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Eurasian Watermilfoil in Crooked Lake *(WBIC# 02-0084)*

Anoka County, MN

Spring Delineation Survey – June 5, 2014

Survey, Analysis, and Reporting by:

James A. Johnson – *Aquatic Ecologist, Freshwater Scientific Services, LLC*

NALMS Certified Lake Manager
www.NALMS.org

Funding Provided by:

Crooked Lake Area Association – Coon Rapids, MN

Prepared for the Crooked Lake Area Association – June 2014

Summary

Purpose of Survey

This survey was conducted to locate and delineate areas of Eurasian watemilfoil (*Myriophyllum spicatum*, henceforth referred to as EWM) in Crooked Lake (#02-0084) in the spring of 2014. The results of this survey will help to guide vegetation management planning (herbicide treatment areas) and provide insights on the effectiveness of previous treatments.

Summary of Findings

1) In 2014, EWM remained widespread in Crooked Lake, but was much less dense than seen in 2013 in many areas. Furthermore, the total area that supported EWM was substantially smaller in 2014 (~23 acres) than in 2013 (~65 acres). However, some denser areas of EWM remained in the southern portion of the lake, with the densest EWM generally growing in a narrow band between the 6 and 9-ft contours. Shallower areas generally supported no EWM or very widely-spaced individual EWM plants; no areas shallower than 4 ft exhibited dense EWM.

   In the northern one-third of the lake, EWM growth was generally sparse and of low density. However, there were a few patches of denser growth between the 6 and 9-ft contours along the east-central shoreline.

2) Although we did not conduct a formal curlyleaf pondweed (CLP) delineation, we observed widespread, but very light curlyleaf growth in the northern one-third of the lake (no nuisance growth observed). Most of this light CLP growth occurred between the 4 and 8-ft contours in areas that had previously been dominated by EWM. We found only sporadic individual curlyleaf plants in the remaining areas of the lake.

3) Many shallower areas (<4 ft) supported moderate to dense native plants, with Chara, Illinois pondweed, and coontail being the most commonly encountered submersed native plants.

Survey & Analysis Methods

Spring Delineation Survey

Freshwater Scientific Services, LLC completed a lake-wide survey for EWM in Crooked Lake on June 5, 2014. During this survey, we navigated a meandering transect over the entire littoral region of the lake (≤15 ft deep). While navigating this transect path, we used a combination of surface observations (using polarized glasses), rake tosses, sonar readings, and an underwater video camera to locate and delineate areas of EWM growth. Sonar and visual assessments were conducted continuously, with subsequent rake tosses to assess EWM abundance at ~200 locations spread throughout the littoral region of the lake. We used a hand-held Garmin GPS unit (GPS-MAP78) to record each of the sampled locations, and documented water depth, EWM plant height, and EWM abundance (rake density rating; 1 to 4 scale as described below).

Rake Density Rating
1 = 1-25% rake head coverage
2 = 25-50%
3 = 50-75%
4 = 75-100%

We loaded the recorded sample locations, water depths, EWM plant heights, and EWM rake density scores into desktop GIS software and projected results over aerial imagery of Crooked Lake. We then delineated beds with predominantly low density (scores ≤1) and nuisance density (scores ≥2) EWM growth throughout the lake. We then calculated the area, mean water depth, mean EWM density, and mean EWM plant height within each of the delineated beds (using point data and sonar records).

EWM Spring Delineation Survey

June 5, 2014

Crooked Lake

Anoka County, MN
#02-0084

Surveyed Locations

- Surveyed Path
- Surveyed Points

See Table 1 for detailed point locations and descriptions

0 500 ft

N

Surveyed: June 5, 2014
Surveyor: J.A. Johnson
Affiliation: Freshwater Sci. Serv.
Methods: Visual, Rake, Sonar, Camera
Analyses by: J.A. Johnson

Map produced for the
Crooked Lake Area Association by:

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EWM Spring Delineation Survey

June 5, 2014

Crooked Lake

Anoka County, MN
#02-0084

Eurasian Watermilfoil

Rake Density Rating (0-4)

- 0
- 1
- 2
- 3
- 4

0 500 ft

N

Surveyed: June 5, 2014
Surveyor: J.A. Johnson
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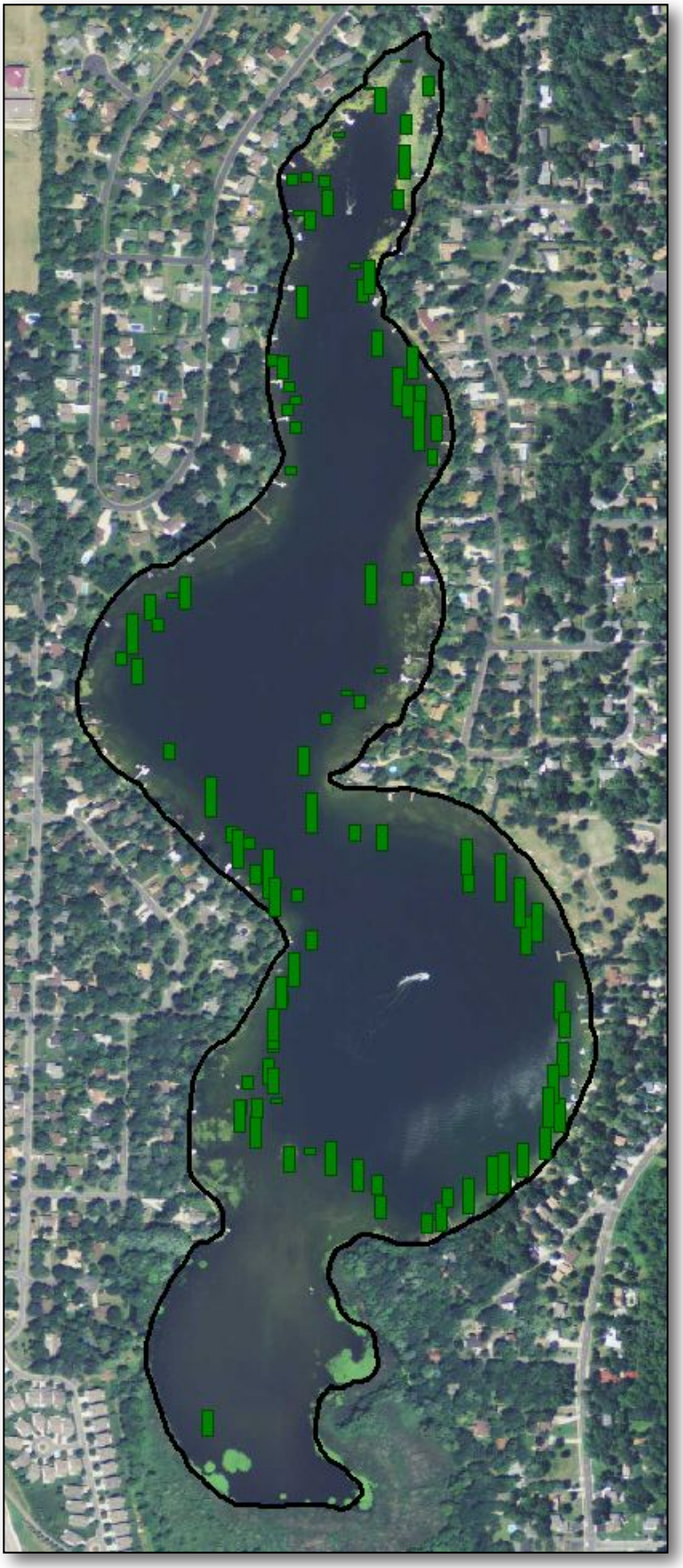

EWM Spring Delineation Survey
June 5, 2014

Crooked Lake
Anoka County, MN
#02-0084

Eurasian Watermilfoil

Plant Height (ft)

2.0 4.0 6.0 8.0

0 500 ft

N

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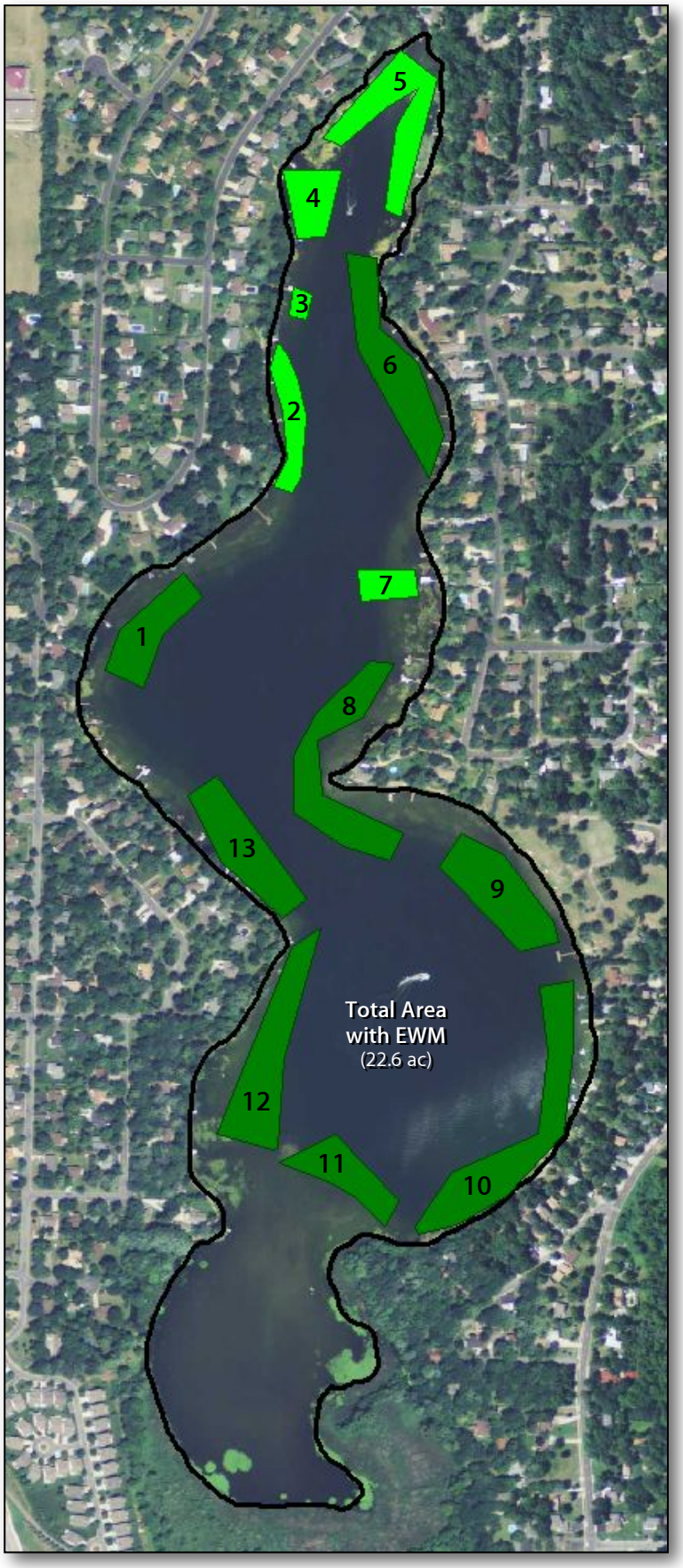

EWM Spring Delineation Survey

June 5, 2014

Crooked Lake

Anoka County, MN
#02-0084

EWM Bed Delineation

- Light EWM Growth (or small patches)
- Moderate/Dense EWM (denser and more uniform)

Plot	Plot Area *(acres)*	EWM Density *(0 to 4)*	EWM Height *(ft)*	Mean Depth *(ft)*
1	1.4	1.3	2.2	8.2
2	1.0	1.0	1.3	4.5
3	0.2	2.0	3.3	5.0
4	1.0	1.0	1.5	3.9
5	2.1	1.1	1.7	3.5
6	2.5	1.4	2.9	7.9
7	0.6	1.5	2.6	5.2
8	2.6	1.6	1.9	7.7
9	2.1	2.2	3.9	8.8
10	3.2	1.9	3.1	8.0
11	1.3	1.7	2.4	8.1
12	2.6	1.6	2.3	7.1
13	2.0	2.1	2.9	8.9

0 500 ft

N

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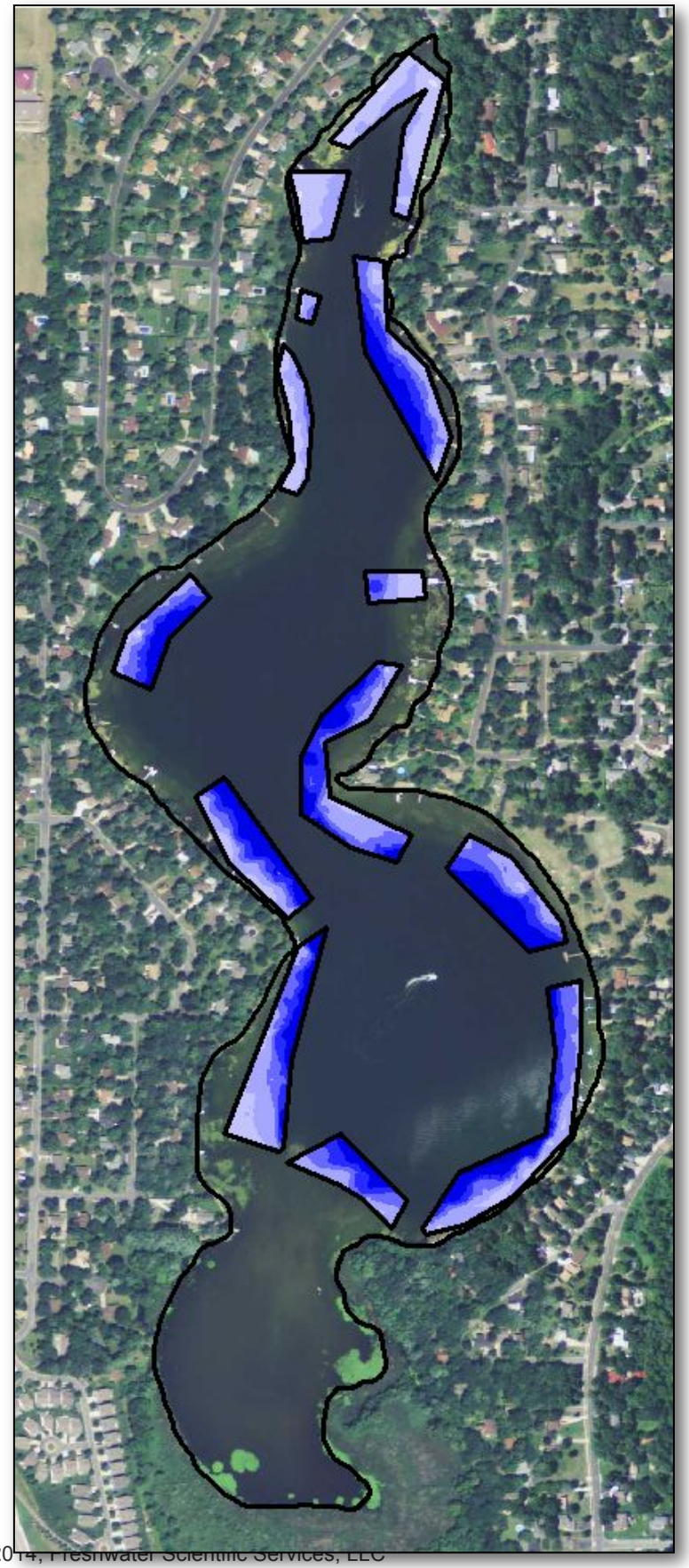

EWM Spring Delineation Survey

June 5, 2014

Crooked Lake

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#02-0084

EWM Plot Depth

- 2-4 ft
- 4-6
- 6-8
- 8-10
- 10-12

0 500 ft

N

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Table 1. GPS coordinates and assessments for surveyed points where EWM was found (Crooked Lake; June 5, 2014). (Note: points with no EWM have been omitted from this table to conserve space.)

Point ID	Lat	Long	Water Depth (ft)	*EWM Plant Height (ft)*	*EWM Density (rake, 0-4)*
2	45.218470	-93.342006	3.0	0.3	1
5	45.218173	-93.342551	2.0	0.3	1
8	45.217693	-93.342996	3.0	0.7	1
13	45.217211	-93.343202	4.3	1.3	2
14	45.217254	-93.343463	3.0	1.0	1
15	45.217222	-93.343677	2.3	1.3	2
16	45.216875	-93.343562	2.6	0.7	1
17	45.216797	-93.343419	3.9	2.0	2
26	45.215947	-93.343512	4.9	3.3	2
41	45.215338	-93.343930	3.3	1.3	1
42	45.215257	-93.343802	5.2	2.3	1
45	45.214926	-93.343616	5.9	1.0	1
46	45.215066	-93.343709	5.2	1.0	1
49	45.214826	-93.343725	7.2	1.3	1
53	45.214636	-93.343612	5.6	1.3	1
60	45.214192	-93.343683	3.6	1.0	1
88	45.212912	-93.345225	8.5	3.3	2
90	45.212885	-93.345423	7.9	0.7	1
95	45.212756	-93.345745	7.5	2.6	1
96	45.212578	-93.345624	12.5	1.3	1
100	45.212479	-93.345998	7.9	3.9	2
106	45.212226	-93.346160	7.2	1.3	1
107	45.212092	-93.345936	10.5	2.6	1
125	45.211258	-93.345457	10.2	1.6	1
132	45.210786	-93.344835	11.2	3.9	3
135	45.210392	-93.344519	10.5	1.6	2
139	45.210242	-93.344427	8.9	3.9	3
140	45.210306	-93.344264	14.1	1.3	1
143	45.209986	-93.343988	11.2	4.9	2
144	45.209978	-93.344161	6.9	2.0	2
148	45.209746	-93.343888	5.6	3.9	3
149	45.209760	-93.343548	14.4	1.3	1
154	45.209290	-93.343337	12.5	2.0	1
156	45.208986	-93.343596	9.2	3.3	2
160	45.208686	-93.343753	9.5	1.3	1
161	45.208743	-93.343794	6.9	3.3	2
164	45.208346	-93.343888	10.5	4.3	2
180	45.207292	-93.344154	5.6	3.3	2
181	45.207542	-93.344138	5.9	2.0	2
183	45.207934	-93.343964	7.9	2.6	1
184	45.208201	-93.343906	9.8	1.0	1
188	45.207809	-93.344276	4.6	1.3	1
189	45.207553	-93.344368	4.6	1.6	1
190	45.207462	-93.344381	4.3	3.3	3
203	45.204257	-93.344831	3.6	2.6	1
230	45.207011	-93.343654	4.9	2.6	1
233	45.207620	-93.343851	8.9	0.7	1
234	45.207825	-93.343898	8.2	2.6	2
237	45.207098	-93.343360	6.6	0.7	1
238	45.207025	-93.343036	9.8	3.3	3

Point ID	Lat	Long	Water Depth (ft)	*EWM Plant Height (ft)*	*EWM Density (rake, 0-4)*
240	45.206848	-93.342629	10.2	3.3	2
247	45.206508	-93.342307	7.5	2.3	2
248	45.206754	-93.342351	11.2	2.0	1
253	45.206342	-93.341627	5.9	2.0	1
255	45.206414	-93.341409	5.9	3.0	1
259	45.206783	-93.340479	4.9	1.3	1
262	45.207188	-93.339889	4.9	3.3	2
264	45.207482	-93.339670	4.3	3.3	2
272	45.208672	-93.339685	8.2	3.9	3
273	45.208425	-93.339596	7.2	2.6	2
274	45.208068	-93.339628	6.6	3.3	2
275	45.207810	-93.339759	7.5	3.9	2
276	45.207562	-93.339843	8.5	3.9	2
279	45.207010	-93.340218	9.2	3.3	2
280	45.206879	-93.340486	8.9	3.9	3
284	45.206623	-93.341329	10.8	2.0	1
285	45.206632	-93.341017	7.2	3.6	3
286	45.206852	-93.340658	10.5	3.9	2
293	45.209359	-93.340183	11.2	3.9	1
294	45.209491	-93.340023	5.6	3.9	3
296	45.209693	-93.340278	9.2	4.9	2
298	45.209932	-93.341021	12.5	2.6	1
300	45.210372	-93.342296	6.9	2.6	2
301	45.210415	-93.342719	6.2	1.6	1
303	45.210625	-93.343336	7.9	3.9	3
311	45.210173	-93.341045	7.2	3.6	3
313	45.209955	-93.340559	5.9	4.6	3
320	45.211163	-93.343473	11.5	3.0	2
331	45.213072	-93.341941	3.6	1.3	1
333	45.213012	-93.342497	10.2	3.9	2
341	45.211872	-93.342846	11.2	0.7	1
342	45.211610	-93.343132	10.8	1.3	1
343	45.211783	-93.342648	6.2	1.3	2
344	45.212108	-93.342336	6.2	0.7	1
353	45.214337	-93.341588	4.3	1.6	1
354	45.214631	-93.341527	4.6	2.6	1
358	45.215317	-93.341899	4.9	3.3	1
364	45.215517	-93.342418	8.2	2.6	2
366	45.215070	-93.342111	10.8	3.9	2
367	45.214908	-93.341776	6.2	3.3	1
368	45.214667	-93.341785	9.8	4.9	2
380	45.214918	-93.341964	10.2	3.3	1
383	45.216071	-93.342628	5.6	2.3	1
384	45.216209	-93.342536	3.6	3.3	2
391	45.216326	-93.342749	7.5	0.7	1
396	45.217017	-93.342107	3.9	2.0	1
399	45.217412	-93.342031	3.9	3.3	2
404	45.217806	-93.341990	4.9	2.0	1
407	45.218204	-93.341662	3.3	2.0	1
410	45.218046	-93.342379	4.6	2.6	1
413	45.216990	-93.343139	6.2	2.6	1

Online Resources & Contacts

Minnesota Administrative Rules for Aquatic Plant Management
https://www.revisor.mn.gov/rules/?id=6280

Minnesota DNR – Aquatic Plant Management Regulations & Permit Application Forms
http://www.dnr.state.mn.us/shorelandmgmt/apg/regulations.html

Estimated Cost of Herbicides (MDNR)
http://files.dnr.state.mn.us/assistance/backyard/shorelandmgmt/apg/pests.pdf

List of Herbicide Retailers and Applicators in MN
http://files.dnr.state.mn.us/assistance/backyard/shorelandmgmt/apg/companies_selling_approved_aquatic_herbicides.pdf

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