



Northern Watermilfoil Found in Fish Lake, Scott County, August 17, 2018

Curlyleaf Pondweed and Point Intercept Surveys for Fish Lake, Scott Co, MN, 2018

No Open Lake CLP Herbicide Application in 2018

Curlyleaf Pondweed Delineation: May 14, 2018
Curlyleaf Pondweed Assessment: June 18, 2018
Point Intercept Plant Survey: August 17, 2018

Prepared for:
Prior Lake/Spring Lake
Watershed District
Prior Lake, Minnesota



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Curlyleaf Pondweed and Point Intercept Surveys for Fish Lake, Scott Co, MN, 2018

Summary

Curlyleaf Pondweed Delineation and Assessment

Delineation, May 14, 2018: A curlyleaf delineation using a meandered survey was conducted on May 14, 2018. Curlyleaf was found at 22 out of 65 sites (Figure S1). Several sites were found with moderate to heavy growth potential.

Assessment, June 18, 2018: A curlyleaf assessment was conducted on June 18, 2018 and curlyleaf was found at 12 out of 40 sample sites (Figure S1). Curlyleaf did not expand significantly compared to the May 14, 2018 delineation.

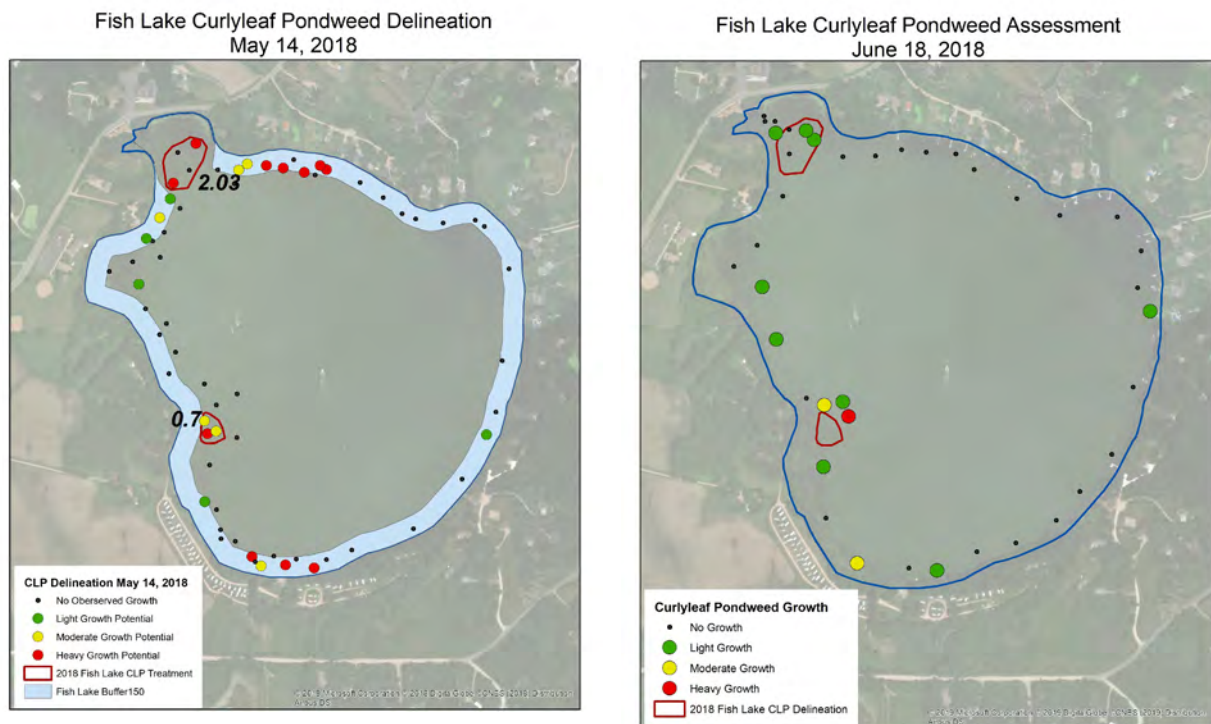


Figure S1. [left] Fish Lake curlyleaf pondweed delineation on May 14, 2018. [right] Fish Lake curlyleaf pondweed assessment on June 18, 2018.

Fish Lake Point Intercept Survey

The Fish Lake point intercept survey consisted of a total of 74 sample sites on August 17, 2018. In the August point intercept survey, curlyleaf was not found at any of the sample sites. Coontail was the most common plant and was found at 25 out of 74 sample sites. A total of 4 submerged species were observed (Table S1) and a map of native plant coverage is shown in Figure S2. Plants were observed growing to a depth of 10 feet and covered an estimated 36% of the lake bottom.

Table S1. Fish Lake aquatic plant occurrence and density for the August 17, 2018 survey based on 74 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=74)		
	Occur	% Occur	Average Density
Spatterdock (<i>Nuphar variegata</i>)	2	3	1.0
White water lilies (<i>Nymphaea odorata</i>)	4	5	2.8
Coontail (<i>Ceratophyllum demersum</i>)	25	34	1.4
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	5	7	1.0
Flatstem pondweed (<i>Potamogeton zosteriformis</i>)	2	3	1.0
Water celery (<i>Vallisneria americana</i>)	7	9	1.0

Fish Lake Native Plant Coverage
August 17, 2018

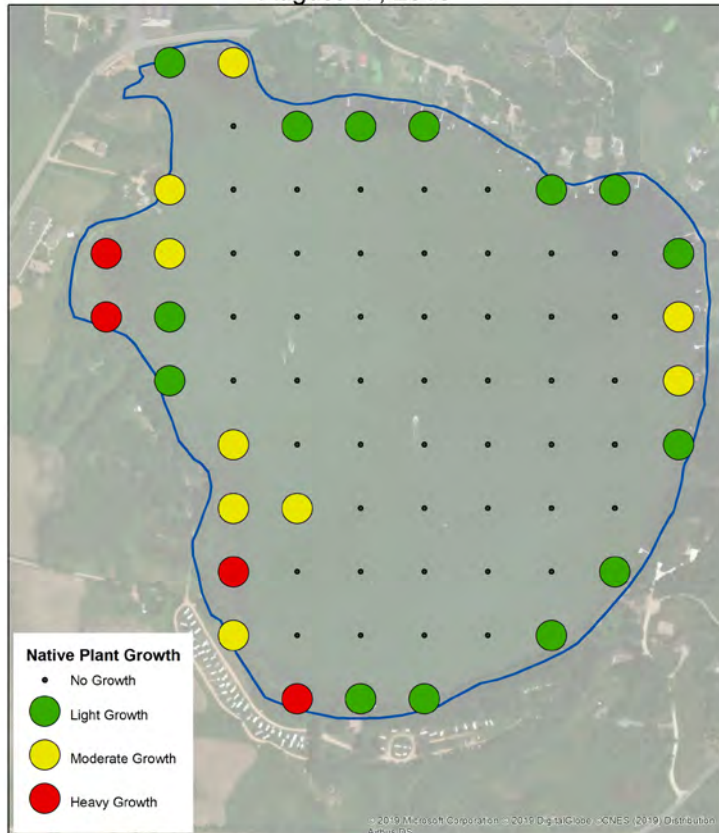


Figure S2. Native aquatic plant coverage map for Fish Lake on August 17, 2018.

Curlyleaf Pondweed and Point Intercept Surveys for Fish Lake, Scott Co, MN, 2018

Fish Lake, Scott County (MnDNR ID: 70006900)

Area: 175.92 acres

Littoral Area: 74 acres

Shore Length: 2.3 miles

Maximum Depth: 28 feet

Introduction

Fish Lake has an area of 176 acres with a littoral area of 74 acres (source: MnDNR). A meandering curlyleaf pondweed delineation survey was conducted on May 14, 2018 and a meandering curlyleaf pondweed assessment was conducted on June 18, 2018. A summer aquatic plant point intercept survey was conducted August 17, 2018 to assess the native plant community in Fish Lake.

Methods

Methods for Delineating and Assessing Curlyleaf Pondweed: At the time of the spring curlyleaf delineation on May 14, only a fraction of the peak curlyleaf biomass is present compared to what could be present in June, at its peak. For spot treatments, the areas to be treated are delineated prior to curlyleaf developing peak biomass.

The delineation survey is conducted using a meandering path around the nearshore area of the entire lake. Curlyleaf is sampled using a fixed 14 tine rakehead on a pole. Curlyleaf stem counts on a rake sampler were used to identify areas that had a potential to produce curlyleaf growth at its June peak. After a short sweep of about 1-foot (which samples about 0.1 m²), if one or two stems (10-20 stems/m²) were collected on the rake sweep, it was predicted that this area would produce only future light growth at its peak and was not delineated for treatment. Alternatively, sites where 3 stems (30 stems/m²) were collected per rake sample future potential growth was considered to be moderate. However if 4 curlyleaf stems (40 stems/m²) or more per rake sample generally indicated some plants had developed runners and would likely produce heavy growth in the next few weeks and this site would be marked for potential treatment. This survey method used for determining curlyleaf pondweed spot herbicide treatments was similar to the methodology published in a peer reviewed journal (McComas et al, 2015)*.

For a curlyleaf assessment, a meandering survey is used but curlyleaf density is based on a scale of 0 to 3 with 3 being the densest (chart is shown on the next page).

*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.
<https://doi.org/10.1080/10402381.2015.1014583>

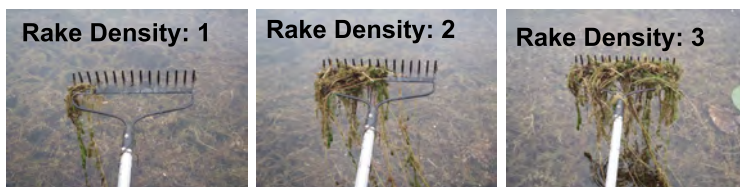
Survey Methods for the Point Intercept Survey: An aquatic plant point-intercept survey of Fish Lake was conducted by Blue Water Science on August 17, 2018. A total 74 points were surveyed. Sample points were spaced 100 meters apart on a grid that covered the lake (Figure 1). At each sample point, a sampling rake was lowered into the water and a plant sample was taken. 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 ranged from 1 to 3 with 1 being sparse and 3 being heavy growth. Based on these sample sites, a plant distribution map was constructed.

Fish Lake 74 points



Figure 1. Point-intercept sample sites for Fish Lake in 2018. Sample sites were spaced 100 meters apart.

Chart of Aquatic Plant Density Ratings



Aquatic plant density ratings from 1 to 3.

Results of Curlyleaf Pondweed Delineation, May 14, 2018: A curlyleaf delineation using a meandered survey was conducted on May 14, 2018. Curlyleaf was found at 22 out of 65 sites (Figure 2). Several sites were found with moderate to heavy growth potential. Less than 3 acres were delineated for potential treatment, but no treatment occurred in 2018 (Figure 2).

Fish Lake Curlyleaf Pondweed Delineation May 14, 2018

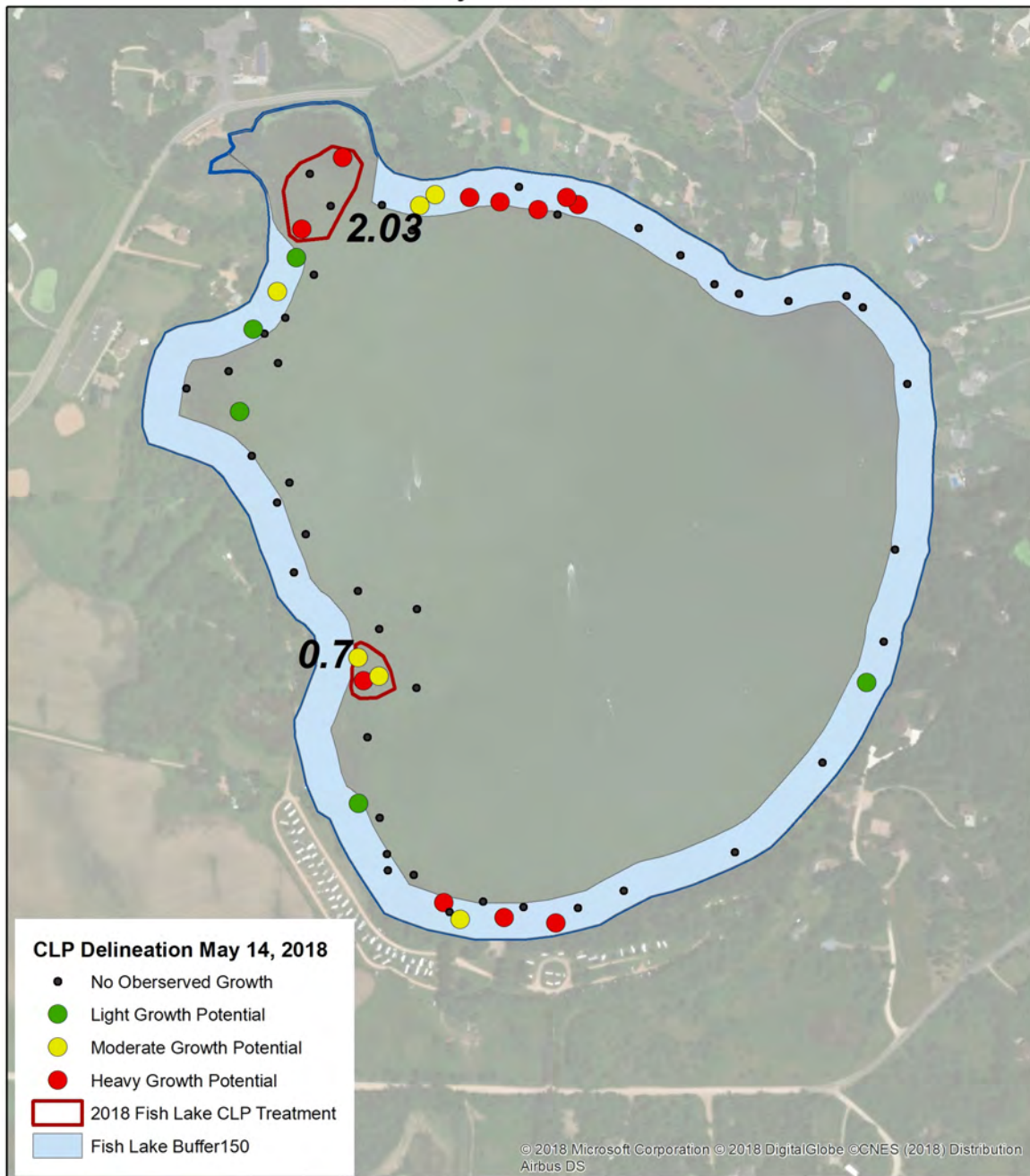


Figure 2. Map of curlyleaf pondweed for May 14, 2018. Colored sample areas indicate the growth in May of 2018 for curlyleaf pondweed. Key: green = light potential growth, yellow = moderate potential growth, red = heavy potential growth, and black dot = no curlyleaf.

Curlyleaf Pondweed Assessment, June 18, 2018: A curlyleaf assessment was conducted on June 18, 2018 and curlyleaf was found at 12 out of 40 sample sites (Figure 3). Curlyleaf did not expand significantly compared to the May 14, 2018 delineation. Climatic conditions may have limited the production of beds of heavy curlyleaf growth in 2018 (Figure 4).

Fish Lake Curlyleaf Pondweed Assessment June 18, 2018

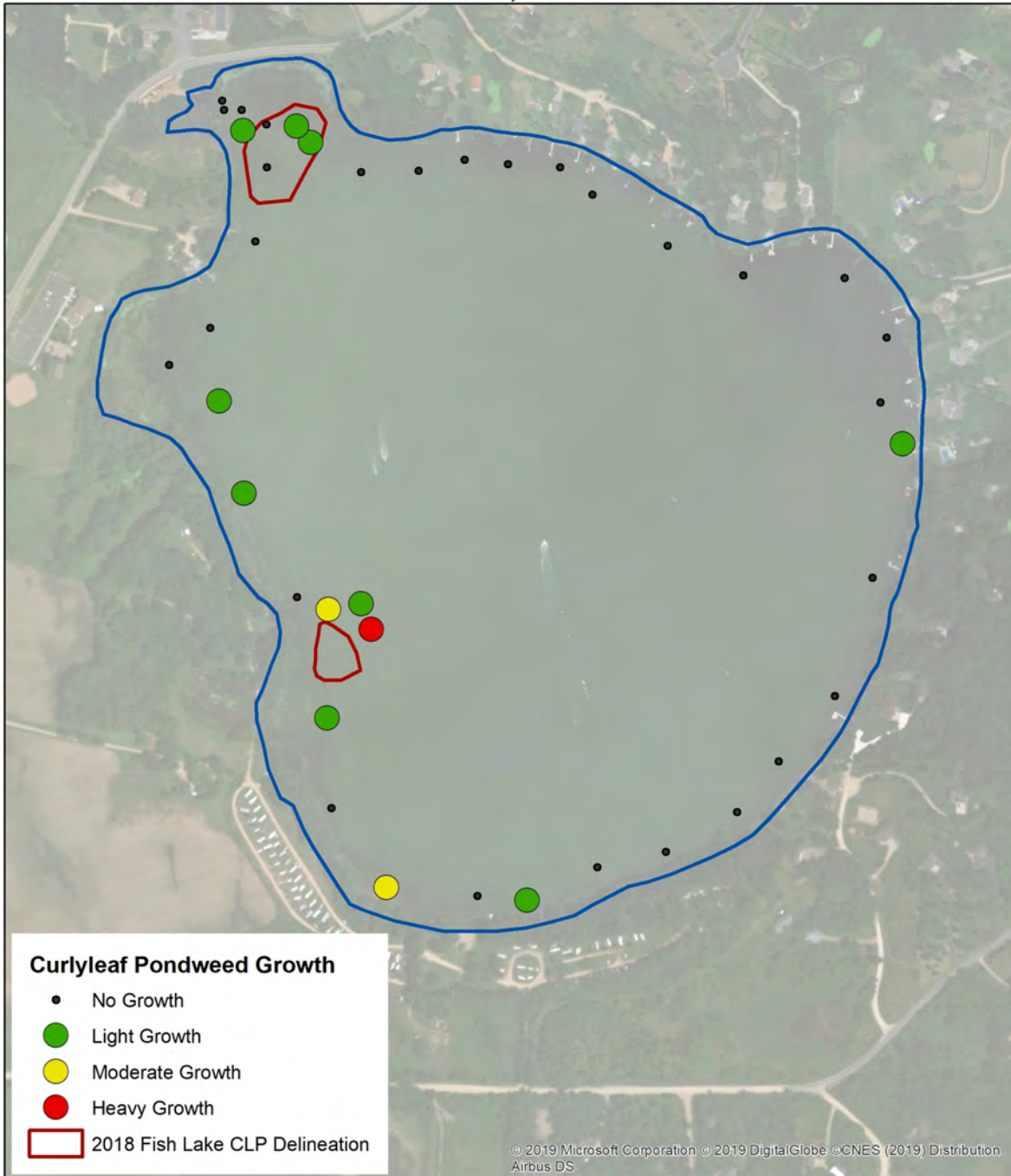


Figure 3. Curlyleaf pondweed assessment on June 18, 2018.
Key: green = light growth, yellow = moderate growth, red = heavy growth, and black = no curlyleaf.

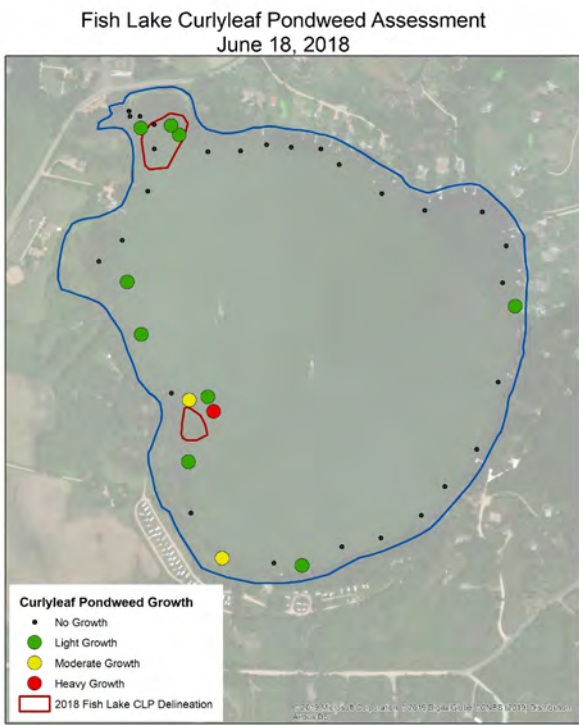
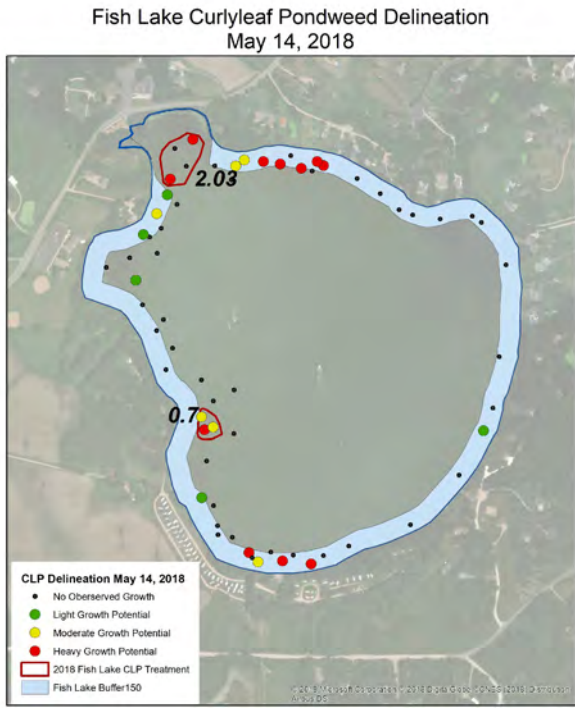


Figure 4. [top-left] Fish Lake curlyleaf pondweed delineation on May 14, 2018. [top-right] Fish Lake curlyleaf pondweed assessment on June 18, 2018. [bottom] Stems of curlyleaf pondweed on a rakehead on May 14, 2018 in Fish Lake.

Point Intercept Summer Survey for Fish Lake

In Fish Lake a total of 74 sites were surveyed with rake sampling on August 17, 2018. In the August survey, curlyleaf was not found at any of the sample sites. Native plants were observed growing at 27 out of 74 sites. Coontail was the most common plant and was found at 25 out of 74 sample sites. A map of native plant coverage is shown in Figure 5. A total of 4 submerged species were observed (Table 1) and grew out to a depth of 10 feet (Tables 2 and 3 and Figure 6).

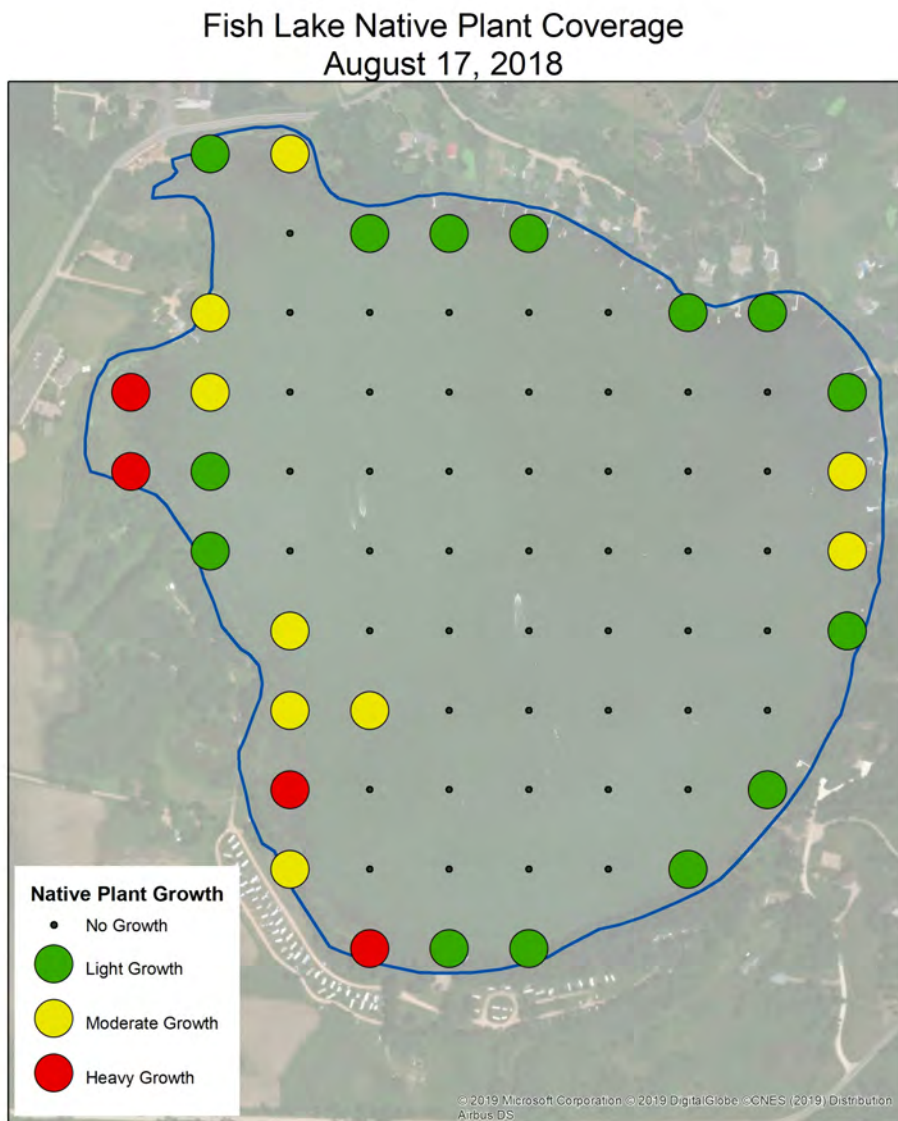


Figure 5. Native aquatic plant distribution and abundance on August 17, 2018.
Key: green = light growth, yellow = moderate growth, red = heavy growth, and black = no growth.

Table 1. Fish Lake aquatic plant occurrence and density for the August 17, 2018 survey based on 74 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=74)		
	Occur	% Occur	Average Density
Spatterdock (<i>Nuphar variegata</i>)	2	3	1.0
White water lilies (<i>Nymphaea odorata</i>)	4	5	2.8
Coontail (<i>Ceratophyllum demersum</i>)	25	34	1.4
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	5	7	1.0
Flatstem pondweed (<i>Potamogeton zosteriformis</i>)	2	3	1.0
Water celery (<i>Vallisneria americana</i>)	7	9	1.0

Table 2. Point intercept survey statistics for samples 0 to 18 feet.

Total # Points Sampled	37
Depth Range of Rooted Veg	3-10 feet
Maximum Depth of Growth (95%) in feet	10.0
# Points in Max Depth Range	28
# Points in Littoral Zone (0-15 feet)	30
% Points w/ Native Submersed Taxa	90
Mean Native Submersed Taxa/Point	1.3
Mean Density of Native Submersed Taxa	1.1
# Submersed Native Taxa	4

Table 3. Aquatic plants sampled by depth.

Depth Bin (Feet)	# points sampled	% Sampling points with submersed species observed
0	0	0
1	0	0
2	0	0
3	4	100
4	6	100
5	4	100
6	6	83
7	1	100
8	1	100
9	3	100
10	3	100
11	1	0
12	0	0
13	0	0
14	1	0
15	0	0
16	2	0
17	3	0
18	1	0

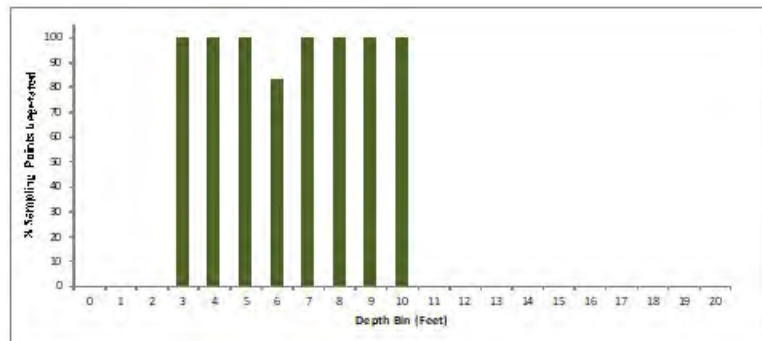


Figure 6. Depth of plant colonization (in feet).

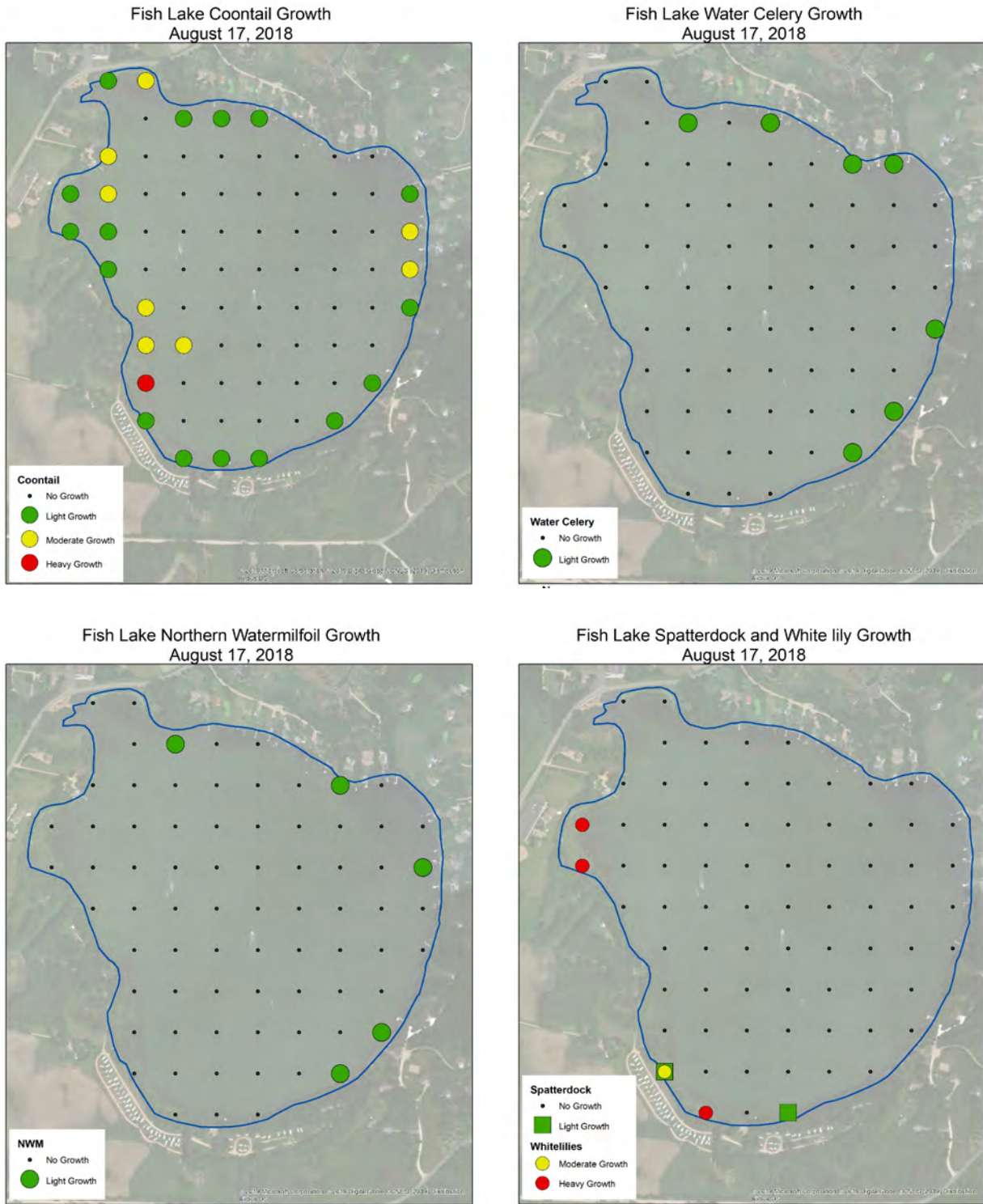


Figure 7. Distribution and abundance of coontail (top-left), water celery (top-right), northern watermilfoil (bottom-left), and lilies (bottom-right) on August 17, 2018.

Key: green = light growth, yellow = moderate growth, red = heavy growth, and black = no growth.

Aquatic Plant Results for 2015 and 2018 Point Intercept Surveys: The aquatic plant community has been fairly stable from 2015 to 2018 (Figure 7 and Table 4).

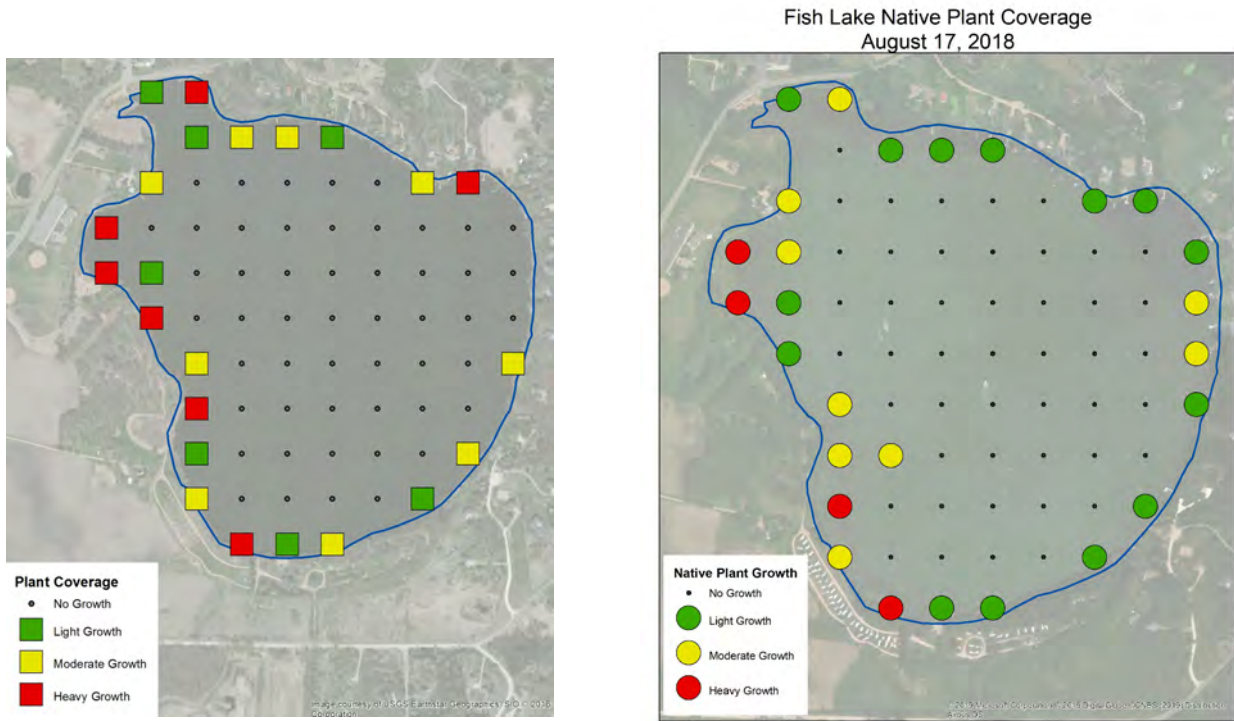


Figure 7. Native aquatic plant distribution and abundance on July 30, 2015 (left) and August 17, 2018 (right). Key: green = light growth, yellow = moderate growth, red = heavy growth, and black = no growth.

Table 4. Fish Lake aquatic plant occurrence and density for the 2015 and 2018 pont intercept surveys. Density ratings in 2015 are 1-5 with 1 being low and 5 being most dense. In 2018, a density scale of 1 to 3 was used.

	July 30, 2015 All Stations (spacing 100 meters)		August 17, 2018 All Stations (spacing 100 meters)	
	Occur	Average Density	Occur	Average Density
Spatterdock (<i>Nuphar variegata</i>)	4	2.8	2	1.0
White water lilies (<i>Nymphaea odorata</i>)	6	2.0	4	2.8
Coontail (<i>Ceratophyllum demersum</i>)	21	2.9	25	1.4
Chara (<i>Chara sp</i>)	1	1.0		
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	7	1.3	5	1.0
Floatingleaf pondweed (<i>Potamogeton natans</i>)	3	1.7		
Flatstem pondweed (<i>Potamogeton zosteriformis</i>)			2	1.0
Sago pondweed (<i>Stuckenia pectinata</i>)	2	2.0		
Water celery (<i>Vallisneria americana</i>)	8	1.6	7	1.0
Water stargrass (<i>Zosterella dubia</i>)	3	1.3		
number of submerged species	7		4	

APPENDIX

August 17, 2018 Point Intercept Survey

Table 5. Individual sample site data for the point intercept survey on Fish Lake on August 17, 2018.

Site	Depth (ft)	Spatter-dock	White lilies	Coon-tail	Flat-stem	NWM	Water celery	FA	No plants
1	4		3	1					
2	6			1				1	
3	4	1		1				1	
4	4	1	2	1				1	
5	17								1
8	16								1
9	6			1		1	1		
10	7			3				2	
16	6			1		1	1		
17	6			2				2	
18	9			2				1	
23	17								1
24	8			2				1	
25	11								1
31	5			1	1		1		
32	4			1				2	
33	14								1
40	9			2					
41	4		3	1					
42	10			1					
49	23								1
50	9			2		1			
51	3		3	1				2	
52	10			2					
59	18								1
60	10			1					
61	5			2	1			1	
62	16								1
66	17								1
67	3					1	1		
68	4						1		
69	6							2	1
70	5			1		1	1	2	
71	6			1				1	
72	5			1			1		
73	3			1				3	
74	3			2				3	
Average		1.0	2.8	1.4	1.0	1.0	1.0	1.7	
Occur (74 sites)		2	4	25	2	5	7	15	47
% occur		3	5	34	3	7	9	20	

Fish Lake 74 points

