



Moody Lake, Chisago County, Minnesota, June 16, 2021

Curlyleaf Pondweed Delineation and Assessment Surveys for Moody Lake, Chisago County, Minnesota, 2021

Curlyleaf Pondweed Delineation: April 16, 2021

Curlyleaf Treatment: No Treatment in 2021

Curlyleaf Pondweed Assessment: June 16, 2021

Prepared for:

Comfort Lake/Forest Lake
Watershed District
Forest Lake, Minnesota



Prepared by:

Steve McComas
Jo Stuckert
Connor McComas
Blue Water Science

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Summary

Curlyleaf Pondweed Delineation: Moody Lake (MnDNR ID #13-0023) is a 45 acre lake located in Chisago County, Minnesota. Water clarity has a summer average of 3.6 feet in 2020 (source: CLFLWD). A curlyleaf pondweed meander survey and a full 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 only found in a few sample sites and were in the nearshore area of Moody Lake (Figure S1). No treatment for curlyleaf pondweed was conducted in 2021.

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 curlyleaf pondweed in Moody Lake was growing at light to moderate densities. Also, in June, Moody Lake had a low diversity of aquatic plants, with coontail, elodea, and aquatic moss the only other submerged aquatic plant species observed.

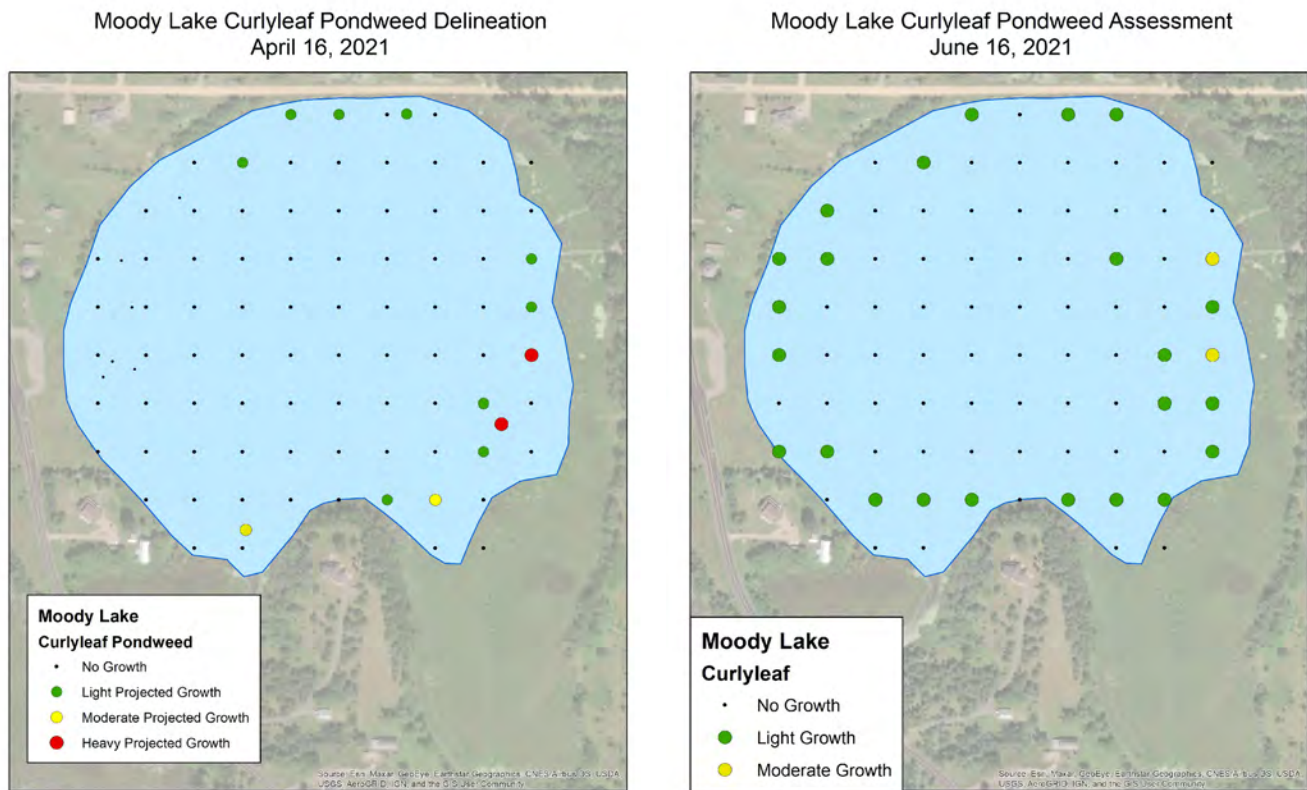


Figure S1. [left] Curlyleaf pondweed treatment areas Moody Lake that were delineated on April 16, 2021. [right] Curlyleaf pondweed coverage for Moody Lake on June 16, 2021.

Key: green dots = light growth, yellow dots = moderate growth, red dots = heavy growth, orange shaded areas = treatment area, and green shaded area = 150 foot buffer around the perimeter of the lake.

Curlyleaf Pondweed Delineation and Assessment Surveys for Moody Lake, Chisago County, Minnesota, 2021

Moody Lake, Chisago County (ID: 13-0023)

Size: 45 acres (MnDNR)

Littoral area: 22 acres (MnDNR)

Maximum depth: 48 ft (MnDNR)

Introduction

A curlyleaf pondweed delineation was conducted on April 16, 2021 on 45 acre Moody Lake, Chisago County. The objective of the delineation was to check the distribution and abundance of curlyleaf pondweed. 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*).

No treatment for curlyleaf pondweed was conducted in 2021.

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: April 16, 2021

Two surveys were conducted to delineate CLP in 2021. A meander survey and a point intercept survey were conducted on April 16, 2021 (Figure 1). Results from both surveys were combined and based on CLP stem densities that were predicted to produce heavy growth at peak CLP abundance in June no areas were delineated for treatment. No treatment occurred in 2021. Elodea was the only other plant species observed (Tables 1, 2, and 3).

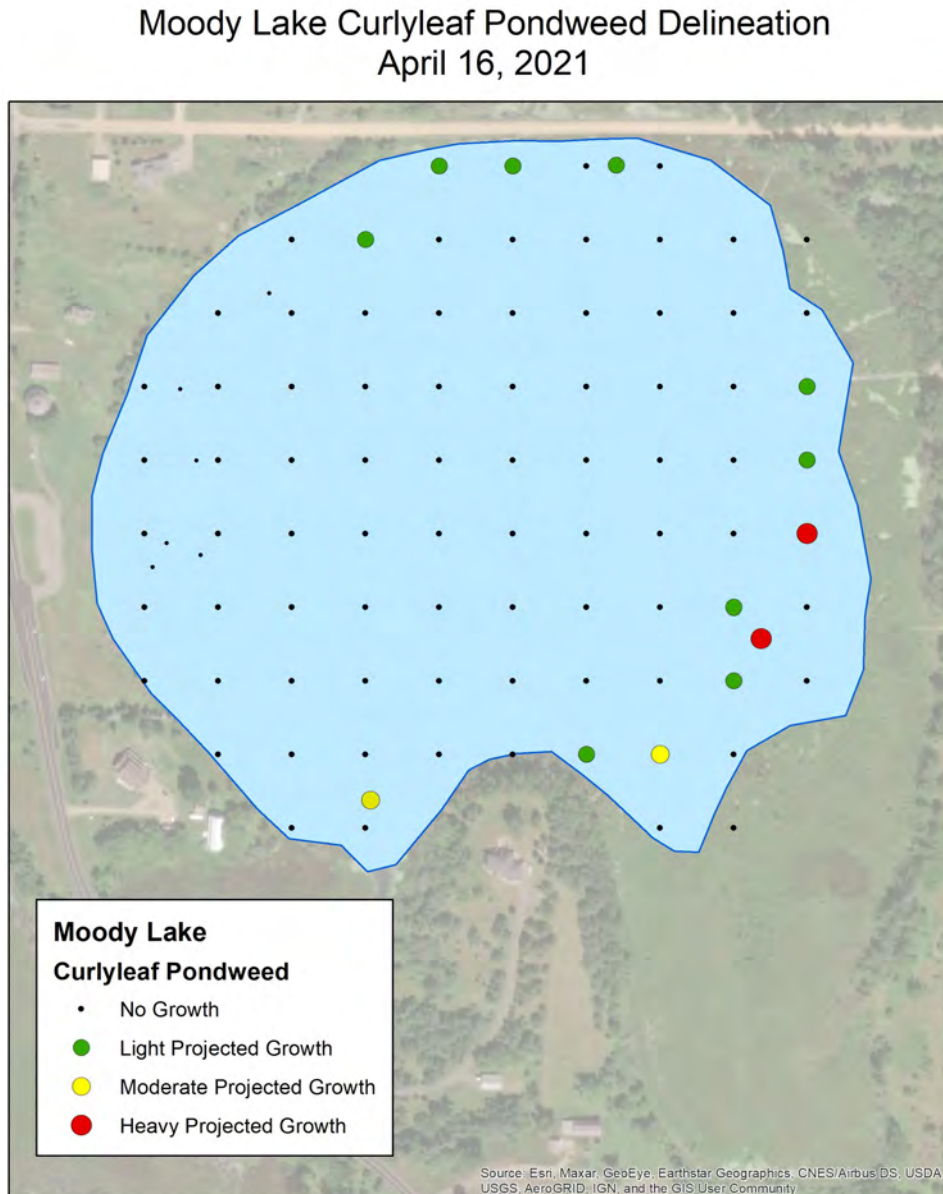


Figure 1. [left] Curlyleaf pondweed from both the meandering survey and the point intercept survey conducted on April 16, 2021.

Key: Green dots = light growth, yellow dots = moderate growth, red dots = heavy growth, and black dot = sample site, no plants.

Meandering Survey (April 16, 2021) Plant Data for the Delineation

Low plant diversity was found in Moody Lake with a total of 2 aquatic plant species (Table 3). Curlyleaf pondweed was the most common plant observed in this delineation survey.

Table 1. Aquatic plant occurrence and stem density for sample points in the meandering survey in Moody Lake, April 16, 2021.

Site	Depth (feet)	CLP Stems	No plants
336	8		1
337	8		1
338	6		1
339	6		1
340	5	2	
341	5	5	
342	4	3	
343	6		1
Average		3.3	
Occurrence (8 sites)		3	5



Figure 2. A sample rake with both curlyleaf pondweed and elodea was collected on April 16, 2021 (left) and a sample rake with elodea (right).

Results for the April 16, 2021 Point Intercept Delineation

Results of the point intercept survey conducted on April 16, 2021 found there was little significant curlyleaf pondweed growth at most of the sample sites in the nearshore area (Table 2). Elodea were the only other plant species observed (Table 2).

In early season surveys, projected CLP growth data is different than rake density ratings (Figure 3). Projected CLP growth can be a light density in April 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. Moody Lake aquatic plant occurrences and densities for the April 16, 2021 point intercept survey based on 83 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=83)	
	Occur	% Occur
Elodea (<i>Elodea canadensis</i>)	31	53
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	10	17

Point Intercept Survey (April 16, 2021) Plant Data for the Delineation

Low plant diversity was found in Moody Lake in the April 16, 2021 point intercept survey with a total of 2 aquatic plant species (Table 3). Elodea was the most common plant observed in this point intercept survey.

Table 3. Aquatic plant occurrence and stem density for the point intercept sample points in Moody Lake, April 16, 2021.

Site	Depth (ft)	CLP Stems	Elodea	No plants
1	2		1	
2	4		1	
5	2		1	
6	6		1	
7	6		1	
8	6		1	
9	2		1	
10	4	1	1	
11	4	3	1	
13	1		1	
14	6		1	
15	7			1
16	8			1
17	7		1	
18	7		1	
19	7		1	
20	6		1	
21	4	1	2	
23	5		1	
24	7			1
25	25			1
26	29			1
27	22			1
28	10			1
29	8			1
30	7		1	
31	5	1	1	
32	4		2	
33	6		1	
34	15			1
40	8			1
41	6			1
42	4	5	1	
43	5		1	
44	12			1
50	11			1
51	7			1
52	4	1	1	
53	4		1	
54	7			1
55	19			1
60	11			1
61	7			1
62	5	2	1	
63	5			1
64	7			1
69	14			1
70	6			1
72	5		1	
73	6	2		
74	6			1
75	8			1
76	13			1
77	12			1
78	6			1
80	4	2	2	
81	4	1	1	
82	5		1	
83	5		1	
Average		1.9	1.1	27
Occurrence (83sites)		10	31	
% occurrence		12	37	

Results for 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 5 submerged plant species, coontail, curlyleaf pondweed, elodea, aquatic moss, and stringy pondweed with elodea being the dominant plant (Table 4 and Figure 3). Results from the assessment found native plants growing out to a depth of 11 feet (Table 5)(Figure 4).

Table 4. Moody Lake aquatic plant occurrences and densities for the June 16, 2021 survey based on 83 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=83)		
	Occur	% Occur	Density
Cattails (<i>Typha sp</i>)	2	2	1.0
Elodea (<i>Elodea canadensis</i>)	57	69	2.0
Coontail (<i>Ceratophyllum demersum</i>)	16	19	1.4
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	25	30	1.1
Aquatic moss (<i>Drepanocladus sp</i>)	3	4	1.0
Stringy pondweed (<i>Potamogeton sp</i>)	3	4	1.0

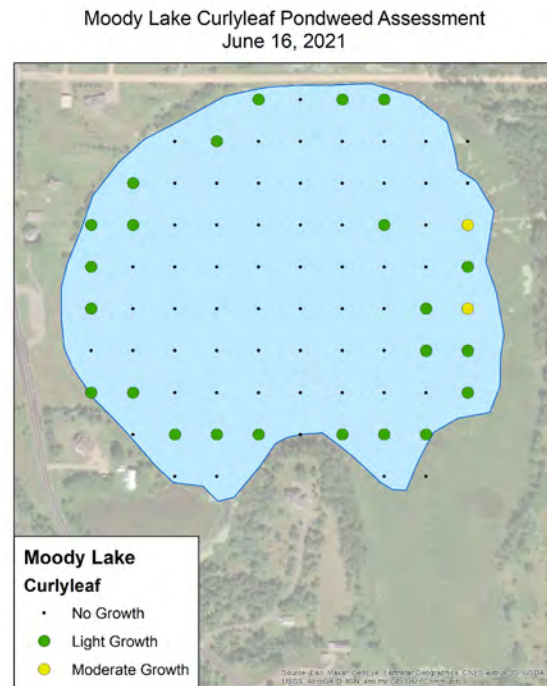


Figure 3. Curlyleaf pondweed coverage for Moody Lake on June 16, 2021. Key: black dots = no growth, green dot = light growth and yellow dots = moderate growth.

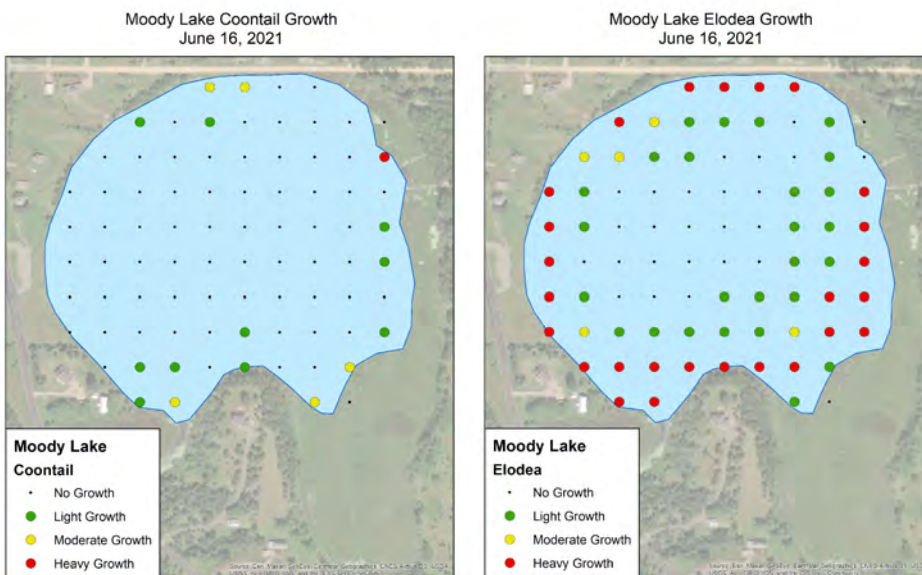


Figure 4. Coontail (left) and elodea (right) coverage for Moody Lake on June 16, 2021. Key: green dots = light growth, yellow dots = moderate growth, red dots = heavy growth, and black dots = no growth.

Point Intercept Survey (June 16, 2021) Plant Data for the Assessment

Low plant diversity was found in Moody Lake with a total of 5 submerged aquatic plant species (Table 5). Elodea was the most common plant observed in this survey. Elodea was sampled at light to heavy growth.

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

Site	Depth (ft)	Cattails	Coontail	Curlyleaf	Elodea	Aquatic moss	Stringy	FA-benthic	FA-floating	No Plants
1	1		1		3				1	
2	3		2		3				1	
3	1		2		1				2	
5	1	1			3				1	
6	4		1	1	3					
7	5		1	1	3		1			
8	3			1	3					
9	1		1		3					
10	3			1	3					
11	3			1	3				1	
12	1		2	1	1				2	
13	1	1		1	3				1	
14	5			1	2					
15	7				1					
16	8				1					
17	6				1					
18	6		1		1	1				
19	5				1					
20	5				2					
21	4				3				2	
22	3		1	1	3					
23	3				3					
24	7				1					
28	9				1			2		
29	7				1					
30	8				1	1				
31	4			1	3		1			
32	4			1	3				3	
33	3			1	3					
40	7				1					
41	5			1	1					
42	3		1	2	3				2	
43	4			1	3					
44	11				1			1		
50	10				1			1		
51	5				1					
52	3		1	1	3				2	
53	3			1	3				1	
54	6			1	1			1		
60	12			1	1					
61	5				1					
62	3			2	3				1	
63	5			1	2			1		
64	6				2					
65	8				1		1	1		
66	8				1					
70	5				1	1				
71	3		3							1
72	3		1		3					
73	4			1	2					
74	6		1		1			1		
75	6				1					
76	10				1					
78	5				1					
80	3		2	1	3				2	
81	3		2		3				3	
82	4			1	3				2	
83	3			1	3				2	
4										1
25	24									1
26	26									1
27	19									1
34	15									1

Site	Depth (ft)	Cattails	Coontail	Curlyleaf	Elodea	Aquatic moss	Stringy	FA-benthic	FA-floating	No Plants
35	30									1
36										1
37										1
38										1
39	15									1
45	23									1
46										1
47										1
48										1
49										1
55	19									1
56										1
57										1
58										1
59										1
67	16									1
68	26									1
69	16									1
77	11							1		1
79										1
Average		1.0	1.4	1.1	2.0	1.0	1.0	1.1	1.7	25
Occur		2	16	25	57	3	3	8	17	
% occur		2	19	30	69	4	4	10	20	