



Shields Lake, Washington County, Minnesota, June 7, 2022

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# Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2022

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Curlyleaf Delineation (point intercept): April 21, 2022

**Curlyleaf Treatment: May 27, 2022 (3.27 ac)**

Curlyleaf Assessment (point intercept): June 7, 2022

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



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**December 5, 2022**

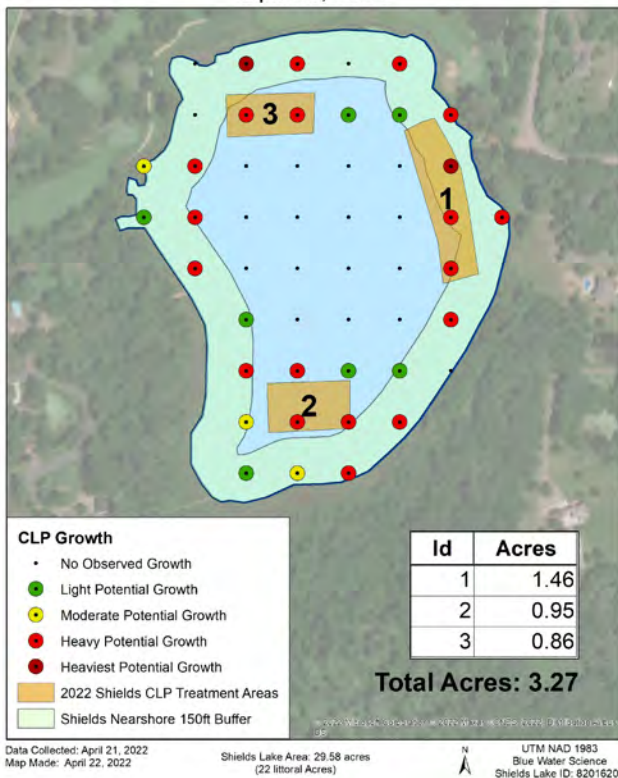
# Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2022

## Summary

**Curlyleaf Pondweed Delineation:** Shields Lake (MnDNR ID #82-016200) is a 30 acre lake located in Washington County, Minnesota. Water clarity has a summer average of 8.4 feet in 2021 (source: Comfort Lake/Forest Lake Watershed District). A curlyleaf pondweed point intercept survey was conducted on April 21, 2022 by Blue Water Science. Results of the curlyleaf delineation survey found curlyleaf pondweed was widespread in the nearshore area of Shields Lake (Figure S1). A treatment area of 3.27 acres was delineated and was treated on May 27, 2022 using Aquathol K at 1.25 ppm (3.2 gallons/acre). A lakewide concentration of the active ingredient was 59 ppb. Curlyleaf pondweed was the only aquatic plant species found on April 21, 2022.

**Curlyleaf Pondweed Assessment:** A point intercept survey was used for the curlyleaf pondweed assessment and was conducted on June 7, 2022 by Blue Water Science (Figure S1). Results of the curlyleaf pondweed assessment found no viable curlyleaf in Shields Lake. Coontail was the only other submerged plant was found in Shields Lake on June 7, 2022..

Shields Lake Curlyleaf Pondweed Delineation and Treatment  
April 21, 2022



Shields Lake Curlyleaf Pondweed Assessment  
June 7, 2022

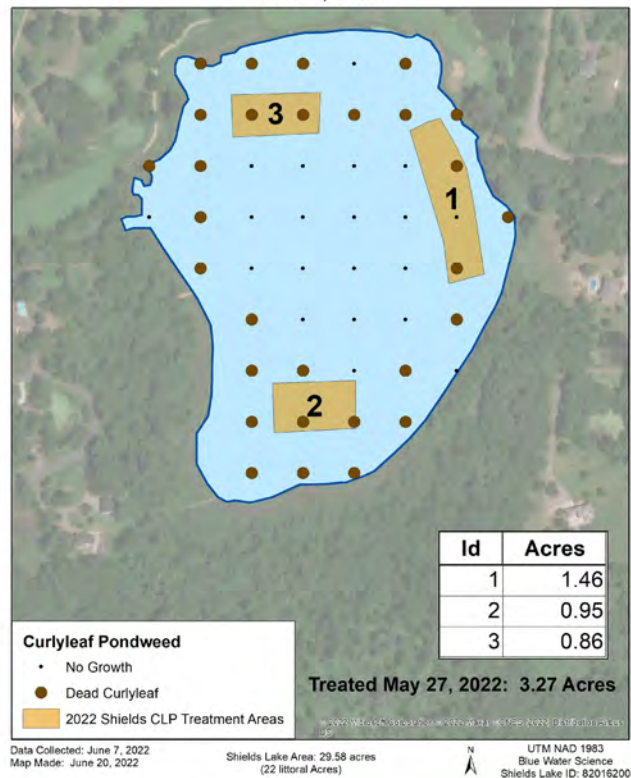


Figure S1. [left] Curlyleaf pondweed treatment areas Shields Lake that were delineated on April 21, 2022. [right] Curlyleaf pondweed coverage for Shields Lake on June 7, 2022.

# Curlyleaf Pondweed Delineation and Assessment Surveys for Shields Lake, Washington County, Minnesota, 2022

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 using a point intercept survey was conducted on April 21, 2022 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 second point intercept was conducted on June 7, 2022 to assess the status of CLP and to check the distribution and abundance of all 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 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 3.27 acres were treated in May, 2022. 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 21 and June 7, 2022. 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 21, 2022

A point intercept survey was conducted to delineate CLP in 2022 on April 21, 2022 (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). Three areas totaling 3.27 acres were delineated for treatment. No other submerged aquatic plant species observed (Tables 1, 2, and 3).

Shields Lake Curlyleaf Pondweed Delineation and Treatment  
April 21, 2022

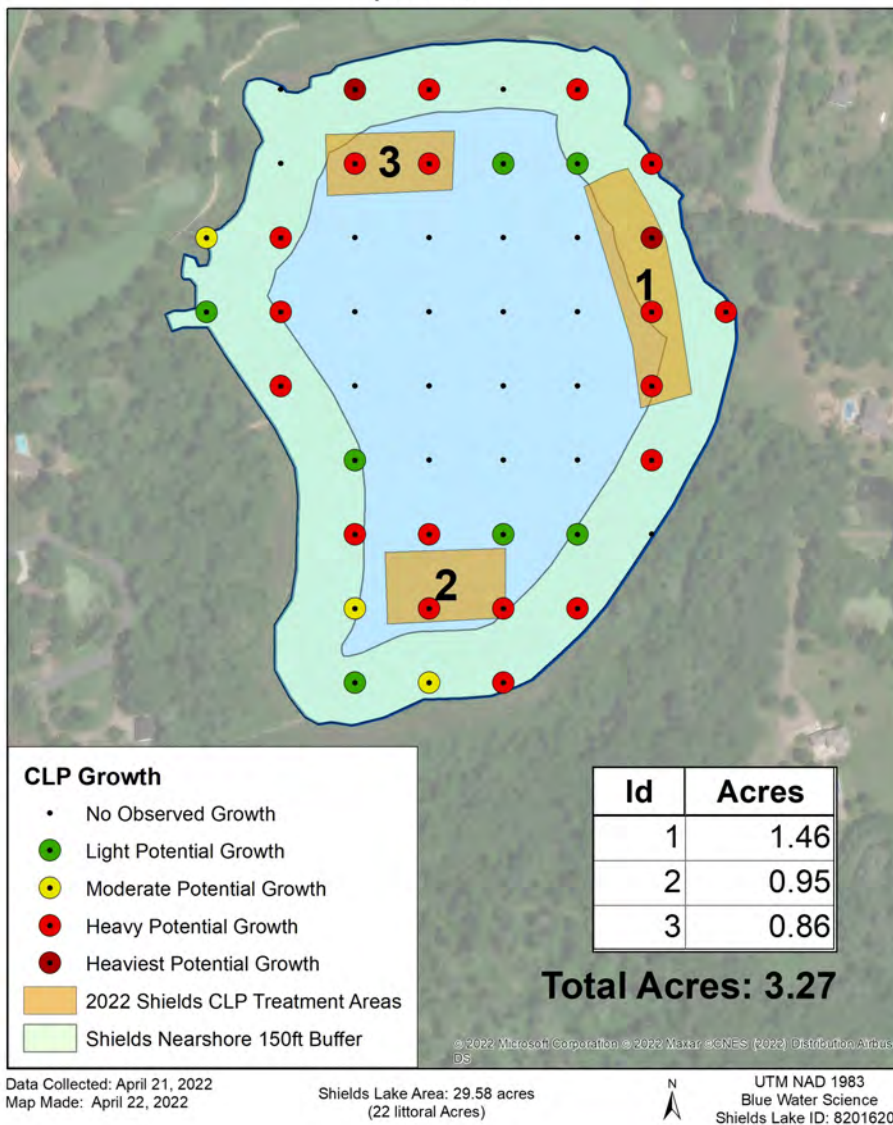


Figure 1. Curlyleaf pondweed potential treatment areas Shields Lake that were delineated on April 21, 2022.

**Point Intercept Survey on April 21, 2022:** Results of the point intercept survey conducted on April 21, 2022 found there was significant curlyleaf pondweed growth at many of the sample sites in the nearshore area (Table 1). Based on results from the point intercept surveys, three areas representing 3.27 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 1. Curlyleaf pondweed occurrences and stem densities for the April 21, 2022 point intercept survey based on 49 sites.**

	All Stations (n=49)	
	Occur	% Occur
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	30	70



**Figure 2. Curlyleaf pondweed rake density on April 21, 2022.**

**Point Intercept Survey on April 21, 2022 Plant Data for the Delineation:** Low plant diversity was found in Shields Lake in the April 21, 2022 point intercept survey with curlyleaf pondweed the only aquatic plant species observed (Table 2).

**Table 2. Aquatic plant occurrence and stem density for the point intercept sample points in Shields Lake, April 21, 2022.**

Site	Depth (ft)	CLP stems	No plants
1	4	2	
2	4	3	
3	3	7	
4	9	3	
5	8	8	
6	6	4	
7	4	9	
8	5	6	
9	9	6	
10	11	1	
11	7	1	
12			1
13	7	2	
14	12		1
15	15		1
16	14		1
17	5	4	
18	5	5	
19	11		1
20	16		1
21			1
22	19		1
23	6	5	
24	3	2	
25	6	7	
26	13		1
27			1
28			1
29	21		1
30	9	5	
31	4	9	
32	3	3	
33	4	6	
34	12		1
35			1
36			1
37	13		1
38	5	12	
39	3		1
40	6	9	
41	6	6	
42	7	1	
43	5	1	
44	4	10	
45	3		1
46	3	12	
47	4	6	
48	4		1
49	4	8	
Average		5.4	
Occur (49 sites)		30	19
% occur		61	



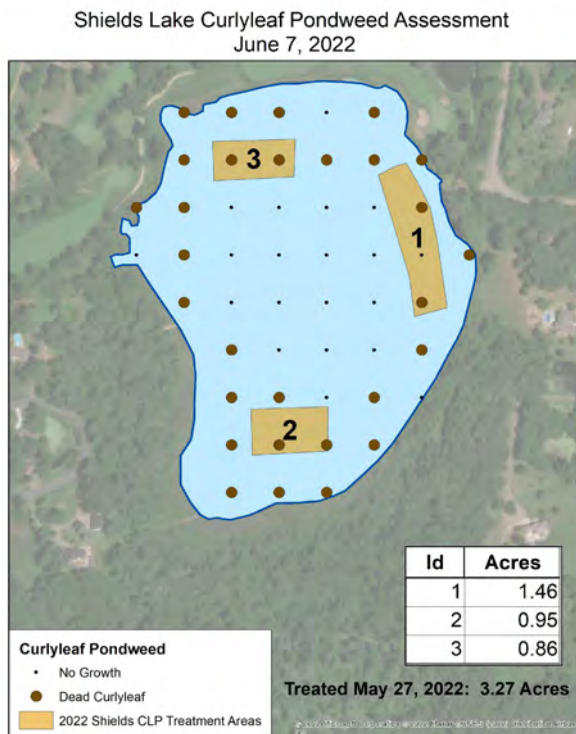


# Results of the June 7, 2022 Point Intercept Survey and CLP Assessment

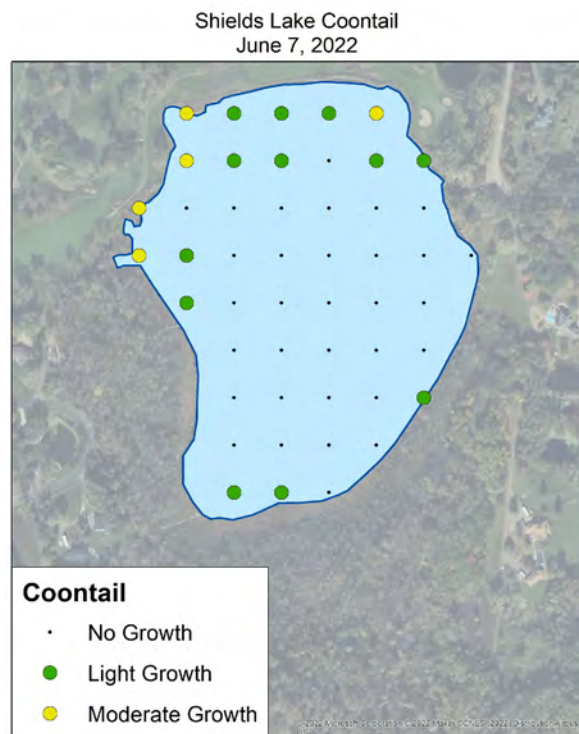
Results of the June 7, 2022 assessment using a point intercept survey found only one submerged plant species, coontail and coontail growth was mostly light (Table 2). No viable curlyleaf pondweed was observed in the lake (Table 3 and Figure 3). Results from the assessment found native plants growing out to a depth of 7 feet (Table 4)(Figure 4).

**Table 3. Shields Lake aquatic plant occurrences and densities for the June 7, 2022 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> )	2	4	1.0
Coontail ( <i>Ceratophyllum demersum</i> )	17	35	1.3
DEAD Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	29	59	1.3



**Figure 3. Curlyleaf pondweed coverage for Shields Lake on June 7, 2022. Key: black dots = no growth and brown dots = dead curlyleaf pondweed.**



**Figure 4. Coontail coverage for Shields Lake on June 7, 2022. Key: black dot = no growth, green dots = light growth, and yellow dots = moderate growth.**

## Point Intercept Survey (June 7, 2022) Plant Data for the Assessment

Low plant diversity was found in Shields Lake with a total of 1 submerged aquatic plant species (Table 4).

**Table 4. Aquatic plant occurrence and density for the point intercept sample points in Shields Lake, June 7, 2022.**

Site	Depth (ft)	Duckweed	Coontail	CLP - dead	No plants
1	5		1	2	
2	3		1	1	
3	3			1	1
4	8			1	1
5	8			2	1
6	6			1	1
7	4			1	1
8	5			3	1
9	10			1	1
10	13				1
11	9			1	1
12	1		1		
13	6			3	1
14					1
15					1
16	16				1
17	5			1	1
18	5		1	1	
19	11				1
20					1
21					1
22	14				1
23	10			1	1
24	2		2		
25	7		1	1	
26	14				1
27					1
28					1
29					1
30	10				1
31	4			1	1
32	3		2	1	
33				1	1
34	12				1
35					1
36					1
37	10				1
38	5			2	
39		1	2	2	
40	6		1	1	
41	6		1	1	
42	6			1	1
43	6		1	1	
44	3		1	1	
45	2	1	2	1	
46	4		1	1	
47	4		1	2	
48	5		1		
49	4		2	1	
Average		1.0	1.3	1.3	
Occur (49 sites)		2	17	29	31
% occur		4	35	59	





## Aquatic plant conditions on June 7, 2022



**Figure 5. After the May 27, CLP treatment curlyleaf pondweed was not viable on the June 7, 2022 survey.**