



Shields Lake, Washington County, Minnesota, June 16, 2021

Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2021

Curlyleaf Delineation (meander and point intercept): April 16, 2021

Curlyleaf Treatment: (3.17 ac)

Curlyleaf Assessment (point intercept): June 16, 2021

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



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Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2021

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 and point intercept survey were conducted on April 16, 2021 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 3.17 acres was delineated and was treated in May 2021 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 16, 2021 by Blue Water Science (Figure S1). Results of the curlyleaf pondweed assessment found little 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.

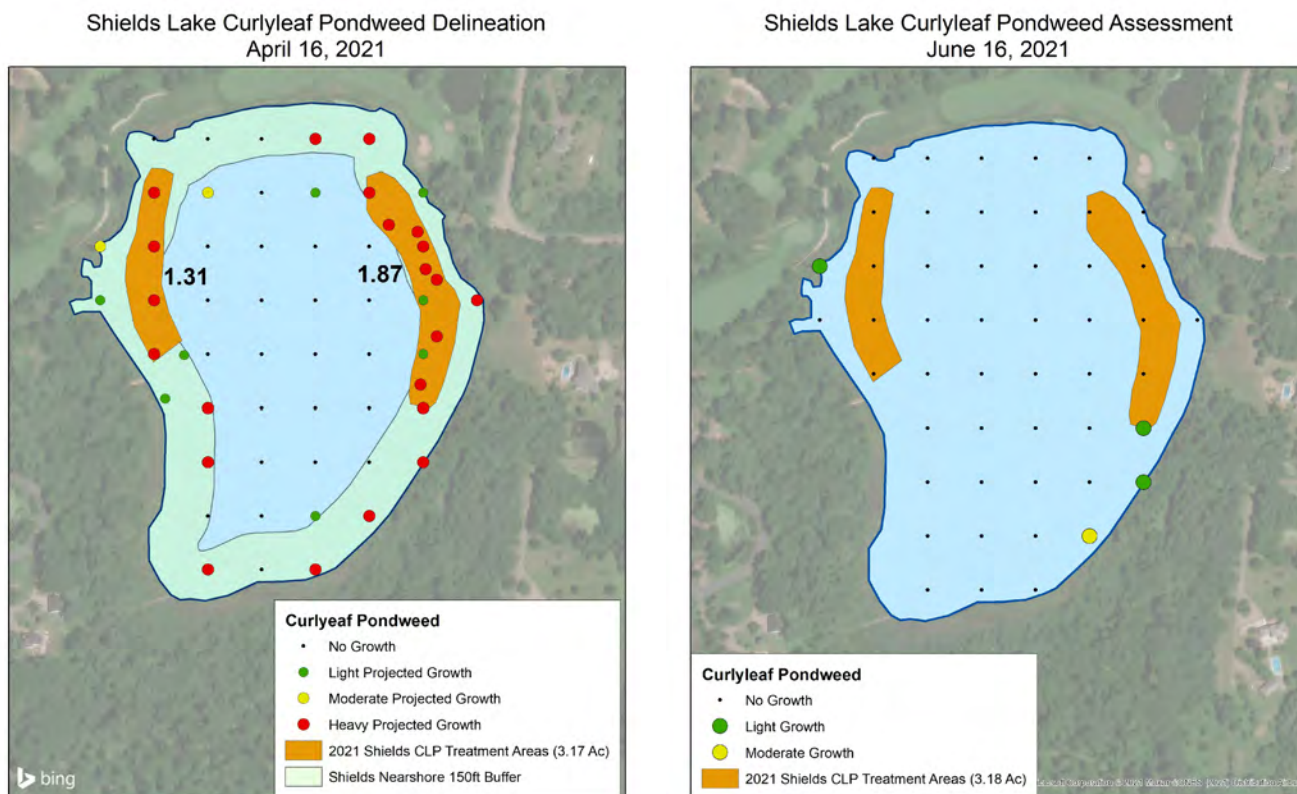


Figure S1. [left] Curlyleaf pondweed treatment areas Shields Lake that were delineated on April 16, 2021. [right] Curlyleaf pondweed coverage for Shields Lake on June 16, 2021.

Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2021

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 16, 2021 on 30 acre Shields Lake, Washington County. The objective of the delineation was to check the distribution and abundance of curlyleaf pondweed. About a month after a CLP treatment, a curlyleaf pondweed assessment was conducted on June 16, 2021 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 3.17 acres were treated in May, 2021. 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 April 16 and June 16, 2021. 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 on April 16, 2021

A combined meandered and point intercept survey was conducted to delineate CLP in 2021 on April 16, 2021 (Figure 1). Results from the survey determined 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 3.17 acres were delineated for treatment. No other submerged aquatic plant species observed (Tables 1, 2, and 3).

Shields Lake Curlyleaf Pondweed Delineation
April 16, 2021

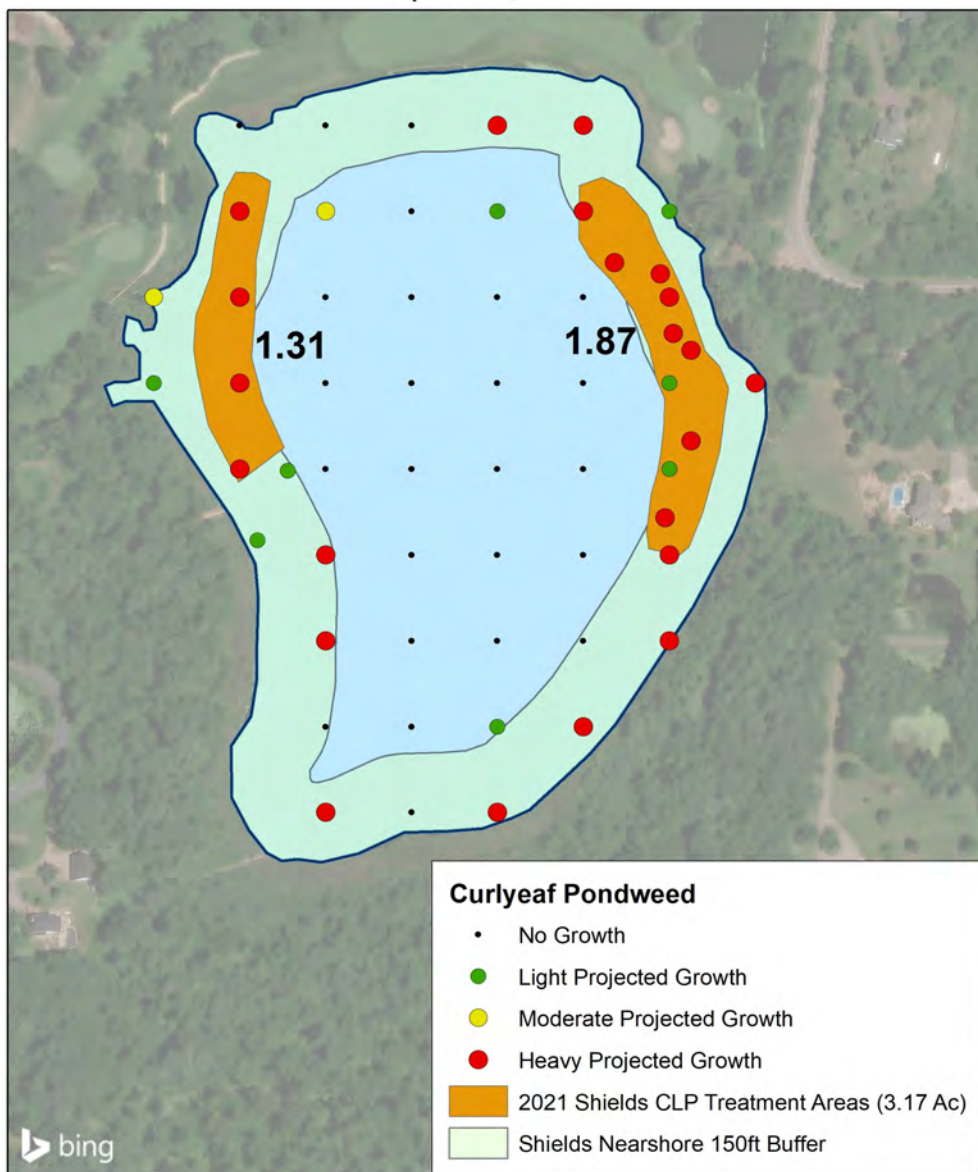


Figure 1. Curlyleaf pondweed potential treatment areas Shields Lake that were delineated on April 16, 2021.

Meandering Survey on April 16, 2021: Low plant diversity was found in Shields Lake. Curlyleaf pondweed was the only aquatic plant species observed in the April 16, 2021 meander survey (Table 1). Curlyleaf pondweed was abundant in many areas.

Table 1. Curlyleaf pondweed occurrence and stem density for sample points in the meandering survey in Shields Lake on April 16, 2021.

Site	Depth (ft)	CLP-stems
344	6	8
345	7	1
346	4	1
347	6	4
348	7	9
349	7	15
350	6.5	11
351	5	7
Average		7
Occurrence (8 sites)		8

Point Intercept Survey on April 16, 2021: Results of the point intercept survey conducted on April 16, 2021 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 3.17 acres were delineated that had the characteristic stem densities that were predicted to produce heavy growth at peak CLP abundance in June (Figure 1).

Table 2. Curlyleaf pondweed occurrences and stem densities for the April 16, 2021 point intercept survey based on 49 sites.

	All Stations (n=49)	
	Occur	% Occur
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	24	49



Figure 2. Curlyleaf pondweed rake density on April 16, 2021.

Point Intercept Survey on April 16, 2021 Plant Data for the Delineation: Low plant diversity was found in Shields Lake in the April 16, 2021 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, April 16, 2021. Gray shading indicates depths with no plants.

Site	Depth (ft)	CLP Stems	FA Benthic	No plants
1	4	5	1	
2	3		1	1
3	3	4	2	
4	9			1
5	9			1
6	7	1		
7	3	7	2	
8	5	6	1	
9	10			1
10	12			1
11	9		1	1
12	4	12		
13	6	5	1	
14				
15				
16	13			1
17	5	9		
18	5	4	1	
19	12			1
20				
21				
22				
23	8	1		
24	2	1		
25	7	5	1	
26	12			1
27				
28				
29				
30	9	1		
31	4	11	1	
32	2	3	1	
33	6	4	1	
34	12			1
35	16			1
36	15			1
37	11			1
38	6	7	1	
39	4	11	1	
40	6	3		
41	7			1
42	6	2	1	
43	6	8	1	
44	3	2	2	
45	3		1	1
46	4		1	1
47	4		1	1
48	3	8	1	
49	3	5	1	
Average		5.2	1.1	
Occurrence (49 sites)		24	22	17
% occurrence		49	45	

Results of the June 16, 2021 Point Intercept Survey and CLP Assessment

Results of the June 16, 2021 assessment using a point intercept survey found there were 2 submerged plant species, coontail and curlyleaf pondweed (Table 4). Little viable curlyleaf pondweed was observed in the lake (Table 4 and Figure 3). Results from the assessment found native plants growing out to a depth of 5 feet (Table 5)(Figure 4).

Table 4. Shields Lake aquatic plant occurrences and densities for the June 16, 2021 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
Duckweed (<i>Lemna sp</i>)	3	6	1.3
Coontail (<i>Ceratophyllum demersum</i>)	16	33	1.6
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	4	8	1.3

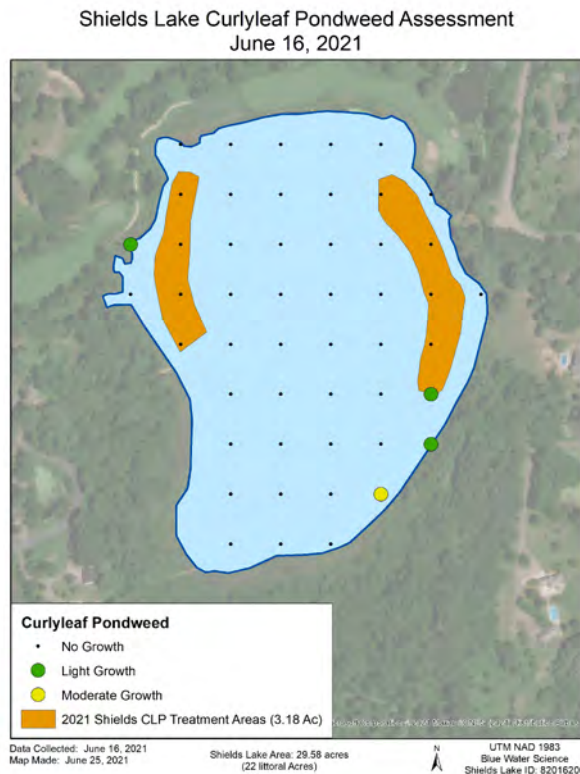


Figure 3. Curlyleaf pondweed coverage for Shields Lake on June 16, 2021. Key: black dots = no growth green dot = light growth and yellow dot = moderate growth.

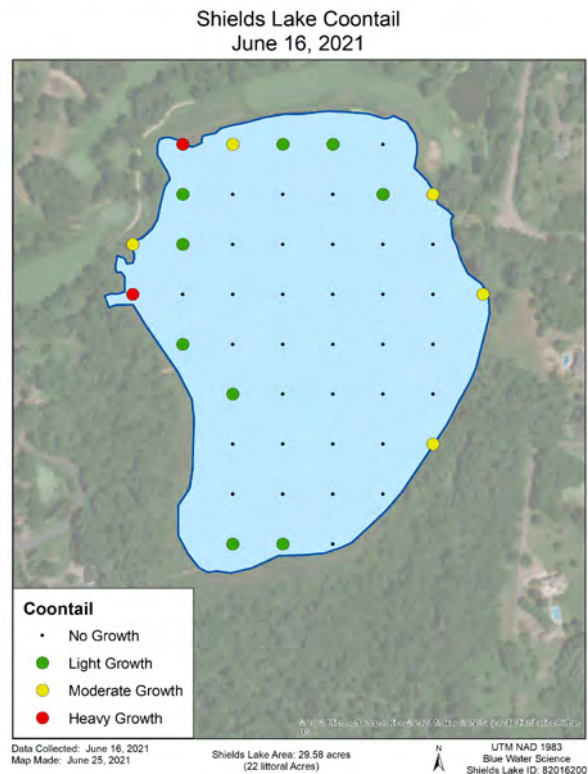


Figure 4. Coontail coverage for Shields Lake on June 16, 2021. Key: black dot = no growth, green dots = light growth, yellow dots = moderate growth, and red dots = heavy growth.

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

Low plant diversity was found in Shields Lake with a total of 2 submerged aquatic plant species (Table 5).

Table 5. Aquatic plant occurrence and density for the point intercept sample points in Shields Lake, June 16, 2021. Gray shading indicates depths with no plants.

Site	Depth (ft)	Duckweed	Coontail	CLP	CLP-dead	FA-benthic	FA-floating	No plants
1	3		1		1	1		
2	3		1			1		
7	3			2	1			
12	2		2	1	1	2	2	
15	5		1		1	1		
17	4			1	1	1		
18	3		1		1	2		
24	2	1	3				3	
31	3		2		1	2	1	
32	2	1	2	1	1	1	3	
33	4		1		1	1		
39	3		1		1	2		
43	5		1		1	2		
44	1		2			1	2	
45	1	2	3		1	1	3	
46	3		2		1	1	2	
47	3		1			1		
48	3		1		1	1		
3	2					2		1
4	7				1	1		1
5	7					1		1
6	5				2			1
8	4				1	1		1
9	8				1	1		1
10	11							1
11	5				1			1
14	12							1
15	15							1
16	12							1
19	9					1		1
20	17							1
21	24							1
22	16							1
23	7					1		1
25	5				1	1		1
26	12							1
27	19							1
28	24							1
29	20							1
30	9					1		1
34	10							1
35	15							1
36	16							1
37	9							1
38	4				1			1
40	4				1	1		1
41	6					2		1
42	5				1	1		1
49	3					2		1
Average		1.3	1.6	1.3	1.0	1.3	2.3	
Occur (49 sites)		3	16	4	23	29	7	31
% occur		6	33	8	47	59	14	



Aquatic plant conditions on June 16, 2021.