



Wild Rice and White Waterlilies in Silver Lake, Eden Prairie, 2013

Aquatic Plant Point-Intercept Surveys for Silver Lake, Hennepin County, Minnesota, 2013

Surveys conducted on June 20, 28, and September 11, 2013

Prepared for:
Riley Purgatory Bluff Creek
Watershed District



Prepared by:
Steve McComas
Jo Stuckert
Blue Water Science
St. Paul, MN 55116

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Aquatic Plant Point-Intercept Surveys for Silver Lake, Hennepin County, Minnesota in 2013

Summary

Two aquatic plant surveys were conducted on Silver Lake (70 acres) in the summer of 2013. The June 20 and 28 survey was to evaluate curlyleaf pondweed and native plants and the September 11 survey was to look for Eurasian watermilfoil and characterize native plants.

In the early summer of 2013, curlyleaf pondweed was found at two locations in Silver Lake and although it was present it was scarce and growth was light. In September, curlyleaf pondweed had died back and was not present in the lake. Wild rice, a relatively rare emergent plant in the metro area, was found at nine sites.

Coontail was the most common plant in the September survey (Table S-1). Plants grew out to about 6 feet of water. Wild rice was found at six sites and was not found growing on the west side of the lake although it was found there in the June survey.

The acreage of aquatic submerged plants in Silver Lake decreased slightly from 48 acres in early summer to 43 acres in late summer (Table S-1).



Figure S-1. Wild Rice in Silver Lake on June 28, 2013. Wild rice will lay on the lake surface until it gains enough turgor to grow as an emergent.

Table S-1. The percent occurrence of aquatic plants for Silver Lake in 2013. Percent occurrence is calculated based on the number of times a plant species occurs at a sampling station divided into the total number of stations for the survey. For example, if coontail was found in 25 out of 50 stations, its percent occurrence would be 50%.

	June 20 and 28, 2013 Occurrence (% Occur) (114 sites)	September 11, 2013 Occurrence (% Occur) (114 sites)
Purple loosestrife (<i>Lythrum salicaria</i>)	0	1 (1%)
Cattails (<i>Typha sp</i>)	19 (17%)	19 (17%)
Wild rice (<i>Zizania aquatica</i>)	9 (8%)	6 (5%)
Duckweed (<i>Lemna sp</i>)	15 (13%)	5 (4%)
White waterlilies (<i>Nymphaea sp</i>)	31 (27%)	25 (22%)
Coontail (<i>Ceratophyllum demersum</i>)	52 (46%)	32 (28%)
Aquatic moss (<i>Drepanocladus sp</i>)	1 (1%)	0
Elodea (<i>Elodea canadensis</i>)	5 (4%)	4 (4%)
Star duckweed (<i>L. trisulca</i>)	2 (2%)	0
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	2(2%)	0
Stringy pondweed (<i>P. pusillus</i>)	4 (4%)	0
Flatstem pondweed (<i>P. zosteriformis</i>)	16 (14%)	9 (8%)
Sago pondweed (<i>Stuckenia pectinata</i>)	13 (11%)	7 (6%)
Bladderwort (<i>Utricularia sp</i>)	7 (6%)	6 (5%)
Aquatic Plant Coverage (acres)	48	43
Number of submerged species	9	5
Secchi disc (ft)		1.5



Figure S-2. Cattails ringed most of the Silver Lake shoreline.

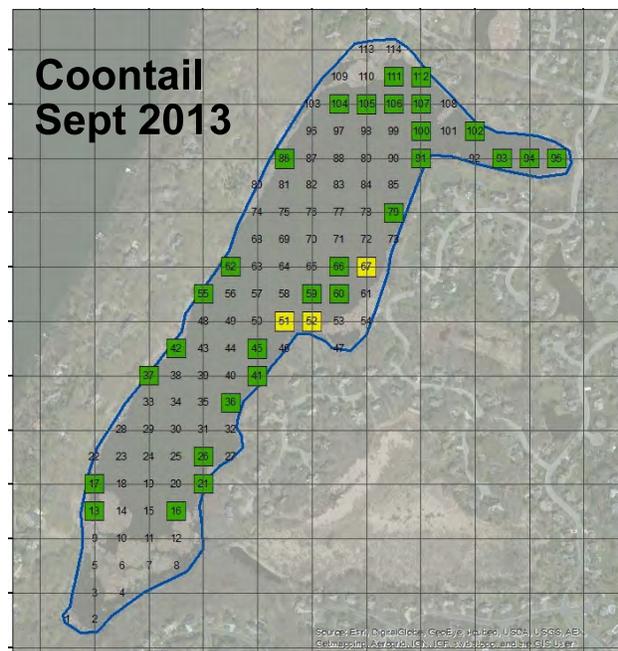
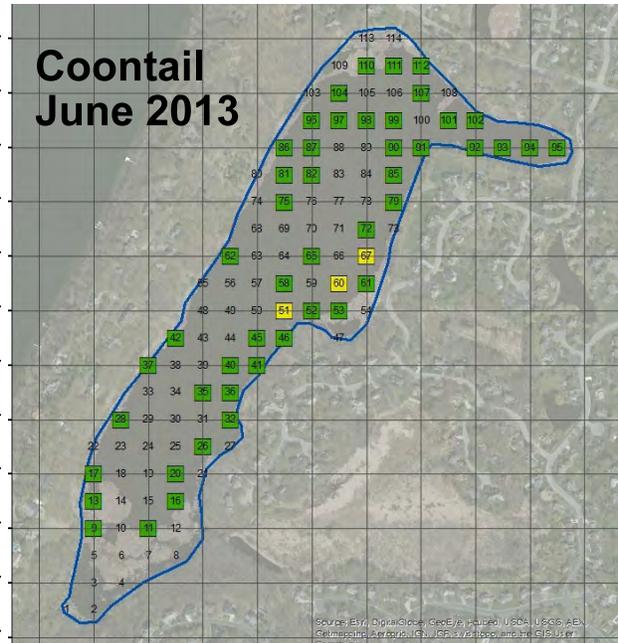
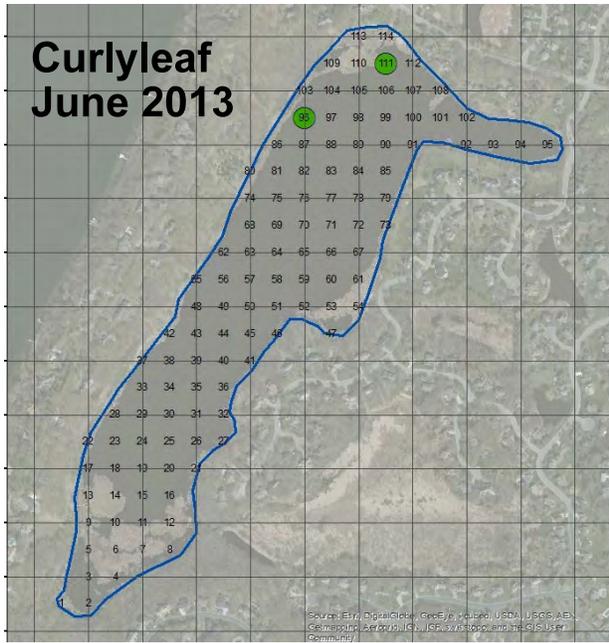


Figure S-3. (top-left) Early summer curlyleaf pondweed coverage on June 20 and 28, 2013 (top-right) Early summer coontail coverage on June 20 and 28, 2013. (bottom-left) Late summer coontail coverage on September 11, 2013.

Key: Green shading = light growth and yellow shading = moderate growth.

Conclusions and Recommendations for Aquatic Plant Management in Silver Lake: The aquatic plant community in 2013 has nine species of submerged plants in early summer and five species in late summer. This is a fair plant diversity condition. Coontail covers about 31 acres in early summer.

Curlyleaf pondweed was the only non-native plant present. Curlyleaf pondweed covers about 1.2 acres in early summer and then dies back. Curlyleaf control is probably unnecessary at this time.

In late summer, coontail covers about 19 acres and grows out to about 6-feet of water depth (Figure S-3). Waterlilies were abundant in Silver Lake as well.

Eurasian watermilfoil was not found in either survey.

Aquatic Plant Point-Intercept Surveys for Silver Lake, Hennepin County, Minnesota, 2013

Lake ID: 27-0136

Size: 70 acres (source: this survey)

Littoral area: 70 acres

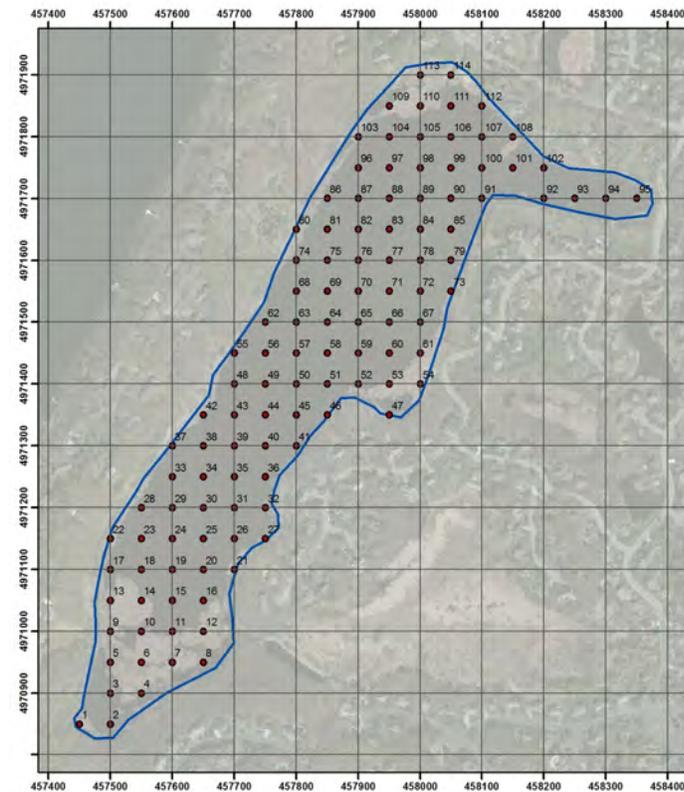
Maximum depth: 12 ft (source: this survey)

Introduction

Silver Lake is a 70 acre moderately fertile lake in Hennepin County, Minnesota. It is a shallow lake with a maximum depth of 12 feet. Because of the shallowness there is a potential for widespread aquatic plant growth. The objectives of these two aquatic plant surveys were to characterize curlyleaf pondweed and native plants in early summer and assess the distribution and abundance of plants in late summer.

Methods - Aquatic Plant Surveys

Two aquatic plant point-intercept surveys of Silver Lake (70 acres) were conducted by Blue Water Science in 2013. The early season survey was performed on June 20 and 28, 2013 and the late summer survey was conducted on September 11, 2013. A map and sampling grid were prepared by Blue Water Science and consisted of a total of 114 points that were distributed



throughout the lake (Figure 2). Points were spaced 50 meters apart. Each point represented about 0.61 acres. GPS coordinates used a UTM WGS84 datum. For each survey, the maximum depth of plant growth was found in the course of sampling. For the June survey, a total of 114 points were sampled and plants were found out to 6 feet of water depth. In the September survey, plants were found out to 6 feet and 114 points were sampled again. At each sample point, plants were sampled with a rake sampler. A plant density rating was assigned to each plant species on a scale from 1 to 5. A density of a “1” indicated sparse growth and a 4.5 or 5 rating indicated matting surface plant growth.

Figure 1. Sample point locations for the aquatic plant surveys.

Results of the Early Summer Survey -- June 20 and 28, 2013

The most abundant plant in early summer in Silver Lake was coontail and it was found at 52 of the 114 sample sites (46%)(Table 1). Curlyleaf pondweed was found growing out to water depths of 6 feet but only at two sample locations. Wild rice was found at nine sites at a relatively low density. Aquatic plant coverage maps are shown in Figure 3.

A summary of plant density and occurrence for individual sites is shown in Table 2. Eurasian watermilfoil was not found in this survey.



Figure 2. Coontail on a sample rake at a density of a 3. White waterlilies are also common in Silver Lake on June 20, 2013.

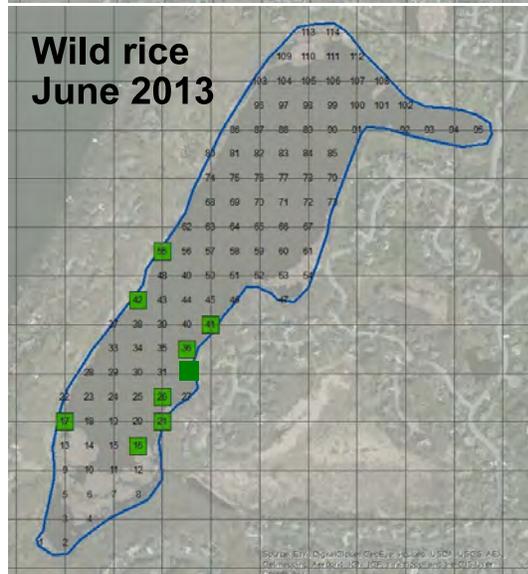
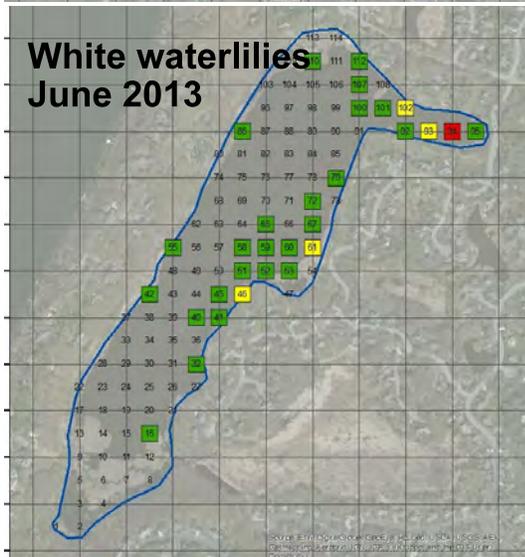
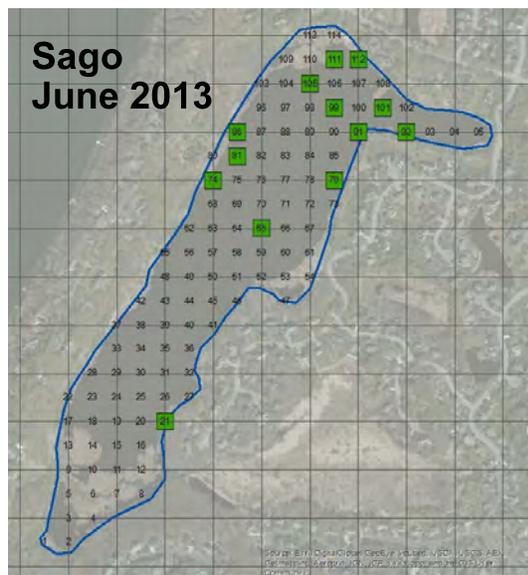
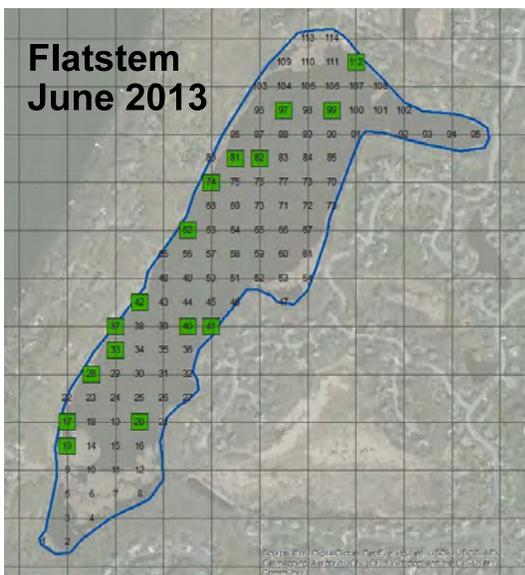
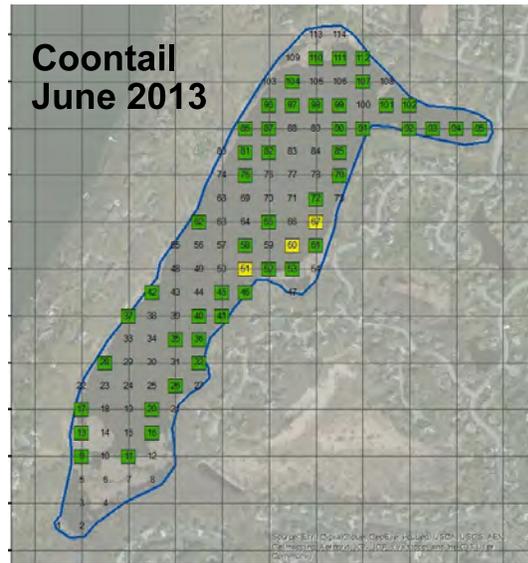
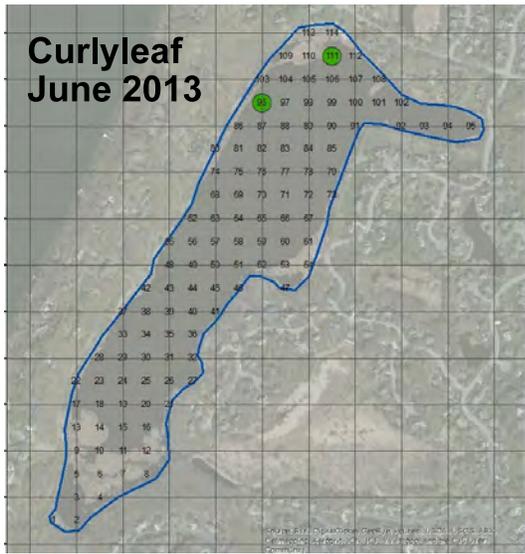


Figure 3. (top-left) Curlyleaf pondweed coverage on June 20 and 28, 2013. (top-right) Coontail coverage. (middle-left) Flatstem pondweed coverage. (middle-right) Sago pondweed coverage. (bottom-left) Wild rice coverage. Key: Green shading = light growth, yellow shading = moderate growth, and red shading = heavy growth.

Table 1. Silver Lake aquatic plant occurrences and densities for the June 20 and 28, 2013 survey based on 114 sites. Density ratings are 1-5 with 1 being low and 5 being most dense.

	All Stations (n=114)		
	Occur	% Occur	Density
Cattails (<i>Typha sp</i>)	19	17	4.0
Wild rice (<i>Zizania aquatica</i>)	9	8%	1.2
Duckweed (<i>Lemna sp</i>)	15	13%	1.7
White waterlily (<i>Nymphaea sp</i>)	31	27%	1.6
Coontail (<i>Ceratophyllum demersum</i>)	52	46%	1.5
Elodea (<i>Elodea canadensis</i>)	5	4%	1.2
Moss (<i>Drepanocladus sp</i>)	1	1%	1.0
Star duckweed (<i>Lemna trisulca</i>)	2	2%	1.0
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	2	2%	1.0
Stringy pondweed (<i>P. sp</i>)	4	4%	1.5
Flatstem pondweed (<i>P. zosteriformis</i>)	16	14%	1.1
Sago pondweed (<i>Stuckenia pectinata</i>)	13	11%	1.2
Bladderwort (<i>Utricularia sp</i>)	7	6%	1.0



Figure 4. Waterlilies were common in Silver Lake. The branch-like structure is the roots of the waterlilies. Aquatic mammals, such as muskrats, like to dig up the roots and eat them.

Table 2. Individual site data for June 20 and 28, 2013. Numbers in the column under plant headings represent plant densities at that site.

Site	Depth	Cattails	Wild rice	White lily	Duckweed	Bladderwort	Coontail	Curlyleaf	Elodea	Flatstem	Moss	Sago	Star duckweed	Stringy	No plants
1	1	4													
2	1	4													
3	1	4													
4	1	4													
5	1	4													
6	1	4													
7	1	4													
8	1	4													
9	4						1								
10	1	4													
11	4						2								
12	1	4													
13	5						1		1	1					
14	9														1
15	7														1
16	4		1	1	1		1								
17	5		1				2			1					
18	12														1
19	12														1
20	6						1			2					
21	2		1		3							1			
22	3				1										
23	12														1
24	9														1
25	7														1
26	4		1				2								
27	0	4													
28	4						2			1				1	
29	8														1
30	7														1
31	7														1
32	2		2	1	3		2								
33	7									1					
34	7														1
35	7						1								
36	4		2				2								
37	4						2			1				1	
38	7														1
39	8														1
40	5			1			2			1					
41	2		1	2	2		1			1					
42	4		1	1			2			1					
43	8										1				
44	10														1
45	5			2	1		1								
46	3			3	2		1								
47	0	4													
48	7														1
49	10														1
50	7														1
51	5			1			3								
52	4			2		1	2								
53	4			2	1	1	1								
54	0	4													
55	4		1	1											
56	6														1
57	8														1
58				2	2		1								
59	5			1											
60	6			1			3								
61	3			3	1		1								
62	5						2			1					
63	10														1

Table 2. Individual site data for June 20 and 28, 2013. Numbers in the column under plant headings represent plant densities at that site.

Site	Depth	Cattails	Wild rice	White lily	Duckweed	Bladderwort	Coontail	Curlyleaf	Elodea	Flatstem	Moss	Sago	Star duckweed	Stringy	No plants
64	6														1
65	6			2			1					1			
66	6			2			2								
67	6			1		1	3								
68	7														1
69	8														1
70	8														1
71	7														1
72	6			1			1								
73	0	4													
74	5									1		2			
75	7						1								
76	7														1
77	9														1
78	8														1
79	4			1	1	1	1					1			
80	0	4													
81	5						1			1		2			
82	7						1			1					
83	9														1
84	9														1
85	6						1								
86	4			1			2					1			
87	6						1								
88	7														1
89	7														1
90	6						1								
91	3					1	1					1			
92	2			1			2					1			
93	4			3			2						1		
94	4			4	1		2								
95	3			2	1		2								
96	6						1	1						1	
97	6						1		2	1					
98	6						2								
99	6						2		1	1		1			
100	3			2	1	1									
101	3			1			1					1			
102	4			3			2						1		
103	3								1						
104	5						1								
105	5											1			
106	5					1									
107	4			1			2								
108	0	4													
109	1	4													
110	4			2			2		1						
111	4						1	1				1			
112	4			1			1			1		1			
113	1	4													
114	1	4													
Average		4.0	1.2	1.7	1.5	1.0	1.5	1.0	1.2	1.1	1.0	1.2	1.0	1.5	
occurrence (114 sites)		19	9	31	15	7	52	2	5	16	1	13	2	4	32
% occurrence		17	8	27	13	6	46	2	4	14	1	11	2	4	

Results of the Late Summer Survey -- September 11, 2013

The most abundant plant on the September 11, 2013 point-intercept plant survey for Silver Lake was coontail and it was found at 32 of the 114 sample sites (28%)(Table 3). The next most common plant was white waterlilies and they were found at 25 sites. Flatstem pondweed was found at 9 sites growing out to water depths of 5 feet in scattered areas.

Aquatic plant coverage maps are shown in Figure 6.

A summary of plant density and occurrence for individual transects is shown in Table 4.



Figure 5. Coontail, on sample rake at a density of a 1, and waterlilies in Silver Lake on September 11, 2013.

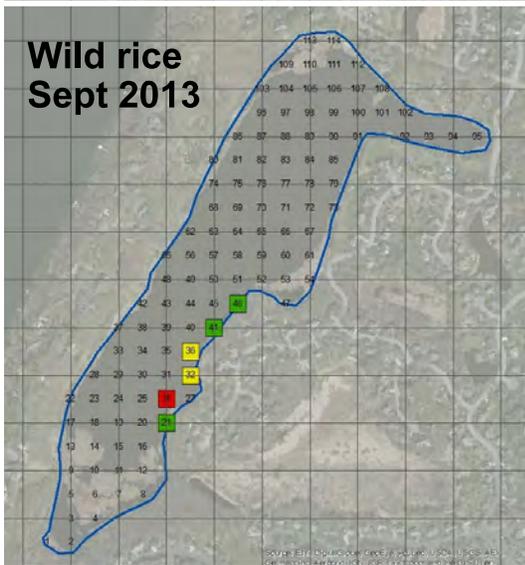
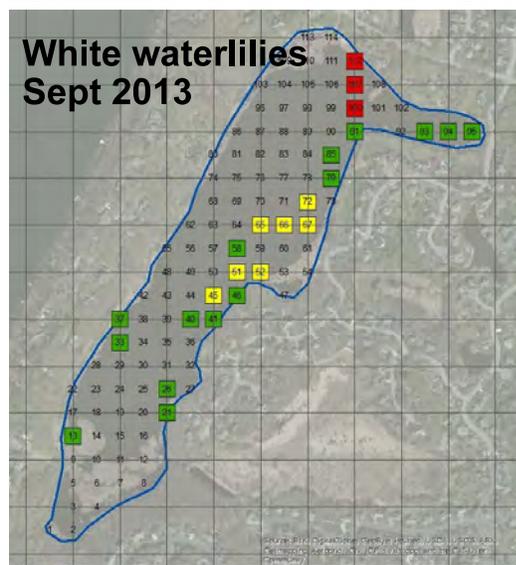
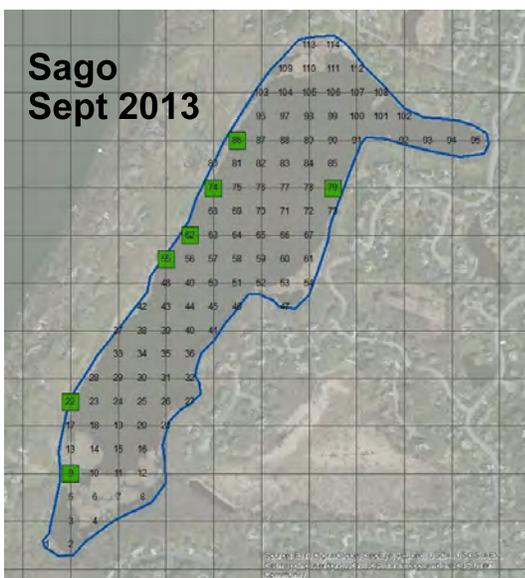
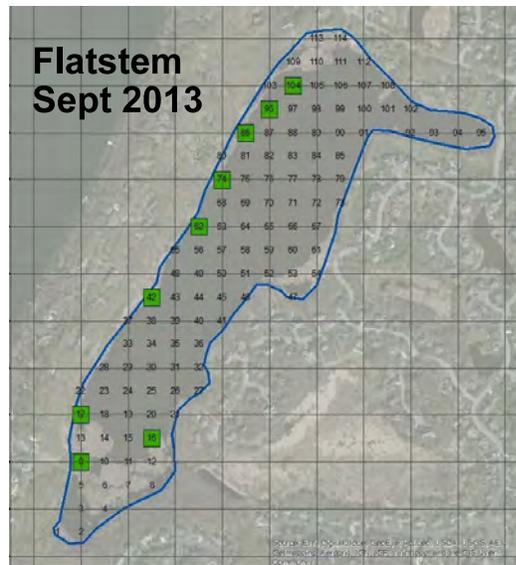
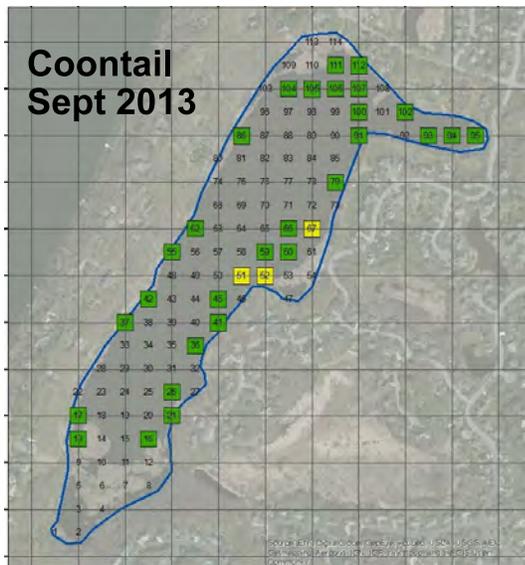


Figure 6. (top-left) Coontail coverage on September 11, 2013 (top-right) Flatstem pondweed coverage. (middle-left) Sago pondweed coverage. (middle-right) White waterlilies coverage. (bottom-left) Wild rice coverage. Key: Green shading = light growth, yellow shading = moderate growth, and red shading = heavy growth.

Table 3. Silver Lake aquatic plant occurrences and densities for the September 11, 2013 survey based on 114 sites. Density ratings are 1-5 with 1 being low and 5 being most dense.

	All Stations (n=114)		
	Occur	% Occur	Density
Cattails (<i>Typha sp</i>)		%	2.6
Purple loosestrife (<i>Lythrum salicaria</i>)	1	1%	1.0
Wild rice (<i>Zizania aquatica</i>)	6	5%	2.2
Duckweed (<i>Lemna sp</i>)	5	4%	1.2
White waterlily (<i>Nymphaea sp</i>)	25	22%	2.0
Coontail (<i>Ceratophyllum demersum</i>)	32	28%	1.4
Elodea (<i>Elodea canadensis</i>)	4	4%	1.0
Flatstem pondweed (<i>Potamogeton zosteriformis</i>)	9	8%	1.2
Sago pondweed (<i>Stuckenia pectinata</i>)	7	6%	1.1
Bladderwort (<i>Utricularis sp</i>)	6	5%	1.2



Figure 7. Bladderwort on the samplers hand. Notice the little bladders located throughout the plant. These bladders capture aquatic organisms.

Table 4. Individual site data for September 11, 2013. Numbers in the columns under plant headings represent plant densities at that site.

Site	Depth	Cattails	Purple loosestrife	White lily	Duckweed	Bladderwort	Coontail	Elodea	Flatstem	Sago	Wild rice	No plants
1	1	4										
2	1	4										
3	1	4										
4	1	4										
5	1	4										
6	1	4										
7	1	4										
8	1	4										
9	3								1	1		
10												
11	4	1										1
12												
13	4			1			1					
14												
15												
16	4						1		2			
17	3						1		2			
18												
19												
20	5											1
21	1			1			1				1	
22	2					1		1		1		
23												
24												
25												
26	2			1	1	1	1				4	
27	0	1										
28	4							1				
29												
30												
31												
32	2				2						3	
33	5			1								
34												
35												
36	2						1				3	
37	2			1			1	1				
38												
39												
40	5			1								
41	2			1		1	2				1	
42	3						1		1			
43	8											1
44												
45	4			3	1		2					
46	2			1							1	
47												
48	6											1
49												
50												
51	3			3			4					
52	2			3			4					
53		1										
54		1										
55	4						1	1		1		
56	8											1
58	6			2								
59	4						1					
60	4						1					

Table 4. Individual site data for September 11, 2013. Numbers in the columns under plant headings represent plant densities at that site.

Site	Depth	Cattails	Purple loosestrife	White lily	Duckweed	Bladderwort	Coontail	Elodea	Flatstem	Sago	Wild rice	No plants
61	2	1										
62	3						1		1	1		
63												
64												
65	5			3	1							
66	5			3			1					
67	4			3			4					
68	4											1
69												
70												
71												
72	4			3		1						
73	0	1										
74	3								1	1		
75	6											1
76												
77												
78												
79	3			1		2	1			2		
80	0	1										
81	4											1
82	7											1
83												
84												
85	5			2								
86	3						2		1	1		
87	6											1
88												
89												
90	6											1
91	2			2		1	1					
92												
93				1			1					
94				1			1					
95				1			1					
96	5								1			
97	5											1
98	5											1
99	5											1
100	2			4			1					
101		1										
102	2						1					
103												
104	5						1		1			
105	5						2					
106	4						1					
107	3			4			1					
108		1										
109		1										
110		1										
111	2		1				1					
112	2			4	1		2					
113												
114												
Average		2.3	1.0	2.0	1.2	1.2	1.4	1.0	1.2	1.1	2.2	
occurrence (114 sites)		19	1	25	5	6	32	4	9	7	6	14
% occurrence		17	1	22	4	5	28	4	8	6	5	

Comparison of Summer Aquatic Plant Surveys in 2000 and 2013

Aquatic plant surveys have been conducted in Silver Lake in 2000 and in 2013. The survey in 2000 was a line transect survey and was not quantitative. The 2013 surveys were point-intercept surveys and were quantitative. A comparison of the surveys is shown in Table 5.

No Eurasian watermilfoil has been observed in the plant surveys.

Table 5. The percent occurrence of aquatic plants for Silver Lake. Percent occurrence is calculated based on the number of times a plant species occurs at a sampling station divided into the total number of stations for the survey. For example, if coontail was found in 25 out of 50 stations, its percent occurrence would be 50%. The June 12, 2000 survey was conducted by Barr Engineering and the 2013 surveys were conducted by Blue Water Science.

	June 12, 2000 (based of plant map) (source: Barr Engineering)	June 20 and 28, 2013 Occurrence (% Occur) (114 sites)	September 11, 2013 Occurrence (% Occur) (114 sites)
Purple loosestrife (<i>Lythrum salicaria</i>)	--	0	1 (1%)
Cattails (<i>Typha sp</i>)	Present	19 (17%)	19 (17%)
Wild rice (<i>Zizania aquatica</i>)	Present	9 (8%)	6 (5%)
Duckweed (<i>Lemna sp</i>)	--	15 (13%)	5 (4%)
White waterlilies (<i>Nymphaea sp</i>)	Present	31 (27%)	25 (22%)
Coontail (<i>Ceratophyllum demersum</i>)	Present	52 (46%)	32 (28%)
Moss (<i>Drepanocladus sp</i>)	--	1 (1%)	0
Elodea (<i>Elodea canadensis</i>)	Present	5 (4%)	4 (4%)
Star duckweed (<i>L. trisulca</i>)	--	2 (2%)	0
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	Present	2(2%)	0
Stringy pondweed (<i>P. sp</i>)	Present (called narrowleaf)	4 (4%)	0
Flatstem pondweed (<i>P. zosteriformis</i>)	Present	16 (14%)	9 (8%)
Sago pondweed (<i>Stuckenia pectinata</i>)	Present (<i>Potamogeton pectinata</i>)	13 (11%)	7 (6%)
Bladderwort (<i>Utricularia sp</i>)	--	7 (6%)	6 (5%)
Aquatic Plant Coverage (acres)	--	48	43
Number of submerged species	6	9	5
Secchi disc (ft)	--		1.5

Interesting Sites from the Silver Lake Surveys in 2013



Cattail floating islands are common in Silver Lake.



Fern on a floating mat.



Flatstem pondweed.



Silver Lake outlet is the source of Purgatory Creek.



Floatingleaf stage of wild rice.



Wild rice bed in Silver Lake.

Conclusions and Recommendations for Aquatic Plant Management in Silver Lake

The aquatic plant community in 2013 has nine species of submerged plants in early summer and five species in late summer. This is a moderate plant diversity condition. Curlyleaf pondweed was the only non-native plant present.

Curlyleaf pondweed covers about 1.2 acres in early summer and then dies back. Curlyleaf control is probably unnecessary at this time.

In late summer, aquatic plants cover about 43 acres and grow out to about 6-feet of water depth. Waterlilies were abundant in Silver Lake.

Eurasian watermilfoil was not found in either survey.



Figure 8. Waterlilies and wild rice were common in Silver Lake during the summer of 2013.