



Curlyleaf Pondweed in Shields Lake, Washington County, Minnesota, April 27, 2020

Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2020

Curlyleaf Pondweed Delineation:
April 27 (meander) and May 1 (point intercept), 2020

Curlyleaf Treatment: May 22, 2020 (3.54 ac)

Curlyleaf Pondweed Assessment (point intercept): June 17, 2020

Prepared for:
Comfort Lake/Forest Lake
Watershed District
Forest Lake, Minnesota



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Summary

Curlyleaf Pondweed Delineation: Shields Lake (MnDNR ID #82-016200) is a 29.63 acre lake located in Washington County, Minnesota. Water clarity has a summer average of 1.9 feet in 2018 (source: Comfort Lake/Forest Lake Watershed District). A curlyleaf pondweed meander survey was conducted on April 27, 2020 and a full point intercept survey conducted on May 1, 2020 by Blue Water Science. Data from both surveys were combined to delineate areas for curlyleaf pondweed treatment and to look for Eurasian watermilfoil. Results of the curlyleaf delineation using both surveys found curlyleaf pondweed was widespread in the nearshore area of Shields Lake (Figure S1). A treatment area of 3.54 acres was delineated and was treated on May 22, 2020 using Aquathol K at 1.25 ppm (3.2 gallons/acre). A lakewide concentration of the active ingredient was 59 ppb.

Curlyleaf Pondweed Assessment: A point intercept survey was used for the curlyleaf pondweed assessment and was conducted on June 17, 2020 by Blue Water Science (Figure S1). Results of the curlyleaf pondweed assessment found no viable curlyleaf in Shields Lake. Also, in June, Shields Lake had a low diversity of aquatic plants, with coontail the only other submerged aquatic plant species observed.

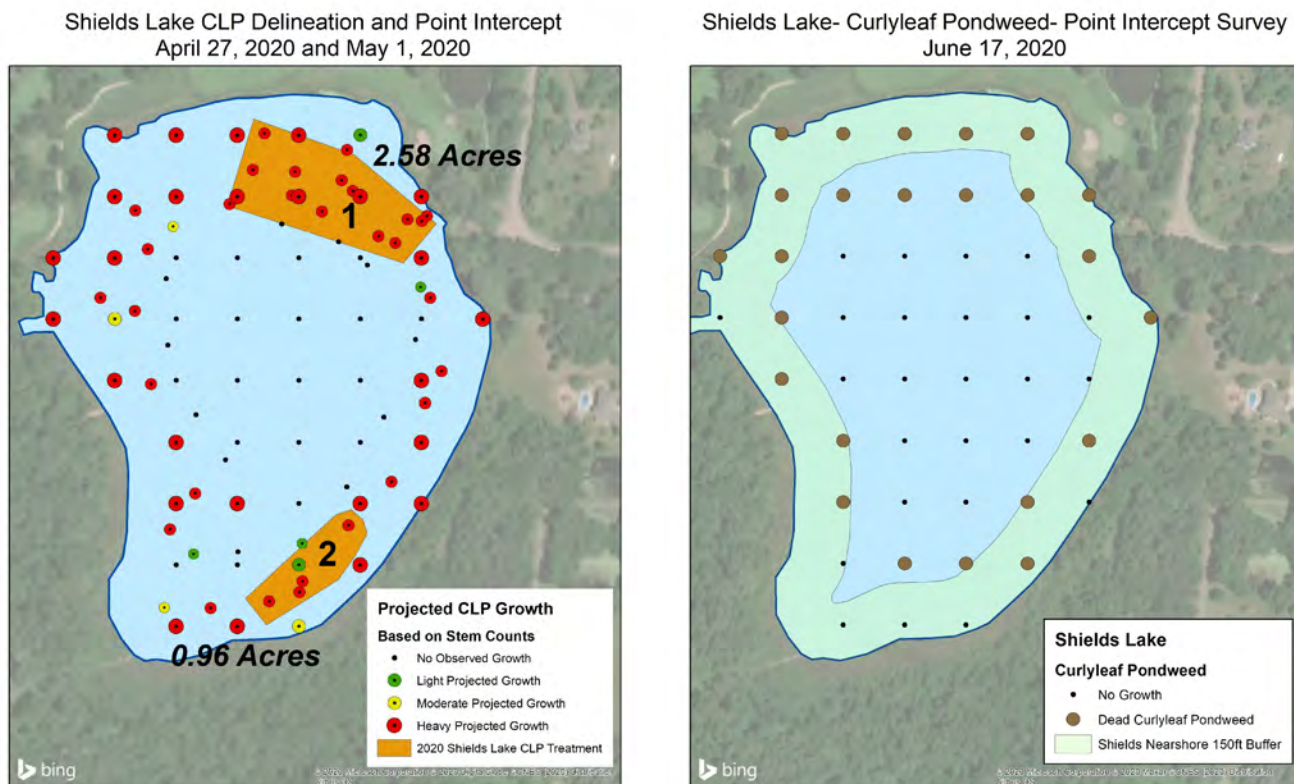


Figure S1. [left] Curlyleaf pondweed treatment areas Shields Lake that were delineated on April 27 and May 1, 2020. [right] Curlyleaf pondweed coverage for Shields Lake on June 17, 2020 (no CLP was observed).

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Shields Lake, Washington County (ID: 82-016200)

Size: 29.6 acres (MnDNR)

Littoral area: 22 acres (MnDNR)

Maximum depth: 27 ft (MnDNR)

Introduction

A curlyleaf pondweed delineation was conducted on April 27 and May 1, 2020 on 45 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, 2020 again to check the distribution and abundance of curlyleaf pondweed and Eurasian watermilfoil and to characterize all native 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 treated. 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 at 3.2 gallons/acre was conducted by Lake Management, Inc and a total of 3.54 acres were treated on May 22, 2020. A lakewide concentration of the active ingredient was estimated at 59 ppb.

Point Intercept Surveys and the Curlyleaf Pondweed Assessment: Two point intercept surveys were conducted by Blue Water Science on May 1 and June 17, 2020. Grid spacing was 50 meters. 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 CLP Delineation: Meandering Survey (April 27, 2020) and Point Intercept Survey (May 1, 2020)

Two surveys were conducted to delineate CLP in 2020. The first survey was a meander survey conducted on April 27, 2020 (Figure 1) and then a point intercept survey on May 1, 2020 (Figure 1). Results from both surveys were combined and areas of significant curlyleaf pondweed growth were delineated (Figure 1) based on CLP stem densities that were predicted to produce heavy growth at peak CLP abundance in June (Figure 1). Two areas totaling 3.54 acres were delineated for treatment. Coontail was the only other plant species observed (Tables 1, 2, and 3).



Figure 2. Curlyleaf pondweed growth in Shields Lake on May 1, 2020.

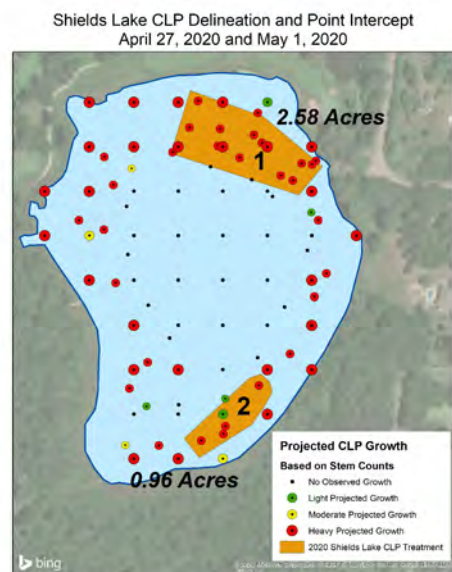
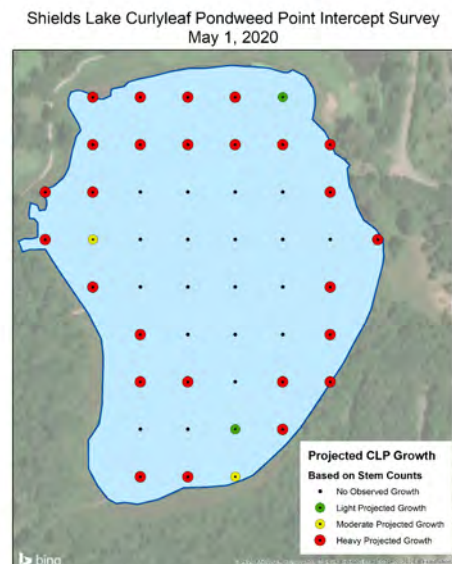
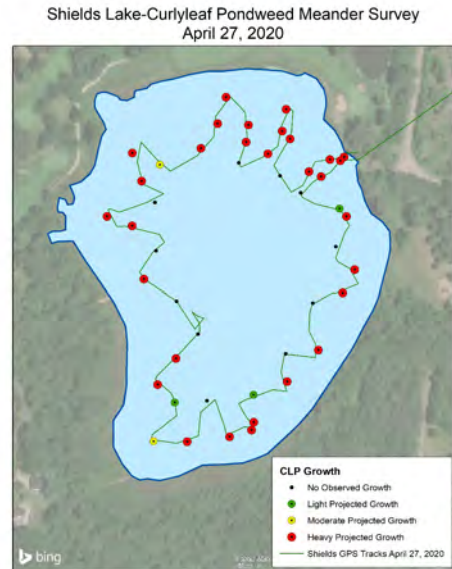


Figure 1. [top] Curlyleaf pondweed meandering delineation on April 27, 2020.
[middle] Projected CLP growth from a point intercept survey on May 1, 2020.
[bottom] Curlyleaf pondweed potential treatment areas Shields Lake that were delineated from surveys on April 27 and May 1, 2020.

Meandering Survey (April 27, 2020) Plant Data for the Delineation

Low plant diversity was found in Shields Lake. Curlyleaf pondweed was the only aquatic plant species observed in the April 27, 2020 meander survey (Table 3). Curlyleaf pondweed was abundant in many areas.

Table 1. Aquatic plant occurrence and stem density for sample points in the meandering survey in Shields Lake, April 27, 2020. Gray shading indicates depths with no plants

Site	Depth (ft)	CLP-stems	No plants
42	3	20	
46	3	12	
1	4	10	
2	4	15	
11	4	16	
16	4	12	
17	4	16	
32	4	25	
35	4	20	
36	4	20	
37	4	16	
41	4	18	
3	5	10	
15	5	10	
19	5	20	
22	5	20	
23	5	14	
29	5	23	
34	5	20	
38	5	18	
43	5	20	
45	5	14	
8	6	20	
9	6	20	
13	6	20	
20	6	3	
31	6	25	
40	6	22	
6	7	20	
26	7	16	
28	7	25	
14	8	1	
18	8		1
5	9	2	
21	9	2	
33	9	3	
24	10		1
30	10		1
39	10		1
7	11		1
25	11		1
27	11		1
4	12		1
44	12		1
10	13		1
12	13		1
Occurrence (46 sites)		35	11
% occurrence		76	

Results for the May 1, 2020 Point Intercept Delineation

Results of the point intercept survey conducted on May 1, 2020 found there was significant curlyleaf pondweed growth at many of the sample sites in the nearshore area (Table 2). Based on results from the meander and the point intercept surveys, two areas representing 3.54 acres were delineated that had the characteristic stem densities that were predicted to produce heavy growth at peak CLP abundance in June.

In early season surveys, projected CLP growth data is different than rake density growth (Figure 3). Projected CLP growth can be a light density in May but grow into heavy growth by mid-June. Standard rake densities for CLP are shown in Figure 3, the map on the right.

Table 2. Shields Lake aquatic plant occurrences and densities for the May 1, 2020 point intercept survey based on 49 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=49)	
	Occur	% Occur
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	30	61

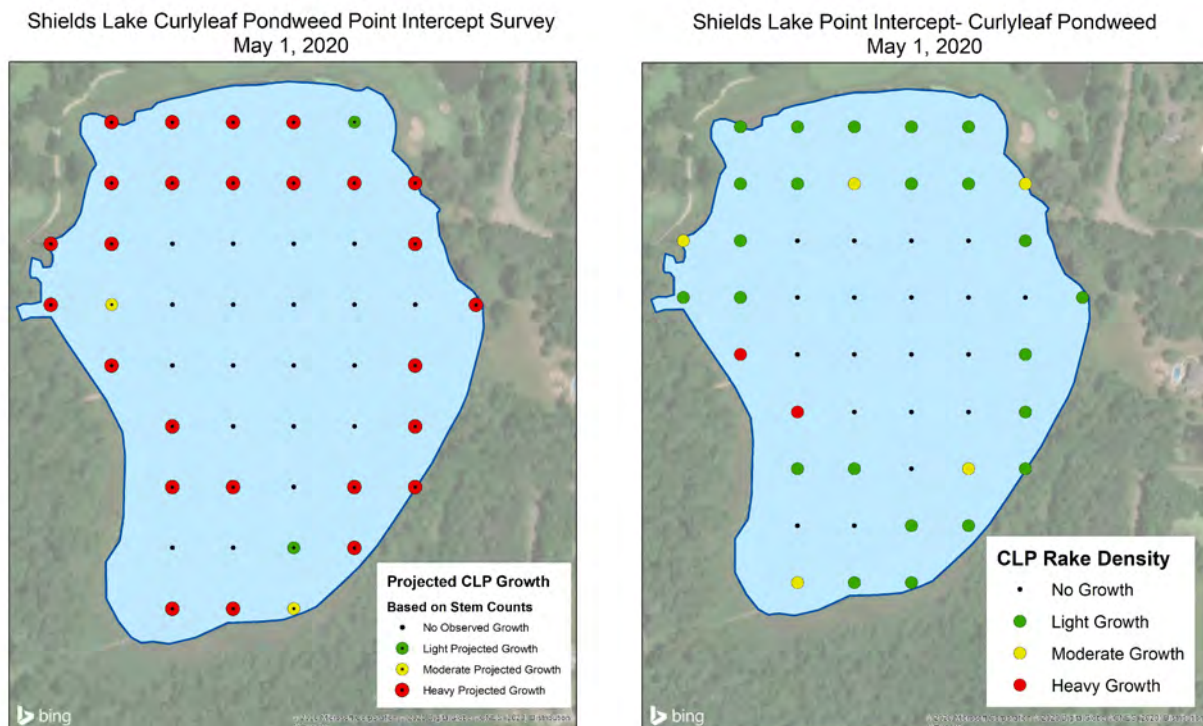


Figure 3. [left] Projected CLP growth on May 1, 2020. [right] Curlyleaf pondweed rake density on May 1, 2020. Key: Green dots = light growth or projected light growth, yellow dots = projected moderate growth, red dots = heavy growth or projected heavy growth, and black dot = no growth.

Point Intercept Survey (May 1, 2020) Plant Data for the Delineation

Low plant diversity was found in Shields Lake in the May 1, 2020 point intercept survey with curlyleaf pondweed the only aquatic plant species observed (Table 3).

Table 3. Aquatic plant occurrence and stem density for the point intercept sample points in Shields Lake, May 1, 2020. Gray shading indicates depths with no plants.

Site	Depth (ft)	CLP-stems	No plants
3	2	3	
45	2	11	
49	2	2	
12	3	6	
18	3	30	
24	3	12	
32	3	20	
44	3	20	
46	3	12	
47	3	8	
48	3	15	
1	4	19	
2	4	4	
7	4	12	
8	4	9	
11	4	22	
17	4	12	
31	4	10	
33	4	9	
38	4	15	
39	4	15	
43	4	7	
40	5	10	
42	5	15	
6	6	1	
13	7	30	
25	7	3	
41	7	20	
5	8		1
9	8	15	
23	8	6	
19	10		1
30	10		1
34	10		1
37	10		1
10	11		1
14	12		1
26	13		1
16	14		1
22	20		1
4			1
Average		12.4	
Occurrence (49 sites)		30	11
% occurrence		61	

Results of the June 17, 2020 Point Intercept Survey and CLP Assessment

Results of the June 17, 2020 assessment using a point intercept survey found there was 1 submerged plant species, coontail (Table 4). No curlyleaf pondweed was observed in the lake (Table 4 and Figure 4). Results from the assessment found native plants growing out to a depth of 7 feet (Table 5)(Figure 5).

Table 4. Shields Lake aquatic plant occurrences and densities for the June 17, 2020 survey based on 49 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=49)		
	Occur	% Occur	Density
Coontail (<i>Ceratophyllum demersum</i>)	2	4	1.5

Figure 4. Curlyleaf pondweed coverage for Shields Lake on June 17, 2020. Key: black dots = no growth, orange shading = treatment areas, and green shading = 150 foot contour around the lake.

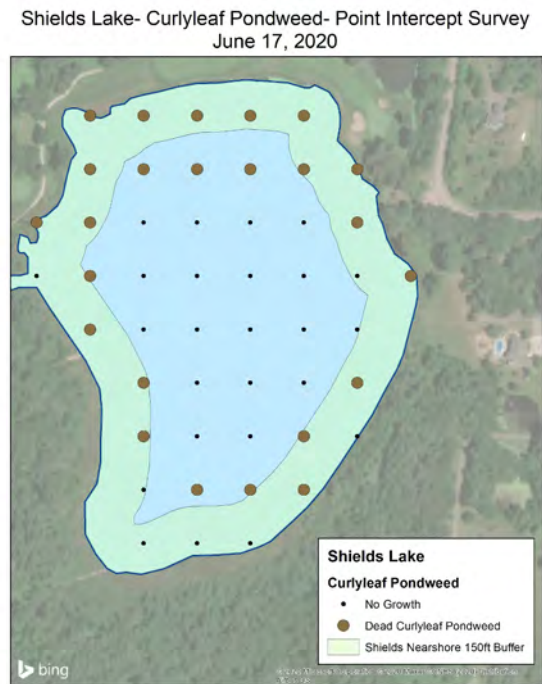
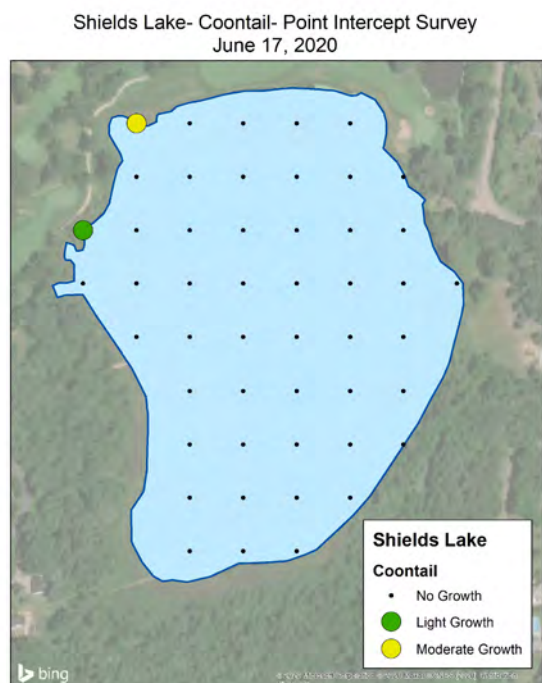


Figure 5. Coontail coverage for Shields Lake on June 17, 2020. Key: green dots = light growth, yellow dots = moderate growth, and black dots = no growth.



Point Intercept Survey (June 17, 2020) Plant Data for the Assessment

Low plant diversity was found in Shields Lake with a total of 1 submerged aquatic plant species (Table 5). Coontail was sampled at light to moderate growth.

Table 5. Aquatic plant occurrence and density for the point intercept sample points in Shields Lake, June 17, 2020. Gray shading indicates depths with no plants.

Site	Depth (ft)	Coontail	CLP-dead	FA-benthic	FA-floating	No plants
24	1			1		1
45	2	2	1	1		
2	3					1
3	3					1
39	3		1			1
44	3		1			1
46	3		1			1
47	3		1			1
48	3		1			1
49	3		1	1		1
1	4					1
7	4		1	1		1
18	4		1			1
43	4		1			1
8	5		1			1
17	5		1			1
33	5		1			1
38	5		1			1
40	5		1			1
5	6		1			1
6	6		1			1
13	6		1			1
25	6		1			1
31	6		1			1
41	6		1			1
42	6		1			1
11	7		1	1		1
4	8					1
23	8					1
9	9					1
19	9					1
30	9					1
10	10					1
37	10					1
26	11					1
34	11					1
16	14					1
22	17					1
29	20					1
14						1
15						1
20						1
21						1
27						1

Site	Depth (ft)	Coontail	CLP-dead	FA-benthic	FA-floating	No plants
28						1
32		1	1		1	
35						1
36						1
12	1					1
Average		1.5	1.0	1.0	1.0	
Occur (49 sites)		2	24	5	1	47
% occur		4	49	10	2	