Shields Lake, Washington County, Minnesota, April 24, 2019

Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2019

Curlyleaf Pondweed Delineation: April 24, 2019
Curlyleaf Treatment: May 20, 2019 (3.14 ac)
Curlyleaf Pondweed Assessment: June 17, 2019

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Comfort Lake/Forest Lake
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December 4, 2019

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Summary

Curlyleaf Pondweed Delineation: Shields Lake (MnDNR ID 82016200) is a 29.6 acre lake located in Washington County, Minnesota. Water clarity had a summer average of 1.9 feet in 2018 (source: Comfort Lake/Forest Lake Watershed District). A curlyleaf pondweed delineation was conducted on April 24, 2019 by Blue Water Science to characterize conditions of curlyleaf pondweed and delineate possible areas for treatment. Results of the curlyleaf delineation indicated that on April 24, 2019 curlyleaf pondweed was widespread with the potential to produce heavy growth over much of the nearshore area. Curlyleaf pondweed was present at 45 of the 64 sample sites (Figure S1). Curlyleaf was observed growing to a depth of 10 feet deep. Curlyleaf pondweed was most dense at depths of 4-8 feet. A 3.1 acre treatment area was delineated and was treated on May 20, 2019 using Aquathol K at 4 gallons per acre. A resulting lakewide concentration of the active ingredient was 64 ppb.

Curlyleaf Pondweed Assessment: A curlyleaf pondweed assessment was conducted on June 17, 2018 by Blue Water Science to evaluate curlyleaf pondweed post-treatment. Curlyleaf pondweed growth was significantly reduced, with no viable living curlyleaf pondweed observed not only in the treated area, but throughout the whole lake (Figure S1). Results of the June 17, 2019 curlyleaf pondweed assessment indicated Shields Lake has a low diversity of aquatic plants, no submerged aquatic plant species were observed.

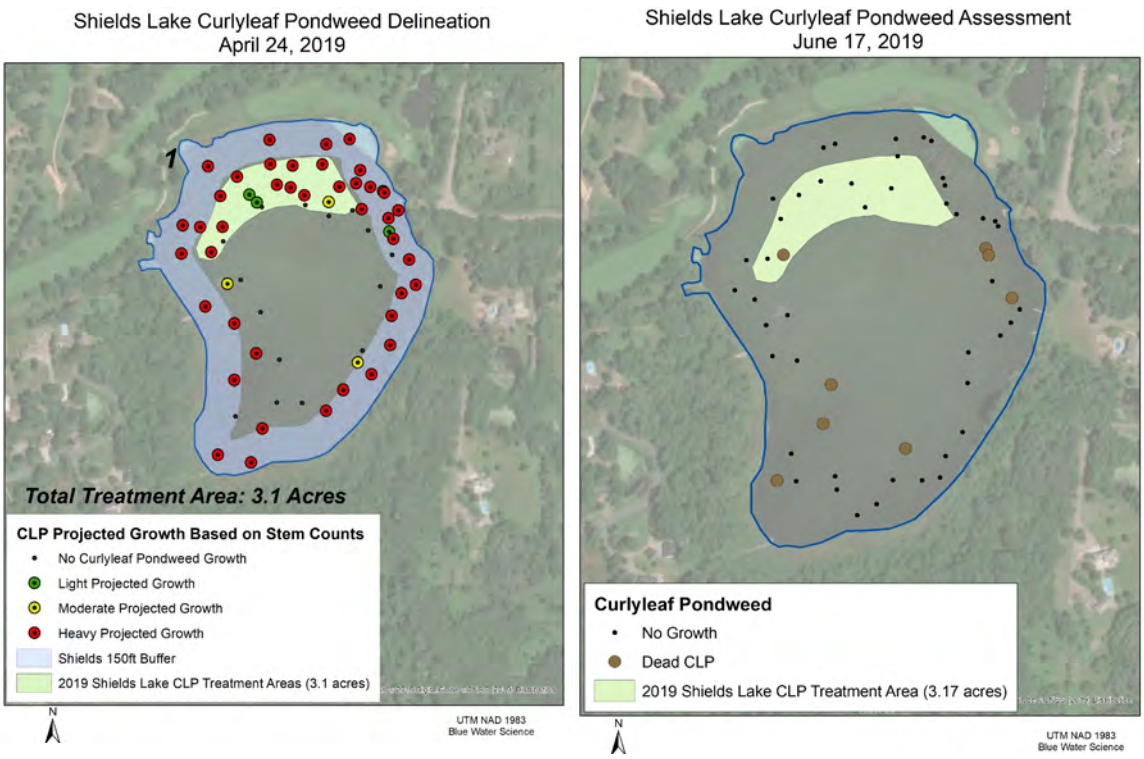

Figure S1. [left] Curlyleaf pondweed delineation and treatment areas Shields Lake April 24, 2019. [right] Curlyleaf pondweed assessment for Shields Lake on June 17, 2019.

Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2019

Shields Lake, Washington County (82016200)
Size: 29.6 acres (MnDNR)
Littoral area: 22 acres (MnDNR)
Maximum depth: 27 ft (MnDNR)

Introduction

A curlyleaf pondweed delineation was conducted on April 24, 2019 on 29.6 acre Shields Lake, Washington County. The objective of the delineation was to check the distribution and abundance of curlyleaf pondweed. A curlyleaf pondweed assessment was conducted on June 17, 2019 to evaluate the distribution and abundance of curlyleaf pondweed and other aquatic plants.

Methods

Curlyleaf Pondweed Delineation: At the time of the spring CLP delineations, only a fraction of the peak curlyleaf biomass is present. For spot treatments, the areas to be treated should be delineated prior to curlyleaf developing peak biomass. Curlyleaf stem counts on a rake sampler were used to identify areas that had a potential to produce dense curlyleaf. After a short sweep of about 1-foot (30 cm), 4 curlyleaf stems or more per rake sample generally indicated some CLP plants had developed runners and would likely produce heavy growth in the next few weeks. Alternatively, sites where 3 stems or less were collected per rake sample were not predicted to produce dense growth at the peak growing period. These areas were not targeted for treatment. This delineation method was used for spot lake treatments in Gleason Lake and has worked for other lakes as well (McComas et al, 2015*).

An endothall herbicide application of 12.4 gallons was conducted by Lake Management, Inc and a total of 3.1 acres were treated on May 20, 2019.

Curlyleaf Pondweed Assessment: A CLP assessment was conducted by Blue Water Science on June 17, 2019. The assessment involved surveying the entire lake nearshore area, observing CLP growth, and sampling aquatic plants with rakes. The plant species were recorded and the density of each species was assigned. Densities were based on the coverage on the teeth of the rake. Density ratings were from 1 to 3 with 1 being sparse and 3 being a nuisance. Based on these sample sites, plant distribution maps were constructed.

**McComas, S.R., Y.E. Christianson, and U. Singh. 2015. Effects of curlyleaf pondweed control on water quality and coontail abundance in Gleason Lake, Minnesota. Lake and Reservoir Management. 31:109-114.*

Results for the April 24, 2019 Delineation

Results of the delineation conducted on April 24, 2019 found there was significant curlyleaf pondweed growth at most of the sample sites (Table 1). One area measuring 3.14 acres was delineated that had the characteristic stem densities that were predicted to produce heavy growth at peak CLP abundance in June (Figure 1, Tables 1 and 2).

Table 1. Shields Lake aquatic plant occurrences and densities for the A pril 24, 2019 survey based on 64 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=64)	
	Occur	% Occur
Curlyleaf pondweed (*Potamogeton crispus*)	45	70

Table 2. Occurrence of plants by depth in Shields Lake sample out to a depth of 13 feet.

Depth (feet)	Number of Sites Sampled	Curlyleaf Pondweed	Avg CLP Stem Count
1			
2			
3			
4	5	5	21
5	14	14	20
6	11	11	21
7	5	5	21
8	5	5	25
9	1	1	16
10	5	4	4
11	5	0	
12	8	0	
13	1	0	
Sites Sampled to 14 feet	60	45	128

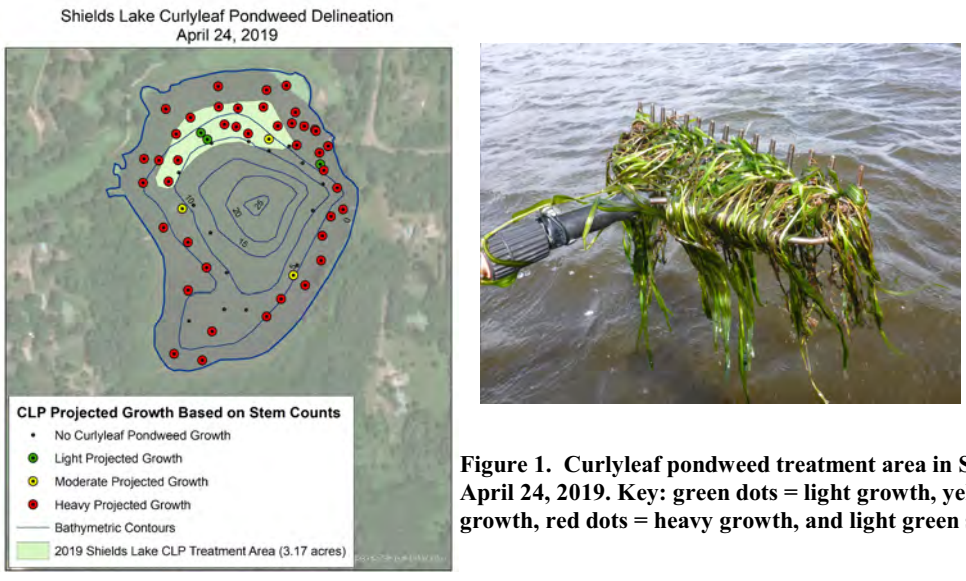

Figure 1. Curlyleaf pondweed treatment area in Shields Lake delineated on April 24, 2019. Key: green dots = light growth, yellow dots = moderate growth, red dots = heavy growth, and light green shading = treatment area.

Individual Site Plant Data for the Delineation, April 24, 2019

Curlyleaf pondweed growth was heavy in the April delineation (Table 3). Curlyleaf pondweed stem counts were extremely high indicating future uncontrolled growth would be abundant.

Table 3. Aquatic plant occurrence and stem density for CLP sample points in Shields Lake, April 24, 2019.

Site	Depth (ft)	CLP-stems	No plants
1			1
2	4	10	
3	5	18	
4	5	28	
5	5	16	
6	6	25+	
7	11		1
8	10	2	
9	7	30+	
10	12		1
11	7	30+	
12	7	30	
13	6	25	
14	11		1
15	6	25	
16	5	25	
17	11		1
18	10	3	
19	6	15	
20	8	12	
21	6	15	
22	11		1
23	11		1
24	7	15	
25	5	10	
26	5	12	
27	10		1
28	5	25	
29	8	20	
30	12		1
31	12		1
32	7	25	
33	5	20	
34	10	3	
35	12		1
36	12		1
37	8	25	
38	5	20	
39	6	20	
40	6	25	
41	10	15	
42	6	15	
43	5	15	
44	5	25	
45	8	2	
46	10	1	
47	12		1
48	6	20	
49	5	20	
50	4	30	
51	5	25	
52	7	20	
53	9	6	

Site	Depth (ft)	CLP-stems	No plants
54	12		1
55	10	3	
56	5	20	
57	4	30	
58	4	20	
59	6	25	
60	13		1
61	12		1
62	8	20	
63	4	15	
64	6	25	
Average		17.7	
Occurrence (64 sites)		45	16
% occurrence		70	

Results for the June 17, 2019 Assessment

Results of the June 17, 2019 assessment found zero submerged plant species. Curlyleaf was lying down and dead with a few remnant pieces left. No viable living CLP was observed (Table 4 and Figure 2). Duckweed was present but no rooted aquatic plants were observed on June 17, 2019.

Table 4. Shields Lake aquatic plant occurrences and densities for the June 17, 2019 survey based on 53 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=51)		
	Occur	% Occur	Density
Curlyleaf pondweed (*Potamogeton crispus*)	0	0	0

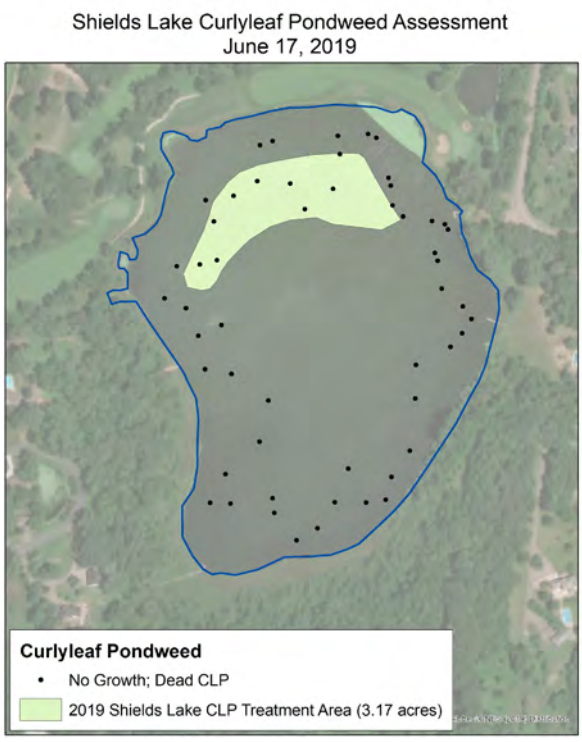

Figure 2. Curlyleaf pondweed coverage for Shields Lake on June 17, 2019.

Individual Site Plant Data for the Assessment, June 17, 2019

No submerged aquatic plants were found in the June assessment survey. Sites where dead CLP was observed were noted (Table 5). Duckweed was present but widely dispersed around Shields Lake.

Table 5. Aquatic plant occurrence and density for individual sample points in Shields Lake, June 17, 2019. Density is rated on a scale from 1 to 3 with 3 being the densest.

Site	Depth (ft)	Duckweed	CLP-dead	No plants
84			1	
85	8		1	
86				1
87	6		1	
88				1
89				1
90				1
91				1
92				1
93				1
94				1
95	4	2		
96		1		
97			1	
98				1
99				1
100	4	2		
101				1
102				1
103				1
104	4	2	1	
105	5	1		
106	6		1	
107	9		1	
108				1
109	4	1		
110	5			1
111	8			1
112				1
113	4	1		
114				1
115				1
116	8		1	
117				1
118				1
119				1
120				1
121				1
122	3	1		
123				1
124				1
125				1
126				1
127				1
128				1
129	4	1		
130				1
131				1
132				1
133				1
134				1
Average		**1.3**	**1.0**	
Occurrence (51 sites)		**9**	**8**	**22**
% occurrence		**18**	**16**	

Curlyleaf Delineation April 24, 2019

Figure 3. Curlyleaf pondweed in Shields Lake was dense and producing runners on April 24, 2019.

Curlyleaf Assessment June 17, 2019

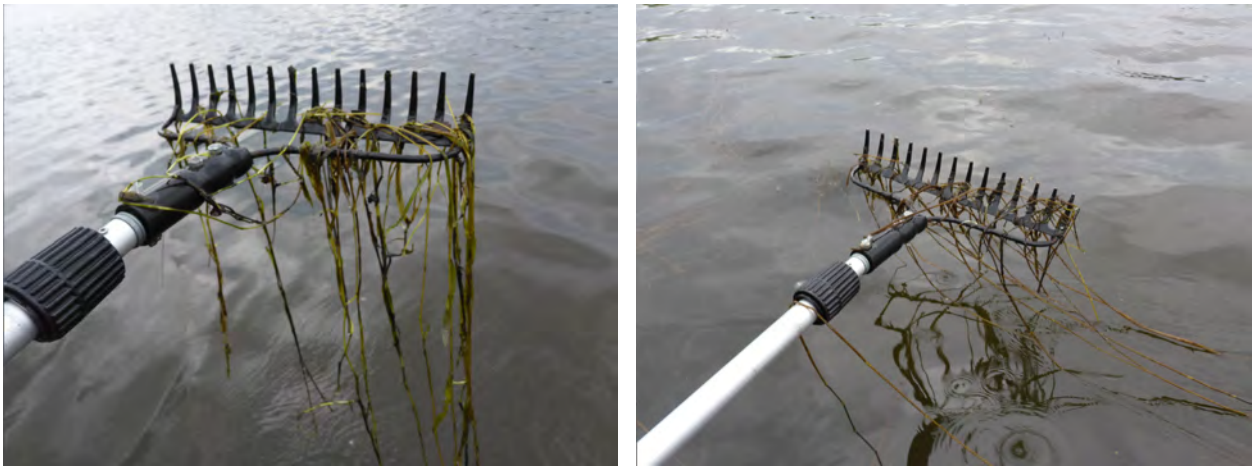

Figure 4. Curlyleaf pondweed was effectively controlled, no viable or actively growing Curlyleaf was seen post treatment on June 17, 2019.