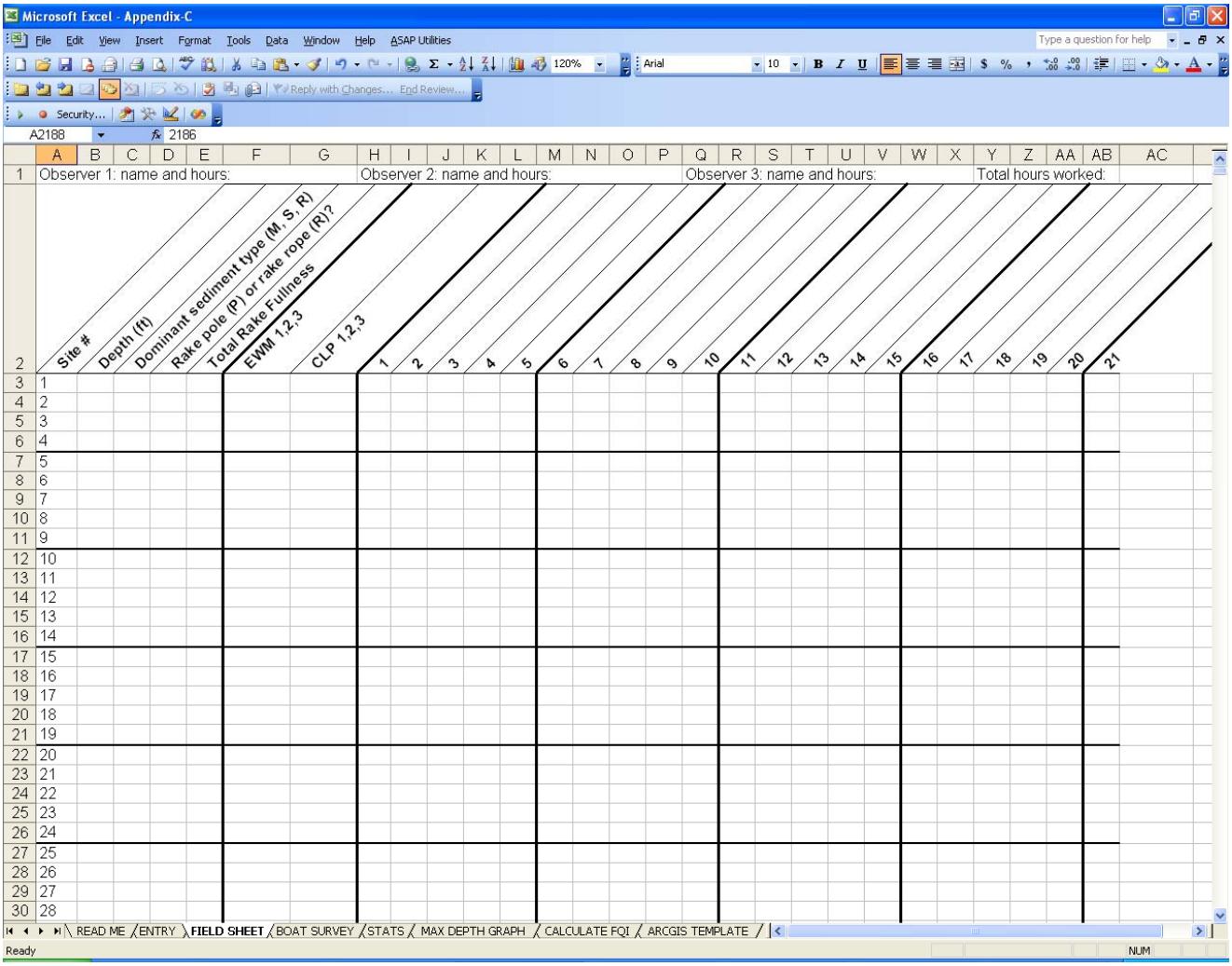
2. A pop-up window will indicate the completion of a successful upload. Click OK.

3. Check that the uploaded waypoints are visible on the GPS receiver: press [MENU] twice to get to the main menu, select "Points", press [ENTER], select "Waypoints", and press [ENTER].

4. Troubleshooting
   a. Storage capability varies by GPS model. In the event that the number of sampling sites exceeds your receiver's storage capacity, the text file containing the survey site information can be split into smaller text files. You will then be able to upload successive files as needed or work from multiple receivers in the field.
   b. For more help, please refer to the appropriate online documentation or user's manuals.

Printing Datasheets

The form used for recording data can be found on the tab labeled "FIELD SHEET" in the Aquatic Plant Survey Data Workbook, downloadable from the University of Wisconsin Extension website (http://www.uwsp.edu/cnr/uwexlakes/ecology/APM/Appendix-C.xls). Print the field sheet (waterproof paper recommended), using the "Print Area > Set Print Area" function under the "File" menu to set the appropriate number of rows to print. Under Header (View > Header and Footer > Custom Header) record lake name, Waterbody Identification Code (WBIC), county and survey date.



Constructing the Rake Samplers

The rake samplers are each constructed of two rake heads welded together, bar-to-bar, to form a double-sided rake head. The rake head is 13.8 inches (35 centimeters) long, with approximately 14 tines on each side. For use in shallow waters, mount a double-sided rake head to a pole that has the capability to extend to 15 feet (4.6 meters). For use in deeper waters, attach a second double-sided rake head to a rope; this rake head should also be weighted (Figure 2).

Pole Sampler

To make the pole samplers shown in the photographs, we removed the handles from 2 standard bow rakes (available at most hardware stores), and welded the rake heads together bar-to-bar. We mounted the rake head to an 8-foot (telescoping to 15.5 feet) pool skimmer handle purchased from a supply store (left, $50). For an even sturdier sampler we purchased an aluminum Co-Handle from Duraframe Dipnet and designed a rake pole which attaches and detaches into 3 sections (right, $200). For depth recording, mark the rake handle in one-foot increments. Electrical tape marked with permanent marker, then covered with a length of clear packing tape works well and holds up over time.

Rope Sampler

A similar rake head should be constructed and attached to a 40-foot-long rope or anchor line. In order to ensure a quick vertical descent to the lake bottom, attach a light weight (~5 lb) to the rake head, away from the tines. The rope sampler pictured here has a short piece of steel tubing welded to the rake head to serve as a handle through which 45 feet of rope is attached.

Figure 2: Examples of sampling rakes used during surveys.

COLLECTING AND RECORDING FIELD DATA

Using the Rake Samplers

Collect one rake sample per sample site.

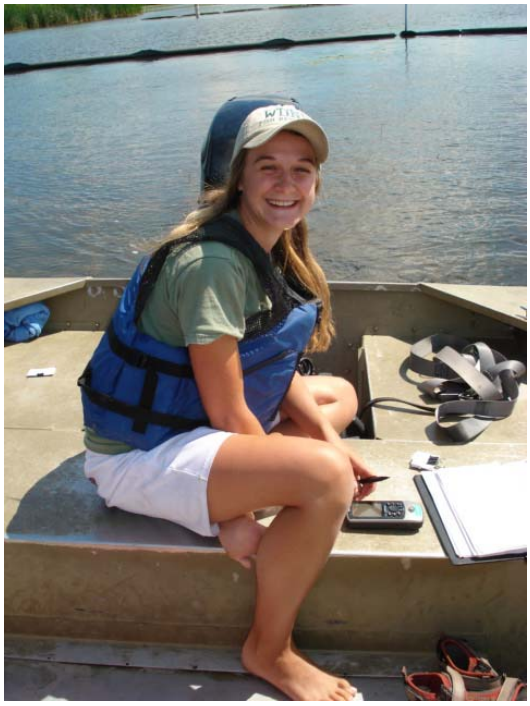
In water shallower than 15 feet deep, use the pole sampler. At each sample site, lower the rake straight through the water column to rest lightly on the bottom, twist the rake around twice, and then pull the rake straight out of the water.

In water deeper than 15 feet, drop the rope sampler straight into the water alongside the boat, drag the rake along the sediment surface for approximately one foot (0.3 m), and then pull the rake to the surface.

A large tray or bin may be used to aid in processing the entire sample.

Navigating to Sites

Accuracy



The location reported by the GPS receiver has an element of error that varies under different conditions. The total error from the GPS and your navigational error *combined* should not exceed half of the sampling resolution. Therefore, when sampling with a Garmin 76 receiver, navigate at no greater than an 80-foot zoom level and aim to completely cover the sampling site with the arrow. At 80-foot zoom, the locator arrow shown on the screen represents approximately 25 feet in length. In order to sample with acceptable accuracy, the arrow must completely cover the sample site on screen. At coarser zoom levels, because the size of the arrow remains constant, the boat may be more distant from the site even though the arrow completely covers the site. You can use a lower zoom level (120-feet is appropriate) in order to travel from site to site, but as you approach the target site, you must confirm your location at using at least the 80-ft zoom resolution to ensure you are sampling with acceptable accuracy.

Determining Maximum Depth of Plant Colonization

When sampling, you will have to determine the maximum depth at which the plants are rooted. The maximum depth of colonization (MDC) can vary greatly among lakes, from just a few feet to as deep as the physiological requirements of a species will allow. When sampling a line of sites heading from shore out to deep water, take samples until plants are no longer found on the

rake. Continue sampling at least two sites deeper to ensure you sampled well over the maximum depth of colonization. If no plants are found at these sites, simply record the depth, sampling tool used, and dominant sediment type. Leave the rake fullness and species information blank. Depending on the lake bathymetry, you may choose to continue down the same row to the other side of the lake. Use a depth finder and begin sampling again when the depth reaches that of the last (no plant) site sampled. Alternatively, if the rows are very long, you may choose to move over to the next row and sample sites back into shore, working back and forth along the shoreline and around the lake. However, if the second row is shallower than the first, be sure to start sampling sufficiently far from shore so that the depth is similar to that at which you stopped sampling in the first row. By sampling in this way, over time you will begin to hone in on the maximum depth of plant colonization.

After working several rows crossing the edge of the littoral zone, estimate the maximum depth of colonization (e.g. 20 feet) and only continue to sample deeper sites within 6 feet of this estimation (all sites ≤ 26 feet). As you complete more rows and gain confidence in your estimation, you can then begin to gradually omit sampling depths that are too deep for plants to grow. Once you have sampled the deep end of your estimated maximum depth of colonization (i.e. 26 feet) at least three times and have not found any plants, then you can discontinue sampling at anything deeper, but continue to sample any sites shallower (≤ 25 feet). If you then sample a shallower depth three times (i.e. 25 feet) and find no plants at any of those sites, you may now discontinue sampling at these deeper sites and only sample sites shallower than this new sampling depth (≤ 24 feet). Continue to successively eliminate shallower depths in sequence until you establish the maximum depth of colonization. To account for patchiness and other sources of variation, never narrow the sampling window to less than 1.5 feet of the estimated maximum depth of colonization. Use your best judgment when eliminating depths, and remember that plant distribution may be uneven and that different areas of a single lake may have plants growing relatively deeper or shallower. It is good practice to err on the side of oversampling.

Recording Data

Completing the Field Sheet

1. General site information
   Complete the top portion of the "Field Sheet" with the lake name, county, WBIC, date, names of observers, and how many hours each person worked during the survey.

2. Site number

   Each site location is numbered sequentially. Each site number will have one row of data on the "Field Sheet."

3. Depth

   Measure and record the depth to the nearest half-foot increment at each site sampled, regardless of whether vegetation is present. The pole mounted rake and rope sampler should be marked to measure the depth of water at a sample site. However, a variety of options exist for taking depth measurements, including sonar handheld depth finders (trigger models) and boat-mounted depth finders. If you are using a depth finder, it is useful to know that the accuracy may decrease greatly in densely vegetated areas. Depth finders sometimes report the depth to the top of the vegetation instead of to the sediment surface. In most cases, it is best to use depth markings on a pole-mounted rake for shallow sites.

4. Dominant sediment type

   At each sample site, record the dominant sediment type based on how the rake feels when in contact with the sediment surface as: mucky (M), sandy (S), or rocky (R).

5. Pole vs. Rope

   Record whether the pole (P) mounted rake or the rake-on-a-rope (R) was used to take the sample.

6. Rake fullness

   At each site, after pulling the rake from the water record the overall rake fullness rating that best estimates the total coverage of plants on the rake (1 - few, 2 - moderate, 3 - abundant; see Figure 3). Also identify the different species present on the rake and record a separate rake fullness rating for each. Account for plant parts that dangle or trail from the rake tines as if they were fully wrapped around the rake head. The rake may dislodge plants that will float to the surface, especially short rosette species not easily caught in the tines. Include the rake fullness rating for plants dislodged and floating but not collected on the rake. Record rake fullness ratings for filamentous algae, aquatic moss, freshwater sponges, and liverworts, but do not include these ratings when determining the overall rake fullness rating. While at a site, perform a brief visual scan. If you observe any species within 6 feet (2m) of the sample site, but not collected with the rake, record these species as observed visually ("V") on the field sheet. These species will be included in total number of species observed.

Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

Figure 3: Illustration of rake fullness ratings used during the survey.

7. Species names

   Note that the field datasheet does not include any species names, except for EWM (Eurasian water milfoil) and CLP (Curly-leaf pondweed). The sampling crew must write the species name in subsequent columns the first time that species is encountered. Names must be re-written on successive field sheets as they are encountered. You may use common or Latin names, but be sure there is no ambiguity in the name that will present problems during data entry. The use of standard abbreviations can greatly shorten this process. It is generally safe to shorten the names to include the first three letters of the genus name followed by the first three letters of the species name (i.e. *Ceratophyllum demersum* = CerDem).

8. Inaccessible sites

   It may be impossible or unsafe to reach some sample sites. Where the water is very shallow, rocks are present, or dense plant growth prevents navigation, field workers should attempt to access the site as long as doing so is safe and relatively practical. It is often possible to reach difficult sites by using oars or poling; however, keep safety in mind and practice good judgment. Do not get out and drag the boat through mucky sediment to reach a site. If the sampling site is shallow but the substrate is firm, you may be able to walk to the site from shore or from the boat. If you cannot access a site, leave the depth blank and record the appropriate comment on the field datasheet from the list below. Remember to also transfer these to the "Comments" column of the ENTRY sheet (see data entry section):

a. NONNAVIGABLE (PLANTS)

1. Sample site cannot be accessed due to thick plant growth.
2. Aquatic plants that are visible within 6 feet of a non-navigable sample site (e.g. water lilies, cattails, bulrushes, etc.) should be recorded as visuals (V) on the datasheet.

b. TERRESTRIAL

1. Sample site occurs on land (including islands).
2. Aquatic plants visible within 6 feet of a terrestrial sample site (e.g. water lilies, cattails, bulrushes, etc.) may be included in the general boat survey list, but should not be marked as visuals (V) on the datasheet.
3. Only species rooted in water should be recorded as present or as part of the boat survey.

c. SHALLOW

1. Sample site is in water that is too shallow to allow access.
2. Aquatic plants that are visible within 6 feet of a shallow sample site should be recorded as visuals (V) on the datasheet.

d. ROCKS

1. Sample site is inaccessible due to the presence of rocks.

e. DOCK

1. Sample site is inaccessible due to the presence of a dock or pier.

f. SWIM AREA

1. Sample site is inaccessible due to the presence of a designated swimming area.

g. TEMPORARY OBSTACLE

1. Sample site is inaccessible due to the presence of a temporary obstacle such as a boater, swimmer, raft, loon, etc.
2. If possible, try to revisit this site later on during the survey once the temporary obstacle has moved.

h. NO INFORMATION

1. No information is available about the sample site because it was not traveled to (inaccessible channel, accidently omitted during survey, skipped due to time constraints, etc.).

i. OTHER

1. Site was not sampled for another reason; please provide a brief description.

9. Filling Out the Boat Survey Datasheet

Often there will be localized occurrences of certain species (e.g., floating-leaf or emergent species) that are missed by the point-intercept grid. For areas that are outside the grid or in between sampling sites, record the name of the plant and the closest site to the plant. This information will be entered into the "BOAT SURVEY" section of the data entry file. Emergent near-shore vegetation should only be recorded if it's rooted in water.

Collecting and Identifying Voucher Samples

Voucher each plant species for verification and identification. You can often use plants collected on the rake as vouchers. However, if the sample is of poor quality or lacks reproductive structures, attempt to collect a better specimen. If a better specimen is unavailable, voucher and press what you are able to collect. Remember that the more material collected, the easier identification will be. Whenever possible, collect at least two specimens, and include reproductive material such as seeds, flowers, fruit, roots, etc. Place the voucher plant into a re-sealable plastic bag with a waterproof voucher label. The voucher label should include the species name, or in the case of unknown species, a unique identifier, the lake name, county, sample site, sediment type, collector's name, and the date. Additional information about habitat or co-occurring species may also be included on the tag. Place all specimens in a cooler for transport to the lab. See below, "Pressing Plants" for instructions once back at the laboratory.

Plant Identification and Troublesome Taxa

1. Plants should be identified to species whenever possible. Certain genera, including *Carex*, *Sparganium*, and *Sagittaria* must be flowering and/or fruiting to confirm identification and may not be identifiable to species without these parts.

2. Non-angiosperms such as *Chara* or *Nitella* are identified to genus only. Often, *Isoetes* can be identified to species by looking at spores, if present. Filamentous algae, aquatic moss, and freshwater sponge can be referred to simply as algae, moss, and sponge.

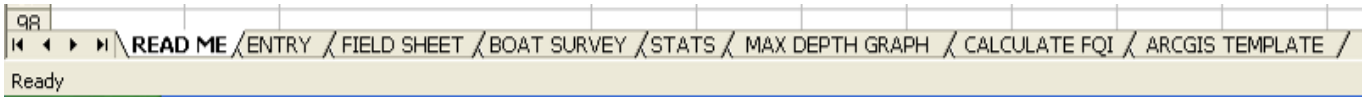
3. If a plant cannot be identified in the field, place the two voucher specimens in a re-sealable bag with a separate voucher label. Take these specimens back to the lab to verify the identity. The label should include a unique identifier, lake, county, the sample site number, and sediment type. The presence and fullness of the species should be recorded on the field datasheet under the same unique identifier name listed on the voucher label.

4. In the lab, try to identify the plant using plant identification keys and a stereo microscope. If you are still uncertain of the identity of the plant, contact a DNR biologist in your region to help with identification. Do not send specimens to an expert until you notify them of your intended shipment and they have instructed you to do so. Once the plant is identified, record this information so that the correct identification is used during data entry.

ENTERING DATA ELECTRONICALLY

Worksheet Descriptions and Instructions

The Aquatic Plant Survey Data Workbook (http://www.uwsp.edu/cnr/uwexlakes/ecology/APM/Appendix-C.xls) contains eight worksheets:



1. READ ME

   Provide a brief description of the six other worksheets included in the workbook.

2. FIELD SHEET

   The FIELD SHEET should be printed on waterproof paper for recording the field data.

3. ENTRY

   a. There are many formulas embedded in the ENTRY sheet that allow for the statistical calculations on the STATS sheet. Thus, **DO NOT add or delete columns or rows on the ENTRY or STATS sheets**.

   b. Data collected in the field is recorded on the FIELD SHEET and afterwards transferred to the electronic ENTRY sheet.

   c. Copy latitude and longitude information for the sample sites from the GPS text file and paste into the appropriate columns of the ENTRY sheet.

   d. Record the lake and county name, WBIC, survey date, and the names of the field workers.

   e. There is a column for comments on the ENTRY sheet. Please use the standardized comments discussed on page 18 of this protocol.

   f. Species' Latin names appear alphabetically in the first row of the spreadsheet. Species such as aquatic moss, freshwater sponge, filamentous algae, and liverworts are listed separately at the end of the alphabetical list.

   g. Additional species not already listed should be added in the columns at the end of the alphabetical list (sp1, sp2, etc.). Any vouchered specimens that are awaiting ID confirmation should be entered here as well. You should use the same unique voucher identifier established in the field to for ease of updating the information.

h. We strongly recommend double-checking the electronically entered data against the original field datasheets to ensure that no errors or omissions occurred during the entry process.

4. BOAT SURVEY

a. Enter information on plants observed during the survey that were observed more than 6 feet away from a sample site.

b. Additional comments about field conditions, known management activities, or other observations can also be recorded in this worksheet.

5. STATS

The STATS worksheet automatically calculates summary statistics using the data entered into the ENTRY worksheet (see Appendix 2, Table 1). There are several summary calculations including:

a. Individual Species Statistics:

- **i. Frequency of occurrence within vegetated areas (%)**: Number of sites at which a species was observed divided by the total number of vegetated sites. Frequency of occurrence is sensitive to the number of sample sites included. Including non-vegetated sites will lower the frequency of occurrence.
- **ii. Frequency of occurrence at sites shallower than maximum depth of plants**: Number of sites a species was observed at divided by the total number of sites shallower than maximum depth of plants.
- **iii. Relative frequency (%)**: This is a proportional value that reflects the degree to which an individual species contributes to the sum total of all species observations. The sum of the relative frequencies of all species is 100%. Relative frequency is not sensitive to whether all sampled sites, including non-vegetated sites, are included. Relative frequency does not take into account aquatic moss, freshwater sponges, filamentous algae, or liverworts.
- **iv. Relative frequency (squared)**: This value is only part of a calculation and is not used directly.
- **v. Number of sites where a species was found**: This is the sum of the number of sites at which a species was recorded on the rake.
- **vi. Average rake fullness**: Mean rake fullness rating, ranges from 1-3.
- **vii. Number of visual sightings**: This is the total number of times a plant was seen within 6 feet of the boat, but not collected on the rake.
- **viii. Present (visual or collected)**: Automatically fills in “present” if the species was observed at a sample site.

b. Summary Statistics:

i. **Total number of sites visited**: Total number of sites where depth was recorded, even if a rake sample was not taken.

ii. **Total number of sites with vegetation**: Total number of sites where at least one plant was found on the rake.

iii. **Total number of sites shallower than maximum depth of plants**: Total number of sites where the depth was less than or equal to the maximum depth at which plants were found. This value is used for frequency of occurrence at sites shallower than maximum depth of plants.

iv. **Frequency of occurrence at sites shallower than maximum depth of plants**: Number of times plants were recorded at a site divided by the total number of sites sampled that were shallower than the maximum depth of plants.

v. **Simpson's Diversity Index**: A nonparametric estimator of community heterogeneity. It is based on relative frequency and thus is not sensitive to whether all sampled sites (including non-vegetated sites) are included. The closer the Simpson Diversity Index is to 1, the more diverse the community.

vi. **The maximum depth of plants**: This is the depth of the deepest site sampled at which vegetation was present. Please note that this value does not take into account aquatic moss, freshwater sponges, filamentous algae, or liverworts. See "MAX DEPTH GRAPH" below for more information.

vii. **Number of sites sampled using rake on rope (R)**

viii. **Number of sites sampled using rake on pole (P)**

ix. **Average number of all species per site (shallower than max depth)**: Mean number of species found at sample sites which were less than or equal to the maximum depth of plant colonization.

x. **Average number of species per site (vegetated sites only)**: Mean number of species found at sample sites were vegetation was present.

xi. **Average number of native species per site (shallower than maximum depth)**: This does not include Eurasian water milfoil, Curly-leaf pondweed, Purple loosestrife, Spiny naiad, or Reed canary grass.

xii. **Average number of native species per site (vegetated sites only)**

xiii. **Species richness**: Total number of species observed not including visual sightings. Please note that this value does not include aquatic moss, freshwater sponges, filamentous algae, or liverworts.

xiv. **Species richness (including visuals)**: Total number of species observed including visual sightings recorded within 6 feet of the sample site (but does not include additional species found during the boat survey).

6. MAX DEPTH GRAPH

The maximum depth of colonization is an important metric to characterize accurately, as it can indicate changes in water clarity and water quality over time. This worksheet automatically displays a histogram of plant occurrences by water depth. Occasionally, unrooted plants floating in the water column are snagged by the rake, which can sometimes result in an inaccurate estimation of the maximum depth of colonization. It is

important to examine the reported maximum depth of plant colonization in order to detect potential outliers. As a general rule, a single plant occurrence reported at a site which is 2 or more feet deeper than the next shallowest site with plants is considered an outlier, and should be excluded when determining the maximum depth of plant colonization (see Figure 4).

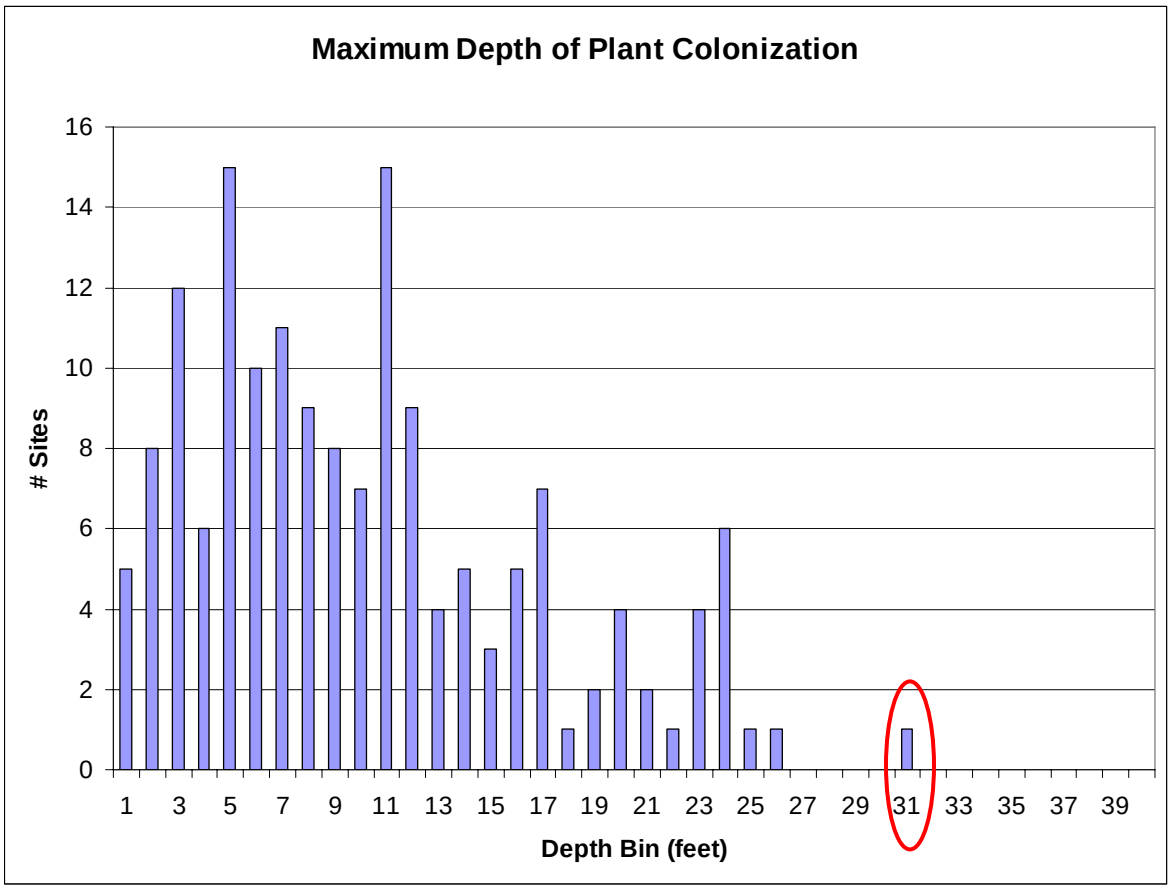


Figure 4: Distribution of plant occurrences versus water column depth. The value circled in red is more than 2 feet deeper than all other plants found during the survey, and is considered an outlier. Outliers should be omitted when determining the maximum depth of plant colonization.

It is necessary to delete the occurrence of this outlier from the ENTRY spreadsheet so that the automatically-calculated statistics will reflect the revised maximum depth of colonization. To do this, locate the sampling point number on the ENTRY worksheet where the outlier was found. Scroll across the row until you find the outlier to omit. Once you've located the cell with the outlier, press delete to clear the cell. Right click on the cell and select "Insert Comment". Briefly describe the occurrence of the outlier and the reason for omitting it. Follow the same steps with the overall rake fullness column, deleting out the contents of the cell and including a brief comment. Please also include information regarding any omissions of outliers and revised MDC directly on the STATS spreadsheet, typing all comments in the space below "See Max Depth Graph Worksheet to Confirm".

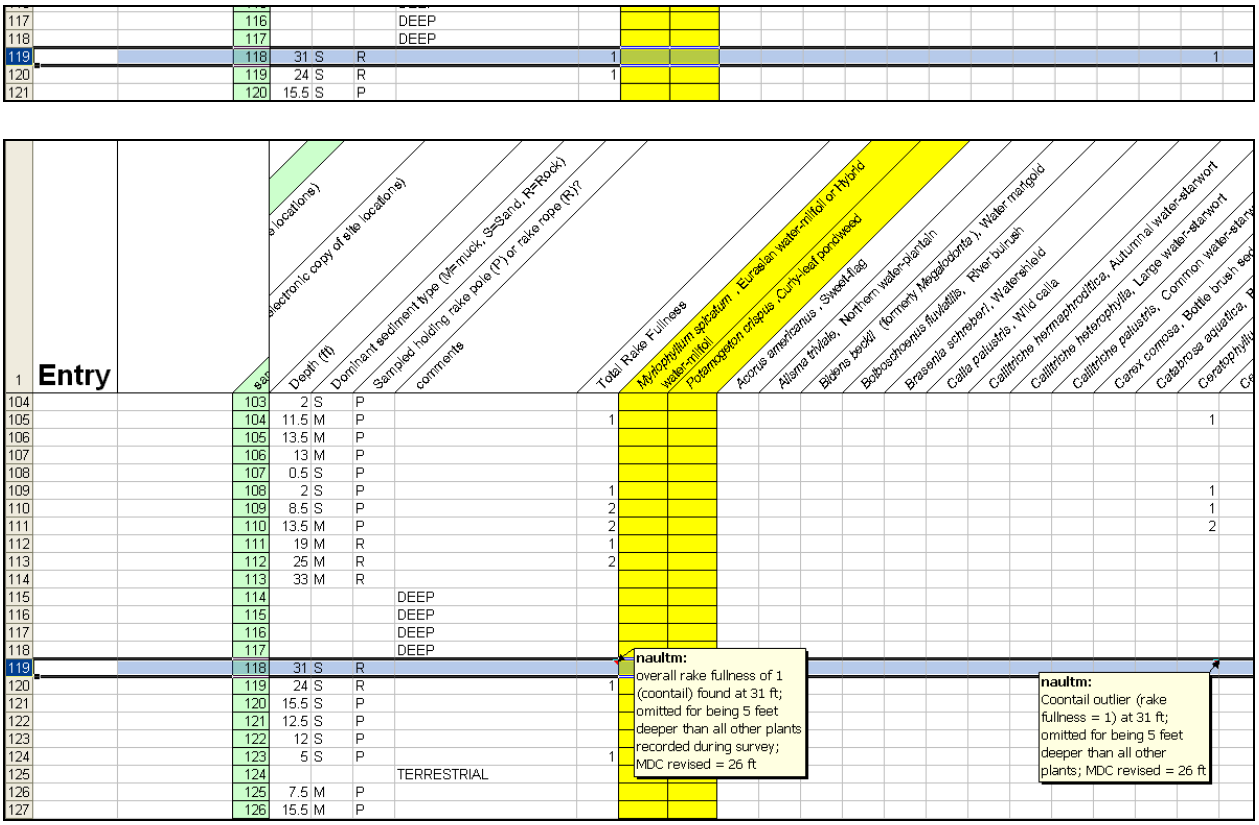


Figure 5: ***Top*** **- Ceratophyllum demersum outlier at 31 feet (sampling point #118).** ***Bottom*** **- C. demersum outlier at 31 feet deleted from both C. demersum and total rake fullness columns. Brief descriptive comments should be inserted in cells where outliers have been deleted.**

7. CALCULATE FQI

This worksheet automatically calculates the Floristic Quality Index (FQI) based upon the data entered into the ENTRY worksheet. The FQI metric is designed to evaluate the closeness of the flora in an area to that of undisturbed conditions[6]. The species list considered in this calculation is that which Nichols[6] originally considered, and the "C values" used in this spreadsheet reflect those currently accepted by the Wisconsin State Herbarium[7]. Species are counted as being present only if they are collected on the rake at some point during the baseline survey.

8. ARCGIS TEMPLATE

This worksheet of truncated species names is used when creating plant distribution maps using ArcGIS 9.3. See Appendix 3 for more information.

[6] Nichols, S.A. 1999. Floristic Quality Assessment of Wisconsin Lake Plant Communities with Example Applications. Journal of Lake and Reservoir Management, 15(2):133-141.

[7] University of Wisconsin-Madison, 2001. Wisconsin Floristic Quality Assessment (WFQA). Retrieved October 27, 2009 from: http://www.botany.wisc.edu/WFQA.asp

Saving the File

Once the data is electronically entered into the Aquatic Plant Survey Data Workbook (http://www.uwsp.edu/cnr/uwexlakes/ecology/APM/Appendix-C.xls), please save the file with a name indicating the lake, county, WBIC, and year sampled. The format we recommend is: Lake_County_WBIC_(year).xls. For example, Lake Mendota sampled in 2009 would be named: Mendota_Dane_805400_(2009).xls

Double-Checking the Data

We strongly recommend double-checking the electronic data against the field sheet to catch any errors made during the entry process.

Sending the Data

Send the final electronic file to the WDNR via email (DNRBaselineAquaticPlants@wisconsin.gov). There should be one file for each completed lake survey.

Creation of Plant Distribution Maps

Aquatic plant distribution maps can be easily created using the point-intercept data collected during the survey. Instructions on how to create these maps can be found in Appendix 3 and 4.

Statistical Analysis of Data

Statistical comparisons of datasets can easily be analyzed between pre- and post-management activities or between two survey years by using a simple chi-square analysis. The chi-square analysis is commonly used to examine whether or not there was a statistically significant change in the occurrence of a plant species between the survey years or after management activities have occurred. The "Compute Pre-Post Data" worksheet (available at: http://www.uwsp.edu/cnr/uwexlakes/ecology/APM/Apendix-D1.xls), allows users to enter in the number of sites at which a species was recorded during each survey, and provides an output indicating whether or not differences reflect a statistically significant change in the plant community.

PRESSING PLANTS – PREPARATION OF VOUCHER SPECIMENS

"Floating" Specimens

Because most aquatic plants, especially finely dissected specimens, tend to stick to paper as they dry, it is usually better to "float" the plant directly onto herbarium paper. However, if the plant is large and robust, or not entirely aquatic (such as bulrushes, emergent sedges or pickerelweed) you can press the plant in newsprint.

1. Use a pencil to label the mounting paper with the plant name, geographic location, date collected, and serial code (a unique identifier in a series that identifies all specimens you have pressed; we use the initials of the presser followed by the year and a sequential number; i.e. AM2009-01). Mount only one species per sheet, and do not cut herbarium sheets in half.

2. Carefully rinse the plant so it is free of epiphyton, silt, and other debris.

3. Fill a sink or tray with about one inch of water. Slip the labeled mounting paper into the water.

4. Float the plant in the water and arrange it onto the sheet.

5. If the plant has fine leaflets, such as water milfoil or bladderwort, cut off one leaf and display it floated out onto the paper so that leaflet characteristics can be readily observed.

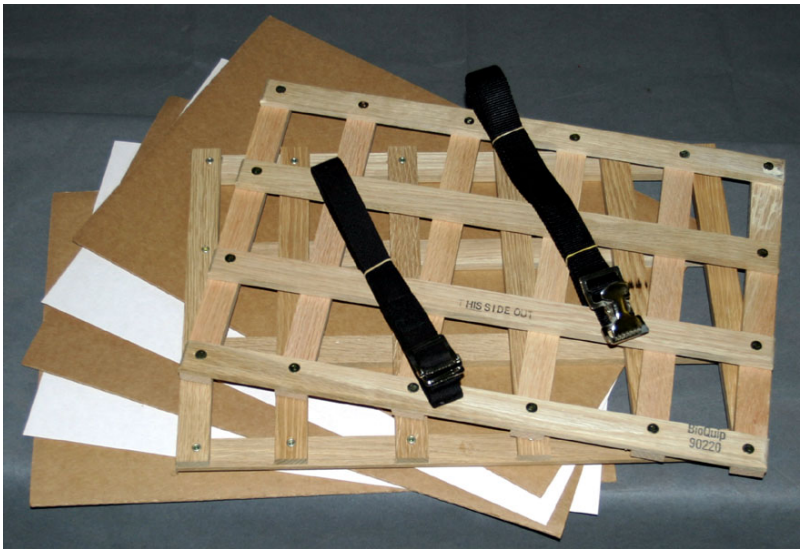
6. The plant may be bent into a "V" or "W" or curled shape to fit on the sheet.

7. Slowly lift the paper out of the water by one end. Keeping the plant in place, let the water slowly drain off.

8. Use a toothpick or probe to spread out plant parts for better display, making sure to expose identifiable characteristics such as stipules, sheaths or seeds.

Pressing Specimens

- Cover the plant with a sheet of waxed paper or plastic wrap if it is especially delicate (we recommend this technique especially for bladderworts and other fine, delicate species).
- Place the specimen sheet inside folds of newspaper.
- Place the newspaper between two sheets of blotting paper, and the blotting paper between two sheets of corrugated cardboard.
- Place multiple specimens in a plant press. Use rope or straps to compress plants to keep specimens flat as they dry.



- Place the press somewhere warm and dry. Placing the press on its long edge on top of a ventilated aluminum or aluminum-lined box containing incandescent light bulbs allows for quick drying. Remove plants after several days when they are thoroughly dry.

Suggested Herbarium Materials

Herbarium and science supply businesses such as the Herbarium Supply Company (www.herbariumsupply.com; 800-348-2338) sell many herbarium products including mounting paper, plant presses, blotting paper, and cardboard spacers. When ordering herbarium mounting paper, look for acid-free, non-glossy, 100% rag, and heavy or standard weights.

Preparing Dried Specimens for Shipment to an Herbarium

1. **Package specimens**. Place each dried specimen with unique identifier clearly marked on the newsprint or mounting paper in the fold of a single sheet of newspaper and place all of the newspaper/specimens between two pieces of cardboard. Tie or rubber band the cardboard bundle together, and put it into a padded envelope or a box. As long as the package is going to or from an educational institution, a special 4th class mailing rate called "Library Rate" can be used.

2. **Label information**. Both of the herbaria utilized by the WDNR label the dried plant specimens themselves. Prepare an electronic spreadsheet with the relevant information for each specimen. Send the file to Mark Wetter (mawetter@wisc.edu) for the Madison herbarium or to Robert Freckmann (rfreckma@uwsp.edu) for the Stevens Point herbarium. Each row (i.e. each specimen) in the file will need a unique identifier such as the collector's initials followed by a specimen number. Use the same identifier on the specimen so the herbaria can match the label to the specimen. Each row of the spreadsheet should include columns for the following (column heading in **bold**, example in plain text):

    a. **Specimen Identifier** CD2009-01
    b. **Collector Name** Isabel Velez
    c. **Preparer's Name** (If different from collector) Chad Douwe
    d. **Lake Name** Little John Jr.
    e. **County** Vilas
    f. **Date collected** 7 July 2009
    g. **Specimen ID** *Potamogeton spirillus*, Spiral-fruited pondweed
    h. **Habitat** muck over sand
    i. **Associated species (if known)** *Najas gracillima, Potamogeton friesii*
    j. **TRS** T41N R07E S29
    k. **WBIC** 1861700
    l. **More detailed location** (if known) SW edge of lake, 1 m depth
    m. **GPS lat/long coordinates** (if known) N 46°15.037' W090°01.804'
    n. **Herbarium of deposition** UWSP

3. **Send pressed plants** to Mark Wetter or Ted Cochrane (UW- Madison), or to Dr. Robert Freckmann (UW-Stevens Point). **Please notify the herbarium of your intention and wait for confirmation before sending plants**:

Mark Wetter or Ted Cochrane
University of Wisconsin-Madison Herbarium
Department of Botany, Birge Hall
430 Lincoln Drive
Madison, WI 53706-1381
tel.: (608) 262-2792
FAX: (608) 262-7509
www.botany.wisc.edu/herbarium/

Dr. Robert Freckmann
Robert Freckmann Herbarium
0310 CNR Addition
1900 Franklin Street
Stevens Point, WI 54481
rfreckma@uwsp.edu

4. **Send electronic record to the WDNR.** Please send a copy of the electronic herbarium file along with the plant data to DNRBaselineAquaticPlants@wisconsin.gov.

CONCLUSIONS

There will be four products from each plant survey. First, there will be the raw data from the quantitative survey which provides a lakewide plant species list and distribution and rake fullness data for each species observed. Second, there will be summary statistics useful in characterizing and comparing populations. Third, there will be observations from the general boat survey. Fourth, voucher specimens will provide a catalog of plant species present in the lake and will bolster the state collections. All electronic data should be sent by email to the WDNR (DNRBaselineAquaticPlants@wisconsin.gov).

ACKNOWLEDGEMENTS

We would like to extend our sincere thanks to the WDNR Lake Coordinators and Aquatic Plant Management staff for recommendations and comments in the design, implementation, and applications of the data and the survey methodology. The many hours the field staff put into testing this methodology was integral to its successful development, and we are very grateful for all of their hard work.

Appendix 1

Current (02/2010) contact information for regional WDNR aquatic plant management (APM) and lake coordinators

Northern Region (NOR)

(Ashland, Barron, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Langlade, Lincoln, Oneida, Polk, Price, Rusk, Sawyer, Taylor, Vilas, & Washburn Co.)

Frank Koshere
APM Coordinator
715-392-0807
frank.koshere@wisconsin.gov

Kevin Gauthier, Sr.
Florence, Forest, Langlade, Lincoln, Oneida, & Vilas Co.
715-365-8937
kevin.gauthiersr@wisconsin.gov

Pamela Toshner
Barron, Bayfield, Burnett, Douglas, Polk, & Washburn Co.
715-635-4073
pamela.toshner@wisconsin.gov

Jim Kreitlow
Ashland, Iron, Price, Rusk, Sawyer, & Taylor Co.
715-365-8947
james.kreitlow@wisconsin.gov

Southeast Region (SER)

(Kenosha, Milwaukee, Ozaukee, Racine, Sheboygan, Walworth, Washington, & Waukesha Co.)

Heidi Bunk
: Ozaukee, Sheboygan, Walworth, Washington, & Waukesha Co.
262-574-2130
heidi.bunk@wisconsin.gov

Craig Helker
Kenosha, Milwaukee, & Racine Co.
262-884-2357
craig.helker@wisconsin.gov

South Central Region (SCR)

(Columbia, Dane, Dodge, Green, Grant, Iowa, Jefferson, Lafayette, Richland, Rock, & Sauk Co.)

Susan Graham
Lake & APM Coordinator
608-275-3329
susan.graham@wisconsin.gov

Northeast Region (NER)

(Brown, Calumet, Door, Fond du Lac, Green Lake, Kewaunee, Manitowoc, Marinette, Marquette, Menominee, Oconto, Outagamie, Shawano, Waupaca, Waushara, & Winnebago Co.)

Mary Gansberg
Kewaunee, Door, Manitowoc, & Menominee Co.
920-662-5489
mary.gansberg@wisconsin.gov

Ted Johnson
Green Lake, Marquette, Waupaca, & Waushara
920-787-4686 ext. 3017
tedm.johnson@wisconsin.gov

Mark Sesing
Fond du Lac, Outagamie, & Winnebago Co.
920-485-3023
mark.sesing@wisconsin.gov

Jim Reyburn
Brown, Oconto, & Shawano Co.
920-662-5465
james.reyburn@wisconsin.gov

Greg Sevener
Marinette Co.
715-582-5013
gregory.sevener@wisconsin.gov

West Central Region (WCR)

(Adams, Buffalo, Chippewa, Clark, Crawford, Dunn, Eau Claire, Jackson, Juneau, La Crosse, Marathon, Monroe, Pepin, Pierce, Polk, Portage, St. Croix, Trempealeau, Vernon, & Wood Co.)

Scott Provost
APM Coordinator
715-421-7881 ext. 3017
scott.provost@wisconsin.gov

Buzz Sorge
Lake Coordinator
715-839-3794
patrick.sorge@wisconsin.gov

Appendix 2

This appendix contains examples of statistical outputs created through the point-intercept sampling method for Kathan Lake, Oneida County. The data was collected during a survey conducted August 21-22, 2007.

Table 1. Summary Statistics

Total number of sites set-up	**203**
Total number of sites visited	**171**
Total number of sites with vegetation	**149**
Total number of sites shallower than maximum depth of plants	**165**
Frequency of occurrence at sites shallower than maximum depth of plants	**90.30**
Simpson Diversity Index	**0.94**
Maximum depth of plants (ft)	**9.50**
Number of sites sampled using rake on Rope (R)	**0**
Number of sites sampled using rake on Pole (P)	**171**
Average number of all species per site (shallower than max depth)	**3.96**
Average number of all species per site (veg. sites only)	**4.39**
Average number of native species per site (shallower than max depth)	**3.56**
Average number of native species per site (veg. sites only)	**3.95**
Species Richness	**37**
Species Richness (including visuals)	**38**
Species Richness (including visuals & boat survey)	**40**

Table 2. Individual species frequency of occurrences

Common Name	Scientific Name	% Frequency (Littoral)	% Frequency (Whole lake)	% Frequency (in vegetated areas)	Relative Frequency (%)
Bushy pondweed	*Najas flexilis*	41.2	39.8	45.6	10.4
Common waterweed	*Elodea canadensis*	40.6	39.2	45.0	10.2
Eurasian water milfoil*	*Myriophyllum spicatum**	40.0	38.6	44.3	10.1
Filamentous algae	*Algae* spp.	26.1	25.1	28.9	6.6
Coontail	*Ceratophyllum demersum*	23.0	22.2	25.5	5.8
Stoneworts	*Nitella* spp.	21.8	21.1	24.2	5.5
Watershield	*Brasenia schreberi*	20.6	19.9	22.8	5.2
Small bladderwort	*Utricularia minor*	17.6	17.0	19.5	4.4
Small pondweed	*Potamogeton pusillus*	17.0	16.4	18.8	4.3
Common bladderwort	*Utricularia vulgaris*	16.4	15.8	18.1	4.1
Wild celery	*Vallisneria americana*	15.2	14.6	16.8	3.8
Flat stem pondweed	*Potamogeton zosteriformis*	13.9	13.5	15.4	3.5
Stiff pondweed	*Potamogeton strictifolius*	11.5	11.1	12.8	2.9
Ribbon leaf pondweed	*Potamogeton epihydrus*	9.1	8.8	10.1	2.3
White water lily	*Nymphaea odorata*	7.9	7.6	8.7	2.0
Muskgrasses	*Chara* spp.	7.3	7.0	8.1	1.8
Freshwater sponge	Sponge spp.	6.1	5.8	6.7	1.5
Moss	Moss spp.	6.1	5.8	6.7	1.5
Large-leaf pondweed	*Potamogeton amplifolius*	5.5	5.3	6.0	1.4
Spiny-spored quillwort	*Isoetes echinospora*	4.9	4.7	5.4	1.2
Waterwort	*Elatine minima*	4.2	4.1	4.7	1.1
Creeping spikerush	*Eleocharis palustris*	4.2	4.1	4.7	1.1
Water horsetail	*Equisetum fluviatile*	4.2	4.1	4.7	1.1
Northern water milfoil	*Myriophyllum sibiricum*	4.2	4.1	4.7	1.1
Thin floating-leaf bur-reed	*Sparganium* sp.	4.2	4.1	4.7	1.1
Spatterdock	*Nuphar variegata*	3.6	3.5	4.0	0.9
Spiral-fruited pondweed	*Potamogeton spirillus*	3.6	3.5	4.0	0.9
American bur-reed	*Sparganium americanum*	3.6	3.5	4.0	0.9
Shoreweed	*Littorella uniflora*	3.0	2.9	3.4	0.8
Brown-fruited rush	*Juncus pelocarpus* f. *submersus*	2.4	2.3	2.7	0.6
Variable pondweed	*Potamogeton gramineus*	2.4	2.3	2.7	0.6
Twin-stemmed bladderwort	*Utricularia geminiscapa*	1.8	1.8	2.0	0.5
Pipewort	*Eriocaulon aquaticum*	0.6	0.6	0.7	0.2
Clasping leaf pondweed	*Potamogeton richardsonii*	0.6	0.6	0.7	0.2
Broad-leaved arrowhead	*Sagittaria latifolia*	0.6	0.6	0.7	0.2
Thin-leaved pondweed	*Potamogeton* sp.	0.6	0.6	0.7	0.2
Flat-leaved bladderwort	*Utricularia intermedia*	0.6	0.6	0.7	0.2
Cattail	*Typha* sp.	Visual	Visual	Visual	Visual
Needle spikerush	*Eleocharis acicularis*	Boat Survey	Boat Survey	Boat Survey	Boat Survey
Three-way sedge	*Dulichium arundinaceum*	Boat Survey	Boat Survey	Boat Survey	Boat Survey

Table 3. Number of sites where species was found and average rake fullness rating

Common Name	Scientific Name	# sites where species was found	# sites where species was found (including visuals)	Average rake fullness rating
Bushy pondweed	*Najas flexilis*	68	68	1.28
Common waterweed	*Elodea canadensis*	67	67	1.28
Eurasian water milfoil*	*Myriophyllum spicatum**	66	71	1.47
Filamentous algae	*Algae* spp.	43	43	1.00
Coontail	*Ceratophyllum demersum*	38	38	1.37
Stoneworts	*Nitella* spp.	36	36	1.00
Watershield	*Brasenia schreberi*	34	58	1.68
Small bladderwort	*Utricularia minor*	29	29	1.10
Small pondweed	*Potamogeton pusillus*	28	28	1.14
Common bladderwort	*Utricularia vulgaris*	27	27	1.30
Wild celery	*Vallisneria americana*	25	26	1.36
Flat stem pondweed	*Potamogeton zosteriformis*	23	25	1.22
Stiff pondweed	*Potamogeton strictifolius*	19	19	1.16
Ribbon leaf pondweed	*Potamogeton epihydrus*	15	18	1.27
White water lily	*Nymphaea odorata*	13	42	1.69
Muskgrasses	*Chara* spp.	12	12	1.25
Freshwater sponge	Sponge spp.	10	11	1.00
Moss	Moss spp.	10	10	1.20
Large-leaf pondweed	*Potamogeton amplifolius*	9	10	1.33
Spiny-spored quillwort	*Isoetes echinospora*	8	11	1.00
Waterwort	*Elatine minima*	7	8	1.00
Creeping spikerush	*Eleocharis palustris*	7	9	1.14
Water horsetail	*Equisetum fluviatile*	7	15	1.43
Northern water milfoil	*Myriophyllum sibiricum*	7	7	1.00
Thin floating-leaf bur-reed	*Sparganium* sp.	7	7	1.00
Spatterdock	*Nuphar variegata*	6	22	1.17
Spiral-fruited pondweed	*Potamogeton spirillus*	6	6	1.00
American bur-reed	*Sparganium americanum*	6	11	1.50
Shoreweed	*Littorella uniflora*	5	5	1.00
Brown-fruited rush	*Juncus pelocarpus* f. *submersus*	4	5	1.25
Variable pondweed	*Potamogeton gramineus*	4	5	1.00
Twin-stemmed bladderwort	*Utricularia geminiscapa*	3	3	1.00
Pipewort	*Eriocaulon aquaticum*	1	2	1.00
Clasping leaf pondweed	*Potamogeton richardsonii*	1	1	2.00
Broad-leaved arrowhead	*Sagittaria latifolia*	1	1	1.00
Thin-leaved pondweed	*Potamogeton* sp.	1	1	1.00
Flat-leaved bladderwort	*Utricularia intermedia*	1	1	1.00
Cattail	*Typha* sp.	Visual	3	n/a
Needle spikerush	*Eleocharis acicularis*	Boat Survey	Boat Survey	n/a
Three-way sedge	*Dulichium arundinaceum*	Boat Survey	Boat Survey	n/a

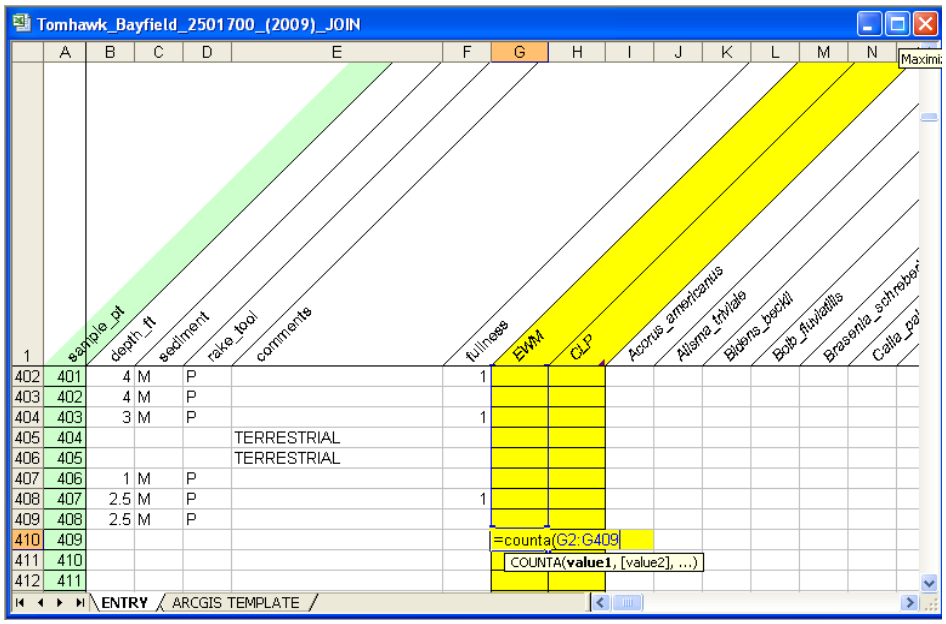
Appendix 3

Creating a Plant Distribution Map Using Point Intercept Data in ArcGIS 9.3

This is a protocol for making a plant distribution map using ArcGIS 9.3 and the Excel (2003 version) file of data from the point intercept (PI) survey. This protocol can be changed in a number of different ways and still produce a similar product. The best way to make PI-based maps depends on the particular dataset; however, this procedure works well in most cases. Similar images may be created in PowerPoint or in photo editing software if the dataset is not large or complex.

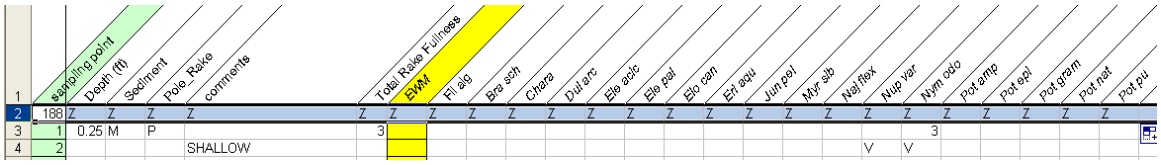
1. After entering the PI survey data into the Aquatic Plant Survey Data Workbook (Appendix-C.xls), save the file using a unique name. We recommend the convention: Lake_County_WBIC_(YYYY).xls

2. Prepare <Lake_County_WBIC_(YYYY).xls> For Join
    a. Open file in Excel
    b. File → Save As → Lake_County_WBIC_(YYYY)_JOIN.xls (DO NOT MODIFY ORIGINAL FILE)
    c. Delete all worksheets except for ENTRY and ARCGIS TEMPLATE (make sure to scroll left and delete the README sheet)
        i. Click on worksheet tab; Edit → Delete Sheet → Delete
    d. Delete the following columns
        i. Entry columns (A & I) and calculated columns (B-H)
            1. Columns B-H are normally hidden. To "unhide" them, cursor over the column heading (A) at the top of the sheet and click/drag to highlight it and the adjacent column (I). Right click the highlighted region, then select unhide. Columns B-H are colored blue. Now delete all columns A-I.
        ii. Latitude, Longitude columns (possibly hidden, located between sampling point and depth columns)
        iii. Replace first row of ENTRY with ARCGIS TEMPLATE
            1. Copy the entire first row of truncated species names from the ARCGIS TEMPLATE worksheet
            2. Highlight the first row on the ENTRY worksheet and replace with the template (Edit → Paste)
        iv. Species columns with no data
            1. Add a count row to identify empty columns to delete
                a. Select all cells and remove any validation
                    i. Select All (Ctrl-A)
                    ii. Data → Validation → OK → Allow Any Value → OK
                b. In the row below the last sampled point, and in the first column under a plant species, enter the formula =counta(
                c. Then highlight the column up to the first sampling point. The beginning of this procedure is depicted below.



d. Finally, add a closing) and hit enter. The final formula will be similar to this: =counta(G2:G500)
e. Point the cursor over the bottom right corner of the cell until cursor turns into a "+". Click/Drag this formula all the way across to the end of the species list.
f. Delete any columns where the sum row is equal to 0
g. Then delete the sum row

e. Delete any rows after the last applicable sample point
   i. The "sample_pt" column is usually populated up to 4000 points; delete any rows where the sampling point column is numbered, but these sample points are greater than the number of points set-up in the lakewide grid, and therefore the row doesn't contain any information.
f. Add a "dummy" row so all data imports into ArcGIS as "text"
   i. Add a row directly above the first sampled point
   ii. In this newly created row, under the Sampling Point column, enter the number equal to the total number of sample points plus 1 (i.e. total sampling points in example image is 187. The number 188 would be entered into the "dummy" row under the sampling point)
g. Enter "Z" in all other cells in all columns that contain any information



h. Save the file and close Excel

3. Save the lake specific polygon and point shapefiles to a folder on a local drive
   a. We'll refer to this folder as "MapFolder"

4. Open ArcMap
   a. Select to Start using ArcMap with "a new empty map" and click "OK"

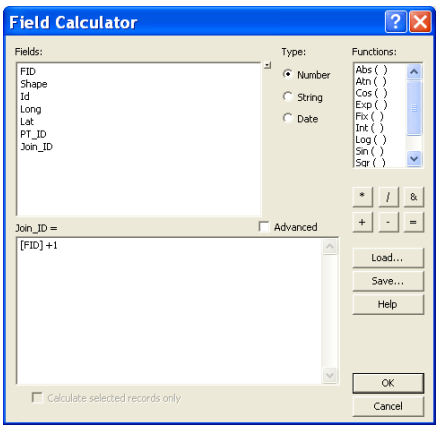
5. Add Data (either method "a" or "b")
    a. Using Add Data Button
        i. Select the "Add Data" button; or File → Add Data 
        ii. Navigate to MapFolder
        iii. Highlight both the lake polygon (lake_country_WBIC_poly.shp) and point (lake_county_WBIC_XXmpts.shp) shapefiles
        iv. Click on 'Add'
    b. Directly from ArcCatalog
        i. Situate ArcMap and ArcCatalog windows so that you can see both
        ii. Navigate to MapFolder in ArcCatalog
        iii. Highlight both the lake polygon (lake_county_WBIC_poly) and point (lake_county_WBIC_XXmpts) shapefiles
        iv. Drag and drop these shapefiles into ArcMap
        v. Note: Shapefiles should only be saved, deleted, moved, etc. in ArcCatalog. Using Windows Explorer with shapefiles can result in accidental deletion of individual shapefile files (i.e. *.shp, *.dbf, *.sbn, *.shx, *.sbx, and *.sbn files must all be stored together. ArcCatalog packages these files together so nothing gets lost)

6. Defining Shapefile Projections
    a. If after adding in your shapefiles a warning message regarding "Unknown Spatial Reference" appears, the shapefiles coordinate system is not defined
        i. To define and verify projection, please contact DNRBaselineAquaticPlants@wisconsin.gov
        ii. Alternatively, the shapefile projection can be defined manually by using the Define Projection Tool located in ArcToolbox
            1. ArcToolbox → Data Management Tools → Projections and Transformations → Define Projection
            2. Input Dataset or Feature Class
                a. Select the shapefile that needs a defined projection
            3. Click on the browse button (right side of dialog box)
            4. In the Spatial Reference Properties dialog box, click on the "Select" button
            5. Browse for the correct coordinate system
                a. Projected Coordinate System → State Systems → NAD 1983 HARN Wisconsin TM.prj; Click Add.
                    i. Do not use the US Feet system
                    ii. The coordinate system name may also be displayed as NAD 1983 HARN Transverse Mercator
                    iii. Coordinate system parameters:
                        1. Projection → Transverse Mercator
                        False Easting → 520000.00000000
                        False Northing → -4480000.000000
                        Central Meridian → -90.00000000
                        Linear Unit → Meter

6. Select “OK” on Spatial Reference Properties dialog box, and “OK” on define projection tool

7. Edit Attribute Table for point shapefile
    a. Open Attribute Table
        i. Right click on point shapefile in ArcMap table of contents
        ii. Select “Open Attribute Table”
    b. Add a Field
        i. Select the “Options” button → “Add Field”
        ii. Name: Join_ID
        iii. Type: Double
        iv. Precision: 10
        v. Scale: 3

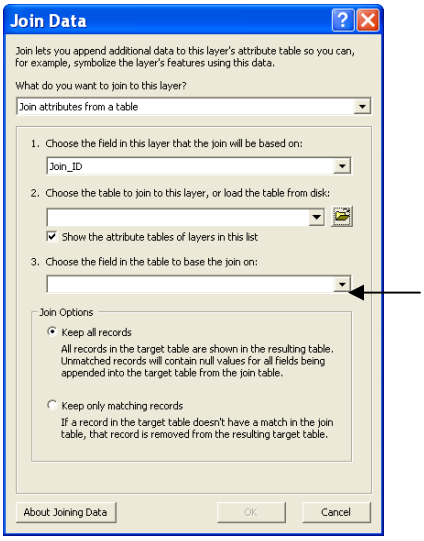
    c. Populate Join_ID Column
        i. Right click on “Join_ID” column heading
        ii. Select “Field Calculator”
        iii. If Field Calculator warning message pops up, click “Yes”
        iv. Set expression by double-clicking FID in the “Fields:” box and typing +1. The white box under “Join_ID =” should now read **[FID] +1**
        v. Click “OK”
        vi. Your Join_ID column should now be populated in sequential order, starting with point #1 at the top
        vii. Close the attribute table
        viii. Note: This expression is assuming that each unique ID was based off of the calculation [FID] +1 when creating the initial point file. If the unique ID’s were not created in sequential order based on the FID field, then calculate Join_ID field accordingly (example: Truncate a unique ID such as ‘Como001’ so that it just reads ‘001’ in the Join_ID field.)



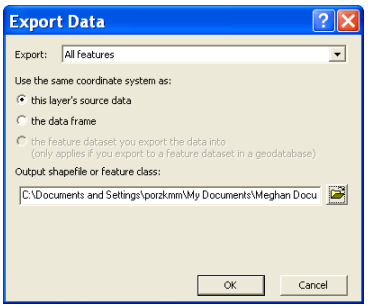
8. Join shapefile to <Lake_County_WBIC_(YYYY)_JOIN.xls>
    a. Right click on point shapefile in ArcMap table of contents
    b. Select Joins and Relates → Join…
    c. Set the following options:
        i. Join Attributes from a table
        ii. Join will be based on “Join_ID”
        iii. Choose the table to join to this layer
            1. Click on Window Folder (See arrow)

2. Navigate to and double-click on the Excel file saved in step 2
3. Double-click on the 'ENTRY $' sheet
4. Click "Add"

iv. Base the join on "sample_pt"
v. Join Options: Keep All Records (If using ArcGIS 9.2, these options can be viewed by clicking the "Advanced" button)
vi. Click "OK"
vii. If prompted to create index, select "Yes"



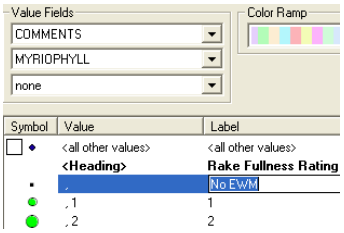
9. Export joined shapefile to make it permanent
    a. Right click on joined point shapefile in ArcMap table of contents
    b. Select Data → Export Data
    c. Set the following options:
        i. Export: All Features
        ii. Use the same coordinate system as: this layer's source data
        iii. Output shapefile or feature class: Save in MapFolder as **Lake_County_WBIC_ XXpts_YEAR_JOIN.shp**



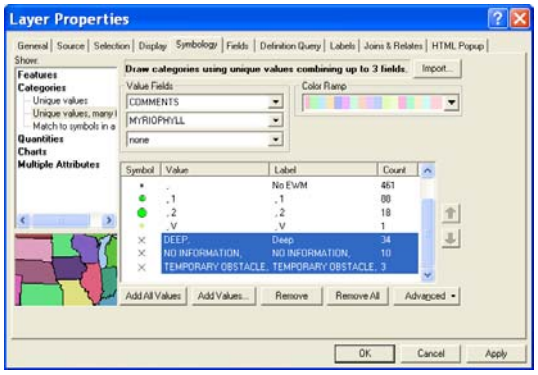
    d. Click "OK"
    e. When asked if you want to add the exported data to the map as a layer, select "Yes"
        i. This final joined shapefile will now be referred to as "Joined Point Shapefile"
    f. Remove the Join from the original point shapefile
        i. Right click on point shapefile in ArcMap table of contents
        ii. Select Joins and Relates → Remove Join(s) → Remove All Joins
    g. In the table of contents, uncheck or remove the original point shapefile that was used to create the Joined Point Shapefile.

10. Check Join Results
    a. Right click on the Joined Point Shapefile in the table of contents
    b. Select "Open Attribute Table"
    c. Verify that Join was successful
        i. All data present in Excel file should now be located in the Joined Point Shapefile attribute table, and the Join_ID and Sample_Pt columns will be identical

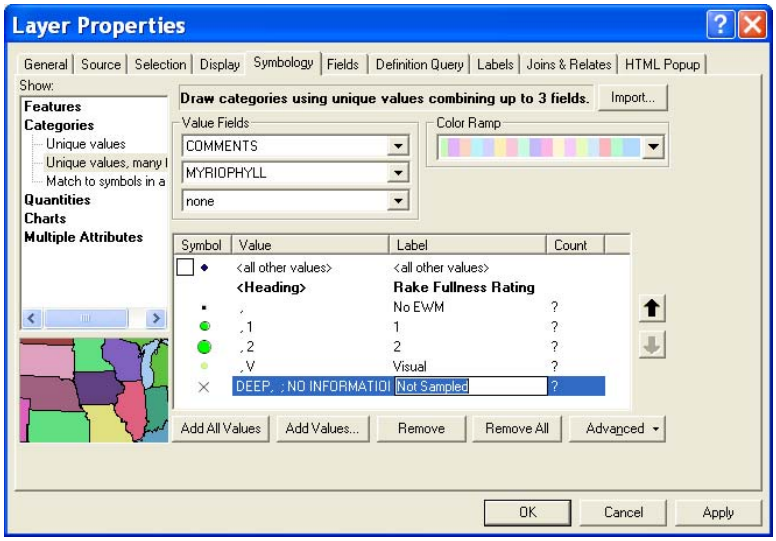
11. Display Plant Distribution Data
    a. Right click on the Joined Point Shapefile in the table of contents
    b. Select “Properties”
    c. Select “Symbology” tab
    d. On left side of dialog box under “Show:”, select “Categories – Unique Values, Many Fields”
    e. Value Fields should be “Comments”. Be sure to select the appropriate Comments field, as there may be two that appear similar.
    f. You will then choose additional Value Fields to display species information (i.e. If you want to display both EWM and CLP species information, then both EWM and CLP need to be chosen as Value Fields)
    g. Select “Add All Values”
        i. All possible values are now displayed, separated by a comma. Each position indicates the unique values for each Value Field you designated in steps e & f, in the order entered. That is, if you selected ‘comments’, ‘EWM’, and ‘CLP’ as your value fields, the first value might read: ‘ , , ‘ indicating points that were sampled, but had neither a comment, EWM, nor CLP present. The next value might read ‘ , ,1’, which includes points with no comments, no EWM, and fullness rating of 1 for CLP.
        ii. Points with information for the ‘comments’ value field were likely not sampled; the comment listed should clarify how to work with these points.
    h. Un-check <all other values> box
    i. Double-click on symbol next to each value to set symbology
        i. You must now choose appropriate symbols and colors for the different variables being expressed.
        ii. Typically we use increasing sizes of a green circle for EWM density ratings (values: 1, 2, 3), a small light green circle for visuals (V), a small black dot for sites sampled that had no relevant plant data, and a small “x” symbol for all sites not sampled
    j. You can change the label name of the symbol being represented by clicking on the respective space under “Label”. (e.g. change “ , ” to “No EWM”; “ ,1” to “1”; “ ,V” to “Visual”; “Deep, ” to “Not Sampled”)



    k. You can also group values together (e.g. No Information, Deep, Shallow, etc)
        i. Hold down the Shift key and highlight all rows that should be grouped

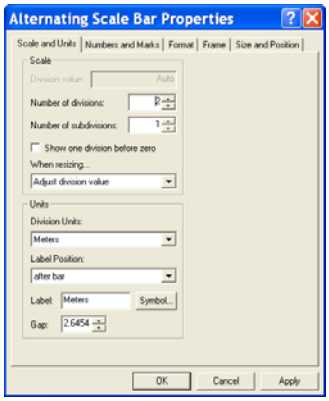


ii. Right click on highlighted rows and select "Group Values"
iii. The final Layer Properties dialog box should look similar to this: Note: If you want to change the order that these will appear in the legend, highlight a row and use the arrows on the right side to move.
iv. Click "Apply" then "OK" to update symbols on map



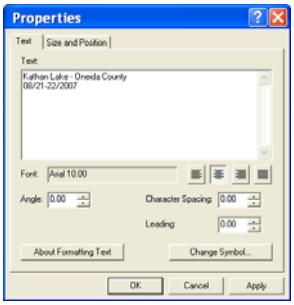
v. The polygon shapefile fill color and outline may also be modified similarly under the "Symbology" tab

12. Map Page Layout
    a. Verify that the coordinate system is defined correctly for the Data Frame
        i. Select View → Data Frame Properties → Coordinate System Tab
        ii. If the coordinate system is incorrectly defined, browse for the correct coordinate system
            1. Predefined → Projected Coordinate System → State Systems → NAD 1983 HARN Wisconsin TM.prj
    b. View → Layout View
    c. File → Page and Print Setup → Select Landscape or Portrait
    d. Modify size/shape of data frame to fit on entire page and serve as map border
        i. Right click data frame, select Properties, under the 'Frame' tab, change border to a thickness of 2 and select OK.
    e. Insert → North Arrow
        i. Size and position appropriately
    f. Insert → Scale Bar
        i. Select "Alternating Scale Bar 1" and click "OK"
        ii. Double-click on Scale Bar in Layout view to edit properties
        iii. Set the following properties:
            1. Number of divisions: 2
            2. Number of subdivisions: 1
            3. Set units to kilometers



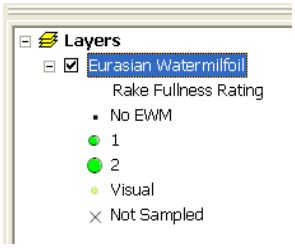
4. Click "OK"

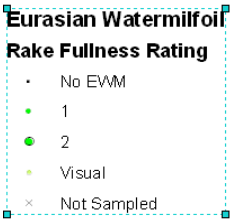
g. Insert → Text
   i. Double-click on Text Box to edit information
      1. Create text box with the following information:
         a. Lake Name, County, Date Sampled, etc.
      2. Format text as appropriate using "Change Symbol…" button



h. Insert → Picture → Navigate to WDNR Logo (Black & White)
   i. Size and position appropriately

i. Legend
   i. In the table of contents, modify the displayed name of your shapefile as you would like it to appear in your legend by single clicking on the text
   ii. Insert → Legend
   iii. Choose which layers you want to include in your legend
      1. Include the layer that has the plant distribution symbology information
      2. You may have to remove the polygon layer by highlighting it under "Legend Items" and clicking the single left angle bracket (<), then select "Next"
   iv. Remove the word "Legend" from the Legend Title and select "Next"
   v. Continue selecting "Next" and then "Finish"
   vi. Format legend text
      1. Right click on Legend and select "Properties"
   vii. Size and position legend as appropriate





j. If you're going to be switching between maps quickly to look at comparisons between years or species, we suggest making and refining the layout first, then saving it as an ArcMap Template so you can use the same one each time
   i. File → Save As → Save As Type: ArcMap Template

k. Check printed map for color accuracy before you export (Step 13). Sometimes the colors may look different on screen, but may print with the same hue and value, making interpretation impossible. You can set a custom color if necessary.

13. Saving Map as JPEG
   a. File → Export Map
      i. Save as type: JPEG
      ii. Set Resolution: 300 dpi
      iii. Navigate to appropriate folder and Save

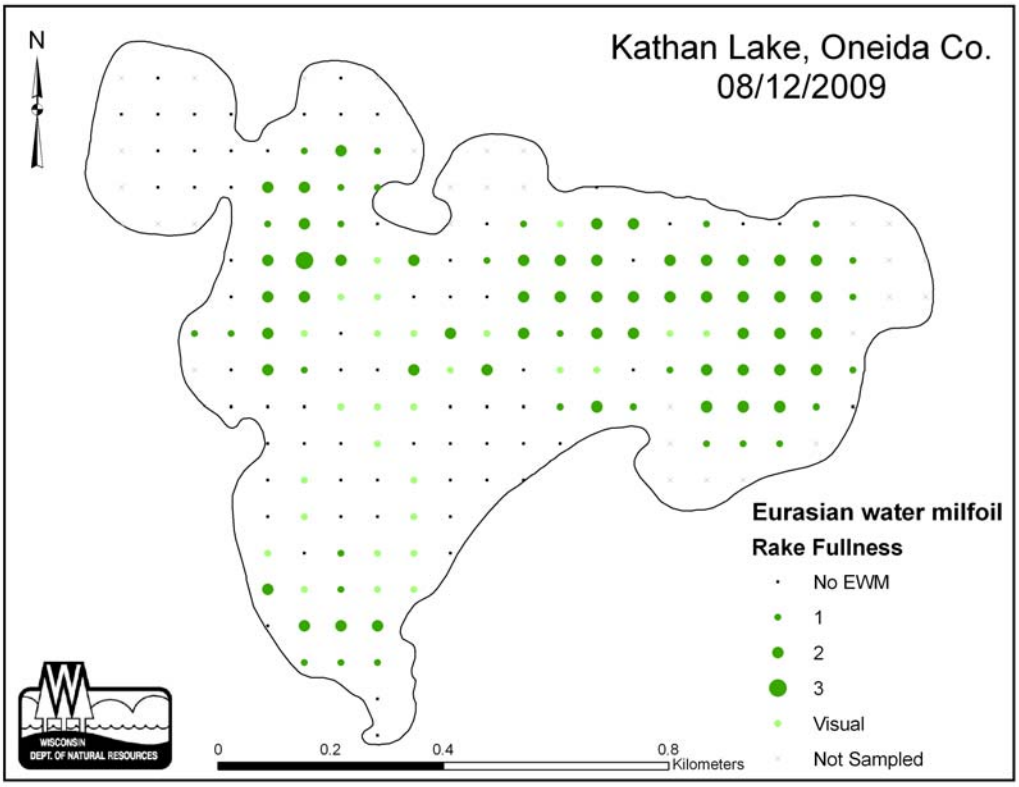


Figure 6: Example plant distribution map created using point-intercept data and ArcGIS 9.3 software for Kathan Lake, Oneida County.

Appendix 4

Creating a Plant Distribution Map Using Point Intercept Data in ArcGIS 3.3

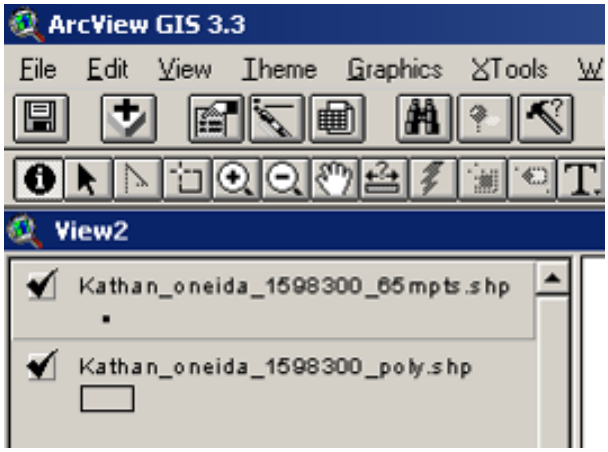
This is a protocol for making plant maps using ArcView GIS 3.3 and the Aquatic Plant Survey Data Workbook Excel file <Appendix-C.xls.>. This protocol can be changed in a number of different ways and still produce a similar product. The best way to make PI-based maps depends on the particular dataset; however, this procedure works well in most cases. Similar images may be created in PowerPoint or in photo editing software if the dataset is not large or complex.

1. Save the ArcView shapefiles (*.shp, *.dbf, *.sbn, *.shx, *.sbx, *.sbn) to a folder on a local drive.
    a. We'll refer to this folder as "MapFolder"

2. Open ArcView and create a new project with a new view.
    a. Click "yes" to add data

3. Add shapefiles from MapFolder
    a. You can add multiple files at once by holding down "shift" while you click the individual files

4. View window: select the point file
    a. Make sure both themes have the box checked in order to view them
    b. Click once on the point layer to activate that theme (raised box around that item)
    c. If necessary, drag the activated point layer above the polygon layer in order to see the sample points



5. Open theme table
    a. Theme > Table or
    b. The open theme table shortcut button

6. Start editing, add variable column
    a. Table > Start Editing
    b. Edit > Add Field
        i. Enter the name of the field (e.g. EWM_2009)
        ii. Specifications 'type', 'width', and 'decimal places' do not need to be changed
        iii. Click "OK"

7. Stop editing, save edits
    a. Table > Stop Editing, 'Yes' to save edits

8. Export point file

a. File > Export
b. Select 'dBASE'
c. Select MapFolder to save file
d. Default will be named <table1.dbf>
e. Close table

9. Set-working directory
    i. File > Set Working Directory
    ii. Change working directory to MapFolder

10. Save project, exit ArcView
    a. File > Save Project As > save in MapFolder (for ease of reference, lets call the file EWM_Map.apr)
    b. Exit ArcView

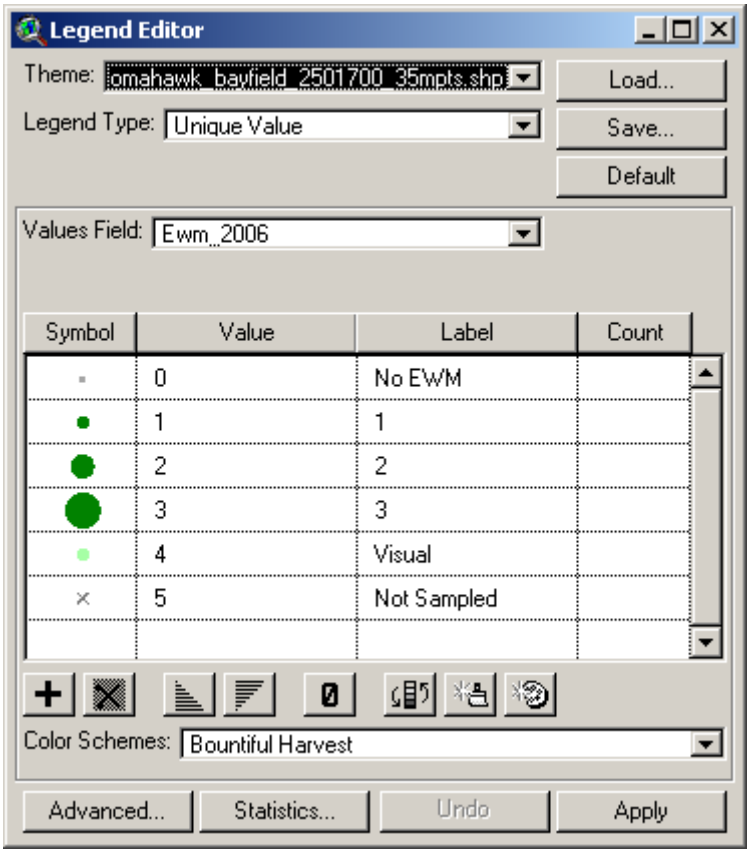
11. Open file saved in step 8 with Excel
    a. Open excel; Open a file, when prompted to find the file, navigate to MapFolder
    b. In "Files of type" option bar select "All files"
    c. Open <table1.dbf>

12. List information under data field created (EWM_2009)
    a. Open PI data entry excel file (WiAPMS.xls)
    b. Copy columns "Sample point, Depth, Comments, & EWM"
    c. Paste special "values" into new excel workbook
        i. Edit > Paste Special > Values
    d. Highlight all data, sort by comments
        i. Data > Sort > Comments
    e. Enter the number 5 into EWM column for all unsampled sites (deep, terrestrial, non-navigable, etc) (this is so the legend can code these sites)
    f. Highlight EWM data column and replace all blanks with 0 (zero), and V (visuals) with 4
        i. Edit > Replace, replace all
    g. Highlight all data, re-sort by sampling site
        i. Data > Sort > Sampling Point
    h. Copy EWM column, excluding header, paste into the .dbf file (already open, originally created in step 8)
    i. "Save as" this file as the **original dbf** file's name (the copy you placed in MapFolder, not the original file, obviously)
        i. i.e. overwrite the ISS original (e.g. Kathan_Oneida_1598300_65mpts.dbf) with the new file you just modified in excel. The name must be EXACTLY the same!!
        ii. Close excel

13. Reopen project in ArcView
    a. Open existing project

b. Open MapFolder and click on EWM_Map.apr (or whatever you chose to name it in step 9)

14. Create legend
    a. Double-click point symbol in the View frame to open the legend window
    b. In "Legend Type" option bar, choose "Unique Value"
    c. In "Values Field" option bar select "EWM_2009" column (or whatever column you want this map to show)
    d. Apply
    e. You must now choose appropriate symbols and colors for the different variables being expressed by the legend. You can change the symbol by double clicking on it
    f. Typically we use increasing sizes of a green circle for EWM density ratings (values: 1, 2 , 3), a small light green circle for visuals (value: 4), a small black dot for sites sampled, but without EWM, (value: 0), and a small "x" symbol for sites not sampled (value: 5).



    g. You can change the label name of the symbol being represented by clicking on the respective cell under "Label". (e.g. change "5" to "Not Sampled", change "4" to Visual)
    h. The color or shading of the polygon can also be changed by double clicking on the theme

15. Set units
    a. View > Properties
    b. Change map units to "meters" and distance units to "kilometers"

16. Layout
    a. View > Layout
    b. Select Landscape or Portrait
    c. Double-click 'View1' to change map title
    d. Double-click scale bar to adjust range or units
    e. If you're going to be switching between maps quickly to look at comparisons between years or species, we suggest making and refining the layout first, then saving it as a Template (Layout > Store as Template) so you can use the same one each time.

f. Check printed map for color accuracy before you export (step 17). Sometimes the colors may look different on screen, but may print with the same hue and value, making interpretation impossible. You can set a custom color if necessary.

17. Save as JPEG
    a. Have the final layout window active
    b. Select File > Export
    c. In "List Files of Type" option bar, select JPEG
    d. Click 'Options' button
        i. Set resolution to highest number
        ii. Likely 144 DPI and Quality = 100
    e. Type file name, choose location in which to save the JPEG
    f. Click OK

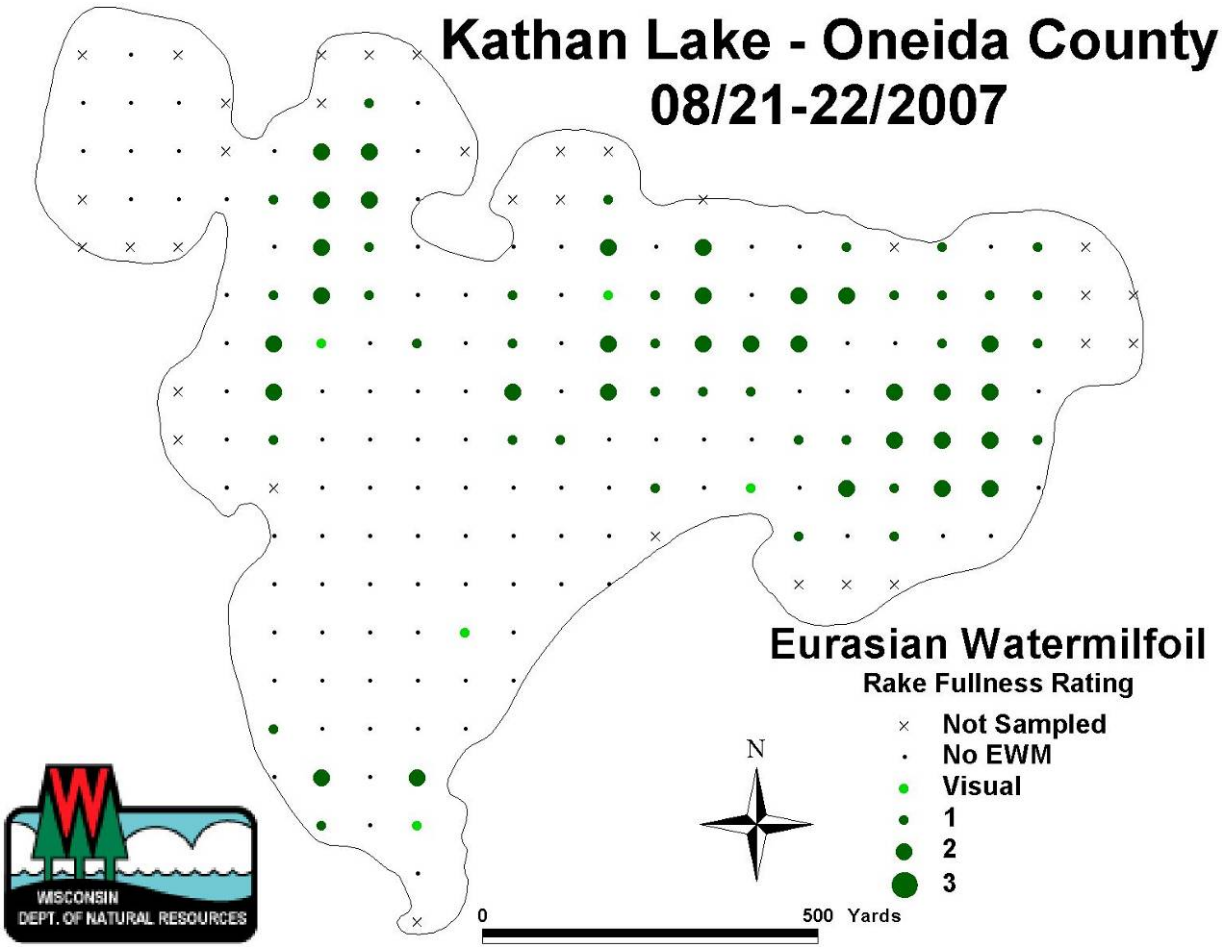


Figure 7: Example plant distribution map created using point-intercept data and ArcGIS 3.3 software for Kathan Lake, Oneida County.

Document citation:

Hauxwell, J., S. Knight, K. Wagner, A. Mikulyuk, M. Nault, M. Porzky and S. Chase. 2010. Recommended baseline monitoring of aquatic plants in Wisconsin: sampling design, field and laboratory procedures, data entry and analysis, and applications. Wisconsin Department of Natural Resources Bureau of Science Services, PUB-SS-1068 2010. Madison, Wisconsin, USA.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