



Water Lilies in Little Comfort Lake, Chisago County, Minnesota, September 1, 2015

Curlyleaf Pondweed Delineation and Assessment And a Point Intercept Survey for Little Comfort Lake, Chisago County, Minnesota, 2015

Curlyleaf Pondweed Delineation: April 18, 2015

Curlyleaf Pondweed Assessment: June 4, 2015

Point Intercept Survey: September 1, 2015

Prepared for:

**Comfort Lake/Forest Lake
Watershed District
Forest Lake, Minnesota**



Prepared by:

**Steve McComas
Jo Stuckert
Blue Water Science**

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Summary

Curlyleaf Pondweed Delineation: Little Comfort Lake (MnDNR ID #13-0054) is a 36 acre lake located in Chisago County, Minnesota. Water clarity has a summer average of 1.5 meters in 2012 (source: Comfort Lake/Forest Lake Watershed District). A curlyleaf pondweed delineation was conducted on April 18, 2015 by Blue Water Science to characterize conditions of curlyleaf pondweed and to look for Eurasian watermilfoil. Results of the curlyleaf delineation indicated that no curlyleaf was present in April.

Curlyleaf Pondweed Assessment: Curlyleaf was not treated in Little Comfort Lake in 2015. A curlyleaf pondweed assessment was conducted on June 4, 2015 by Blue Water Science and found that curlyleaf pondweed was found in 4 locations (Figure S1). Results of the curlyleaf pondweed assessment indicated Little Comfort Lake has curlyleaf pondweed but it is scarce. Eurasian watermilfoil was not observed in either of the surveys. Floating filamentous covered about 2 acres.

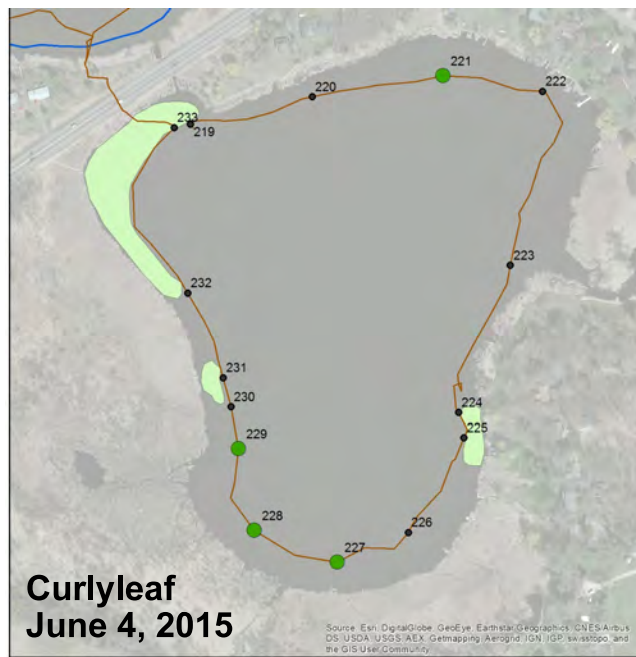
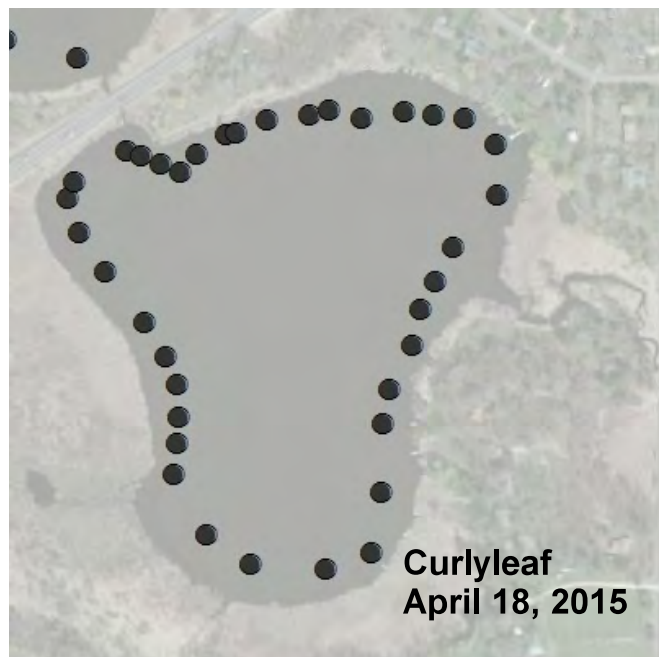


Figure S1. [left] Little Comfort Lake sample locations on April 18, 2015. No curlyleaf pondweed was found. [right] Little Comfort Lake curlyleaf pondweed and filamentous algae on June 4, 2015.
Key: black dot = no curlyleaf pondweed and green dot = light growth.



Aquatic Plant Point Intercept Survey: On September 1, 2015 an aquatic plant point-intercept survey was conducted on Little Comfort Lake. The survey looked for non-native species such as curlyleaf pondweed and Eurasian watermilfoil and characterized all aquatic plants.

In September, coontail was the only native submerged plant found. Coontail was observed at 21 sites (34% of the sites)(Table S1). Plants grew out to about 7 feet of water depth (Figure S2)(Table S1). Three species of floatingleaf plants were observed on September 1, 2015 including duckweed, spatterdock, and white water lilies.

Conclusions: The aquatic plant community in 2015 had 1 species of submerged plants in late summer. This is a low plant diversity condition. Filamentous algae was present with above average coverage in 2015 and covered over about 2 acres of surface area.

Eurasian watermilfoil and curlyleaf pondweed were not found in this point intercept survey.

Table S1. The percent occurrence of aquatic plants for Little Comfort Lake. Percent occurrence is calculated based on the number of times a plant species occurs at a sampling station divided into the total number of stations for the survey. For example, if coontail was found in 25 out of 50 stations, its percent occurrence would be 50%.

	September 1, 2015 % Occur (62 sites)
Duckweed (<i>Lemna sp</i>)	13
Spatterdock (<i>Nuphar variegatum</i>)	5
White Water lilies (<i>Nymphaea tuberosa</i>)	21
Coontail (<i>Ceratophyllum demersum</i>)	34
Filamentous algae	11
Aquatic Plant Coverage (acres)	13 (36%)



Figure S2. Coontail was growing to the surface in many locations around Little Comfort Lake in 2015.

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Lake ID: 13-0054

Size: 36 acres

Littoral area: 16 acres

Maximum depth: 56 ft (at normal lake level)

Introduction

A curlyleaf pondweed delineation was conducted on April 18, 2015 on 36 acre Little Comfort 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 4, 2015 again to check the distribution and abundance of curlyleaf pondweed. A full point-intercept survey was conducted on September 1, 2015 to characterize the aquatic plant conditions and to check for non-natives including curlyleaf pondweed and Eurasian watermilfoil.

Methods

Delineation and Assessment Surveys: The curlyleaf pondweed (CLP) delineation and assessment of Little Comfort Lake were conducted by Blue Water Science in April 18, 2015 and June 4, 2015. For the delineation 62 sites were evaluated around Little Comfort Lake and for the assessment 13 sites were evaluated. Sample sites were randomly selected around Little Comfort Lake. For the CLP delineation, at each sample point, a sampling rake was lowered into the water and a plant sample was taken. If more than 4 CLP stems per rake sample were measured, future growth at this site was considered to be heavy. If 3 stems or less were sampled, future growth was considered to be light and would not be treated.

For the June CLP assessment, 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 5 with 1 being sparse and 5 being a nuisance. Based on these sample sites, plant distribution maps were constructed.



Figure 1. Little Comfort Lake has natural landscape around much of the lake.

Aquatic Plant Survey Point Intercept Survey: An aquatic plant survey of Little Comfort Lake using a point intercept sampling method was conducted by Blue Water Science on September 1, 2015. A map and sampling grid were prepared by Blue Water Science and consisted of a total of 62 points that were distributed throughout the lake (Figure 3). Points were spaced 50 meters apart. Each point represented about 0.6 acres. GPS coordinates used a UTM WGS84 datum. At each sample point, plants were sampled with a rake sampler. A plant density rating was assigned to each plant species on a scale from 1 to 5 (Figure 2). A density of a “1” indicated sparse growth with one or two stems present on the rake sampler. A 4.5 or 5 rating indicated matting surface plant growth.

Chart of Aquatic Plant Density Ratings

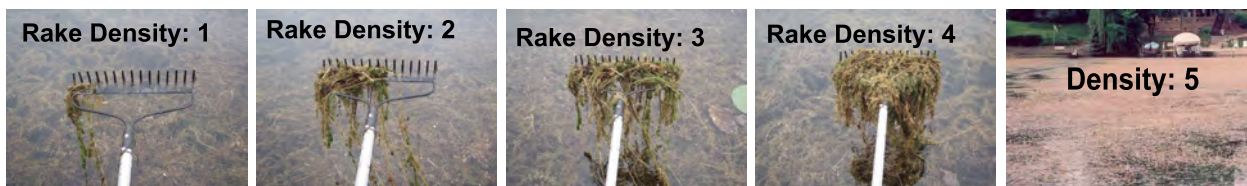


Figure 2. Aquatic plant density ratings from 1 to 5. A density rating of 4.5 or 5 is used for plants topping out at the surface.

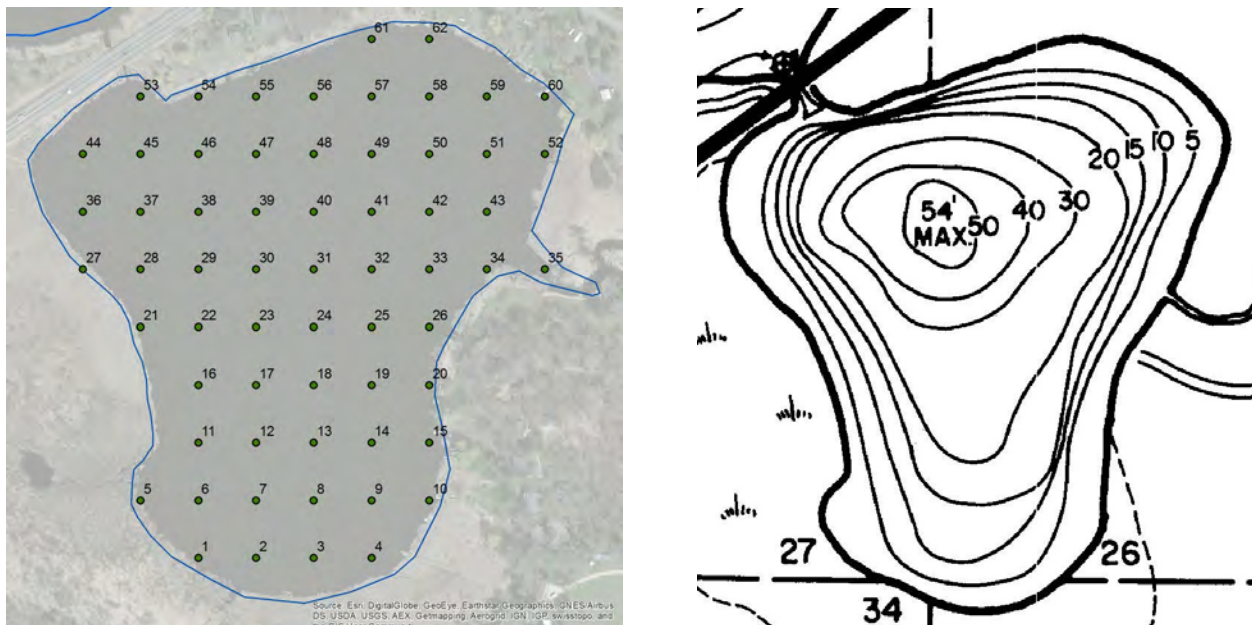


Figure 3. [left] Point locations for the aquatic plant surveys. Lake map with UTM coordinates using the NAD1983 datum. [right] MnDNR contour map.

Results for the Curlyleaf Pondweed Delineation and Assessment

Results of the delineation conducted on April 18, 2015 found there was no curlyleaf pondweed growth at any of the sample sites (Table 1). Coontail was the only plant species observed (Table 1). A follow-up curlyleaf assessment was conducted on June 4, 2015. In June, curlyleaf was found at 4 out of 15 sample sites and all sites had light growth (Table 1 and Figure 5).

Filamentous algae growth was significant on June 4 and covered at least 2 acres.

Table 1. Little Comfort Lake aquatic plant occurrences and densities for the April 18, 2015 survey based on 37 sites. Density ratings are 1-5 with 1 being low and 5 being most dense.

	April 18, 2015		June 4, 2015	
	All Stations (n=37)		All Stations (n=15)	
	Occur	% Occur	Occur	% Occur
Coontail (<i>Ceratophyllum demersum</i>)	32	86%	15	100%
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	0	0	4	37%



Figure 4. Filamentous algae on June 4, 2015.

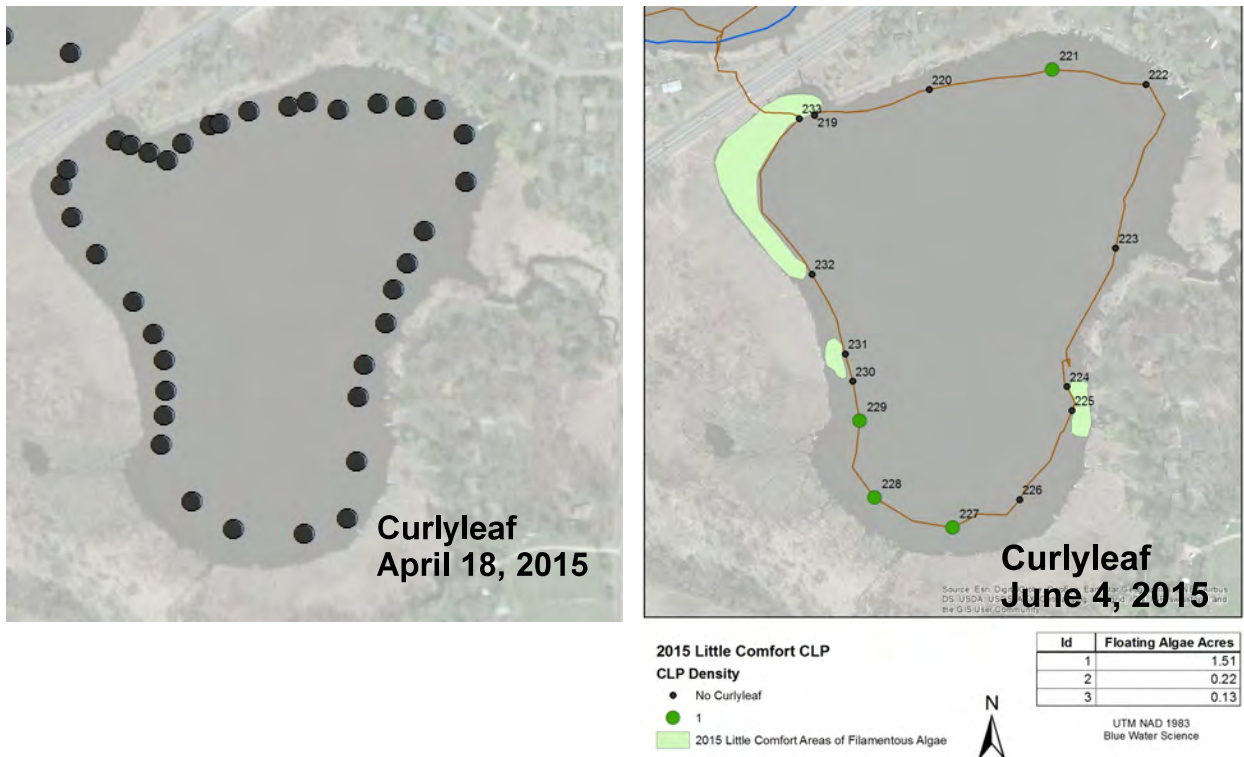


Figure 5. [left] Little Comfort Lake sample locations on April 18, 2015. No curlyleaf pondweed was found. [right] Little Comfort Lake curlyleaf pondweed and filamentous algae on June 4, 2015. Key: black dot = no curlyleaf pondweed and green dot = light growth.

Results of the Point Intercept Survey -- September 1, 2015

The most abundant plant on the September 1, 2015 point-intercept plant survey for Little Comfort Lake was coontail found at 21 out of 62 sites (34%) at mostly heavy growth (Figure 6 and Table 2). Other floating plants observed were white lilies and spatterdock (Figure 6) as well as duckweed. Filamentous algae had declined in distribution and abundance from June and was found at light growth at 7 sites (Figure 6).

A summary of plant density and occurrence for coontail and other plants is shown in Tables 2 and 3.

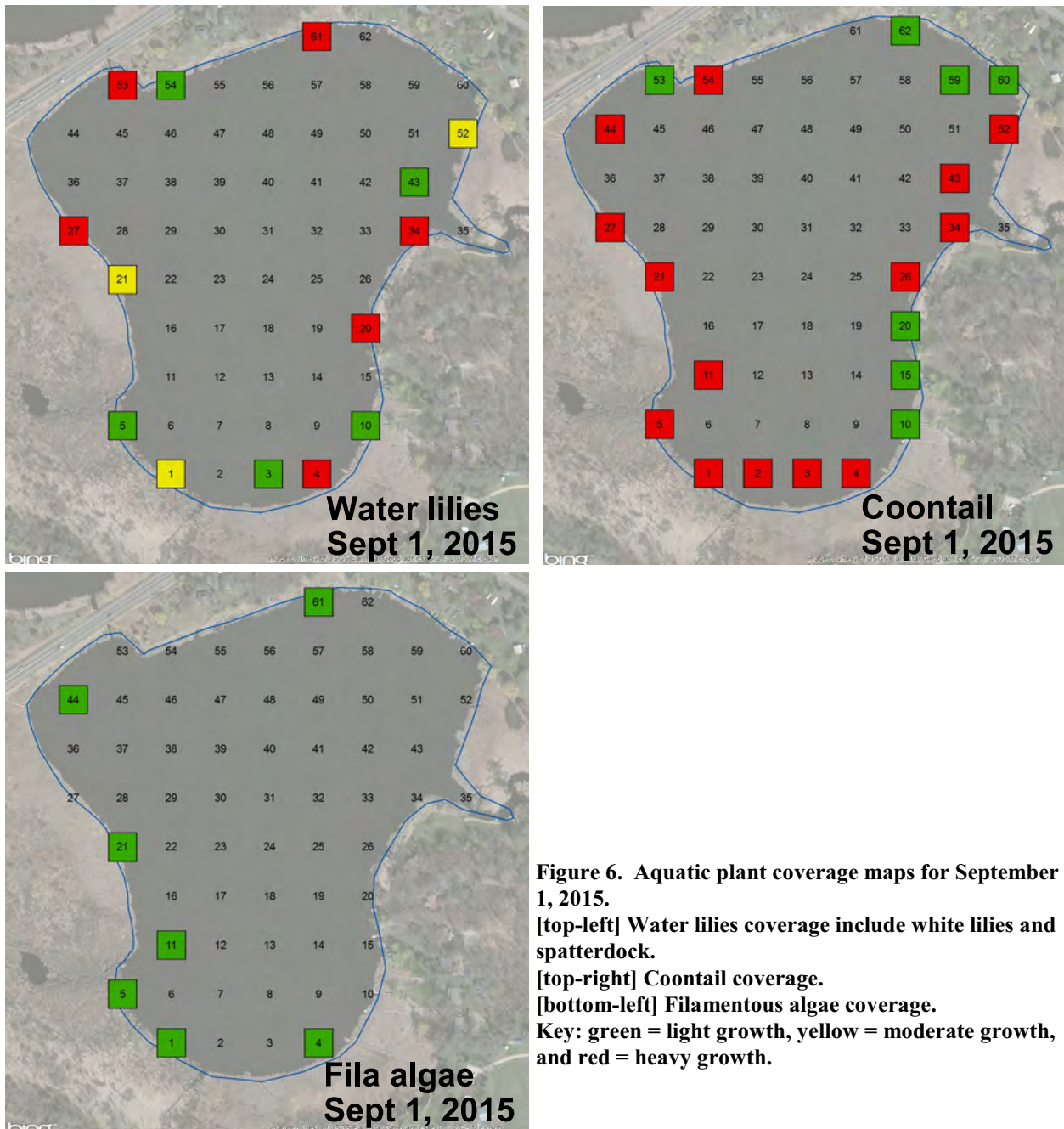


Table 2. Little Comfort Lake aquatic plant occurrences and densities for the September 1, 2015 survey based on 83 sites. Density ratings are 1-5 with 1 being low and 5 being most dense.

	September 1, 2015 (62 sites)		
	occurrence	% occur	Average density
Duckweed (<i>Lemna sp</i>)	8	13	2
Spatterdock (<i>Nuphar variegatum</i>)	3	5	3
White water lilies (<i>Nymphaea tuberosa</i>)	13	21	3
Coontail (<i>Ceratophyllum demersum</i>)	21	34	4
Filamentous algae	7	11	1

Table 6. Individual site data for September 1, 2015. Numbers indicate plant density.

Site	Depth (ft)	Duckweed	Spatterdock	White lilies	Coontail	FA	No Plants
1	4	2		3	5	1	
2	4	1			5		
3	6	1	2	1	5		
4	4	1		4	5	2	
5	2			1	5	2	
6	8						1
7							1
8							1
9							1
10	4			1	2		
11	7				5	1	
12							1
13							1
14							1
15	3				1		
16	deep						1
17							1
18							1
19							1
20	3			4	1		
21	2	2		3	4	1	
22	deep						1
23							1
24							1
25							1
26	7				5		
27	2	2	4	1	4		
28	deep						1
29							1
30							1
31							1
32							1
33							1
34	3	2		4	4		
35							1
36	7						1
37							1
38							1
39							1

Site	Depth (ft)	Duckweed	Spatterdock	White lilies	Coontail	FA	No Plants
40							1
41							1
42							1
43	5			2	5		
44	7				4	1	
45							1
46							1
47							1
48							1
49							1
50							1
51	deep						1
52	3			3	5		
53	3		4		1		
54	4			2	5		
55	7						1
56	deep						1
57							1
58							1
59	7				1		
60	4				1		
61	2	2		4		2	
62	3				2		
Average		2	3	3	4	1	
Occurrence (62 sites)		8	3	13	21	7	40
% occur		13	5	21	34	11	



Site map

Conclusions: The aquatic plant community in September, 2015 had 1 species of submerged plants which was coontail combined with 2 floatingleaf species of white lilies and spatterdock and 1 floating species which was duckweed. This is a low plant diversity condition. Curlyleaf pondweed was the only non-native plant present and was found with light growth in June.

Aquatic plants covered about 13 acres or about 36% of the lake area and grew out to about 7-feet of water depth.

Eurasian watermilfoil was not found in this survey.



Figure 7. Coontail was the only submerged aquatic plant found on September 2015. It was very abundant in water depths out to 7 feet.