



Underwater View of Coontail in Fish Lake, Scott County, August 1, 2022

Curlyleaf Pondweed and Point Intercept Surveys for Fish Lake, Scott Co, MN, 2022

No Open Lake CLP Herbicide Application in 2022

Curlyleaf Pondweed Delineation: April 26, 2022

Curlyleaf Pondweed Assessment: June 2, 2022

Point Intercept Plant Survey: August 1, 2022

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, 2022

Summary

Curlyleaf Pondweed Delineation and Assessment

Delineation, April 26, 2022: A curlyleaf delineation using a meandered survey was conducted on April 26, 2022. Curlyleaf was found at 5 out of 65 sites (Figure S1). Growth of curlyleaf was light to moderate, no heavy growth was observed and no CLP areas were delineated for chemical treatment.

Assessment, June 2, 2022: A curlyleaf assessment was conducted on June 2, 2022 and curlyleaf was found at 20 out of 154 sample sites (Figure S1). Curlyleaf was found at mostly light growth with one site producing heavy growth.

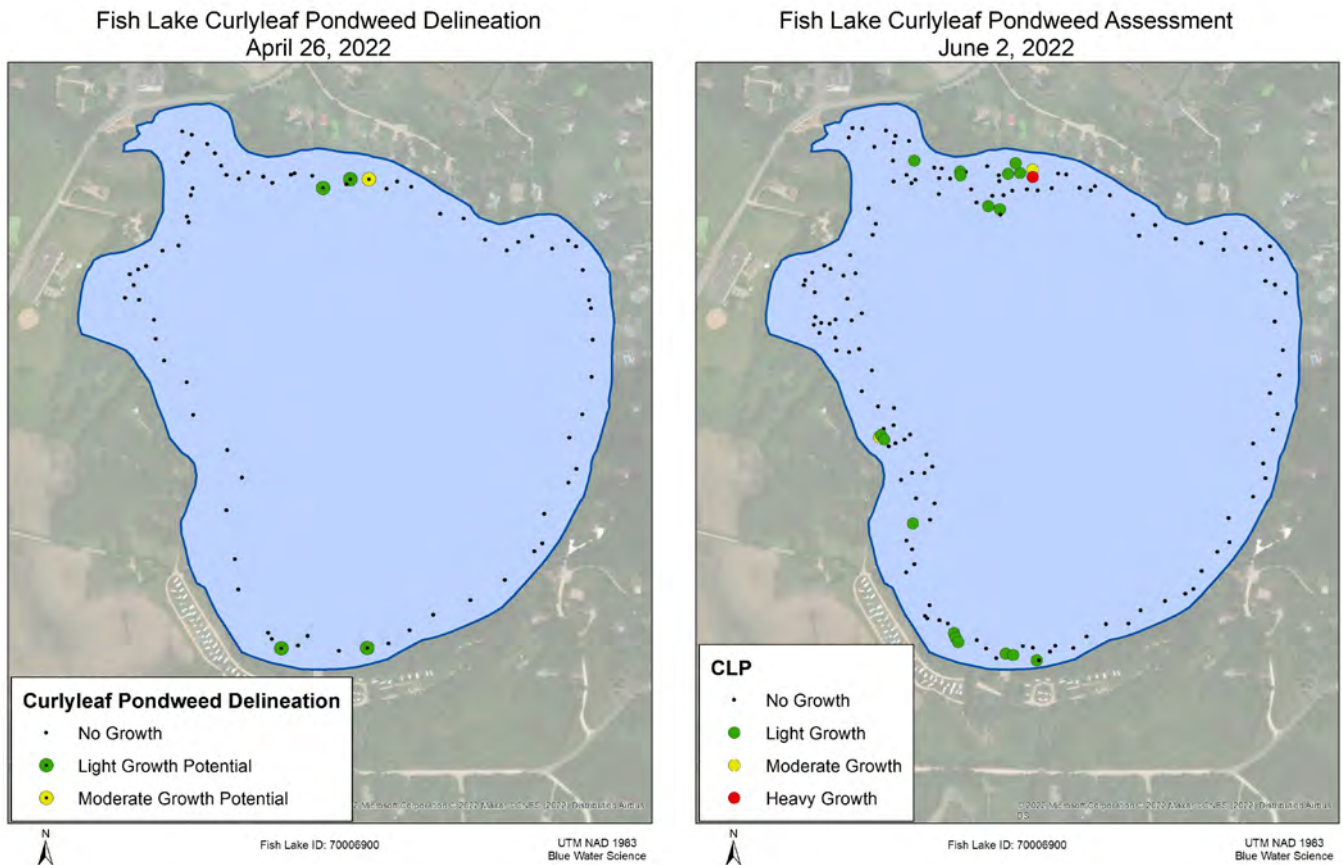


Figure S1. [left] Fish Lake curlyleaf pondweed delineation on April 26, 2022. [right] Fish Lake curlyleaf pondweed assessment on June 2, 2022.

Fish Lake Point Intercept Survey: August 1, 2022

The Fish Lake point intercept survey consisted of a total of 74 sample sites that were spaced 100 m apart on August 2, 2022. In the August point intercept survey, curlyleaf was found at 1 sample site with light growth. Coontail was the most common plant and was found at 20 out of 30 sample sites where sampling occurred at a depth of 15 feet. A total of 6 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 6 feet and covered an estimated 30% of the lake bottom.

Table S1. Fish Lake aquatic plant occurrence and density for the August 1, 2022 survey based on 30 sites in the littoral plant growing zone. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=30)		
	Occur	% Occur	Average Density
Spatterdock (<i>Nuphar variegata</i>)	2	7	2.0
White water lilies (<i>Nymphaea odorata</i>)	5	17	1.8
Coontail (<i>Ceratophyllum demersum</i>)	20	67	1.6
Curlyleaf Pondweed (<i>Potamogeton crispus</i>)	1	3	1.0
Flatstem pondweed (<i>Potamogeton zosteriformis</i>)	8	27	1.3
Sago Pondweed (<i>Stuckenia pectinata</i>)	4	13	1.0
Water Stargrass (<i>Heteranthera dubia</i>)	1	3	1.0
Water celery (<i>Vallisneria americana</i>)	11	37	1.4

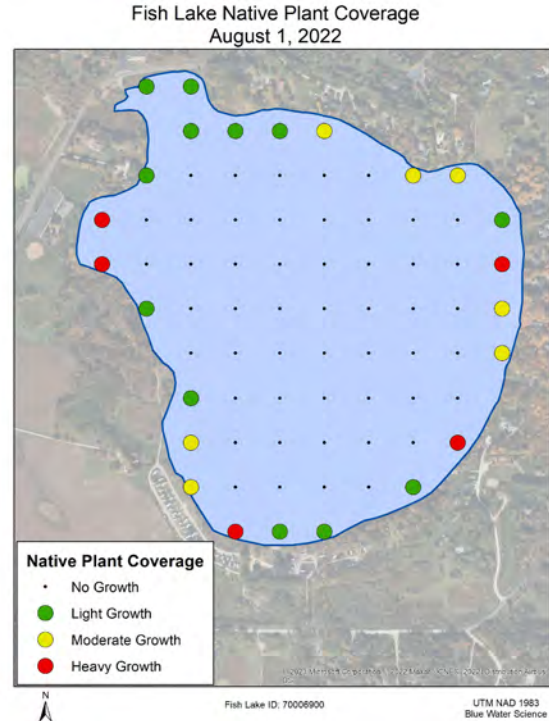


Figure S2. Native aquatic plant coverage map for Fish Lake on August 1, 2022.

Curlyleaf Pondweed and Point Intercept Surveys for Fish Lake, Scott Co, MN, 2022

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 was conducted on April 23, 2022. Then a meandering curlyleaf pondweed assessment was conducted to assess the growth of CLP at its peak, in June. A summer aquatic plant point intercept survey was conducted August 1, 2022 to evaluate the native plant community in Fish Lake.

Methods

Methods for Delineating and Assessing Curlyleaf Pondweed Growth: The delineation and assessment surveys are 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 1, 2022. A total 74 points were placed on a grid and sample points were spaced 100 meters apart (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 2022. 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, April 26, 2022

A curlyleaf delineation using a meandered survey was conducted on April 26, 2022. Curlyleaf was found at 5 out of 65 sites (Figure 2). Four sites were found with light CLP growth and one site with moderate growth around Fish Lake. Overall CLP growth was sparse. Curlyleaf pondweed grew in water depths of 5-8 feet. No areas were delineated for treatment

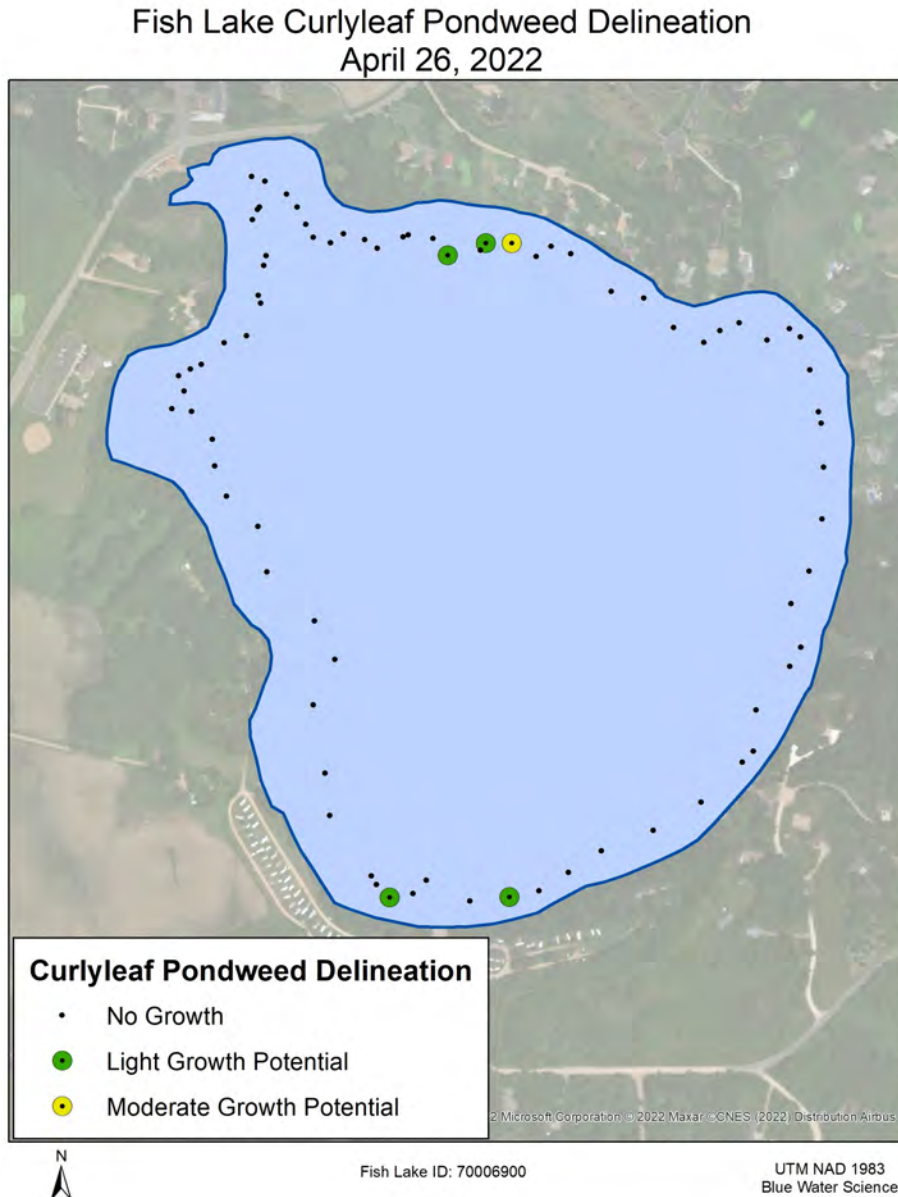


Figure 2. Map of curlyleaf pondweed for April 26, 2022.

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

Results of Curlyleaf Pondweed Assessment, June 2, 2022

A curlyleaf assessment using a meandered survey was conducted on June 2, 2022. Curlyleaf was found at 20 out of 154 sites (Figure 3). One site was found with heavy CLP growth, moderate growth (yellow dots) was found at 2 sites, and 17 sites had light growth. Most CLP growth was found in the northern side of Fish Lake.

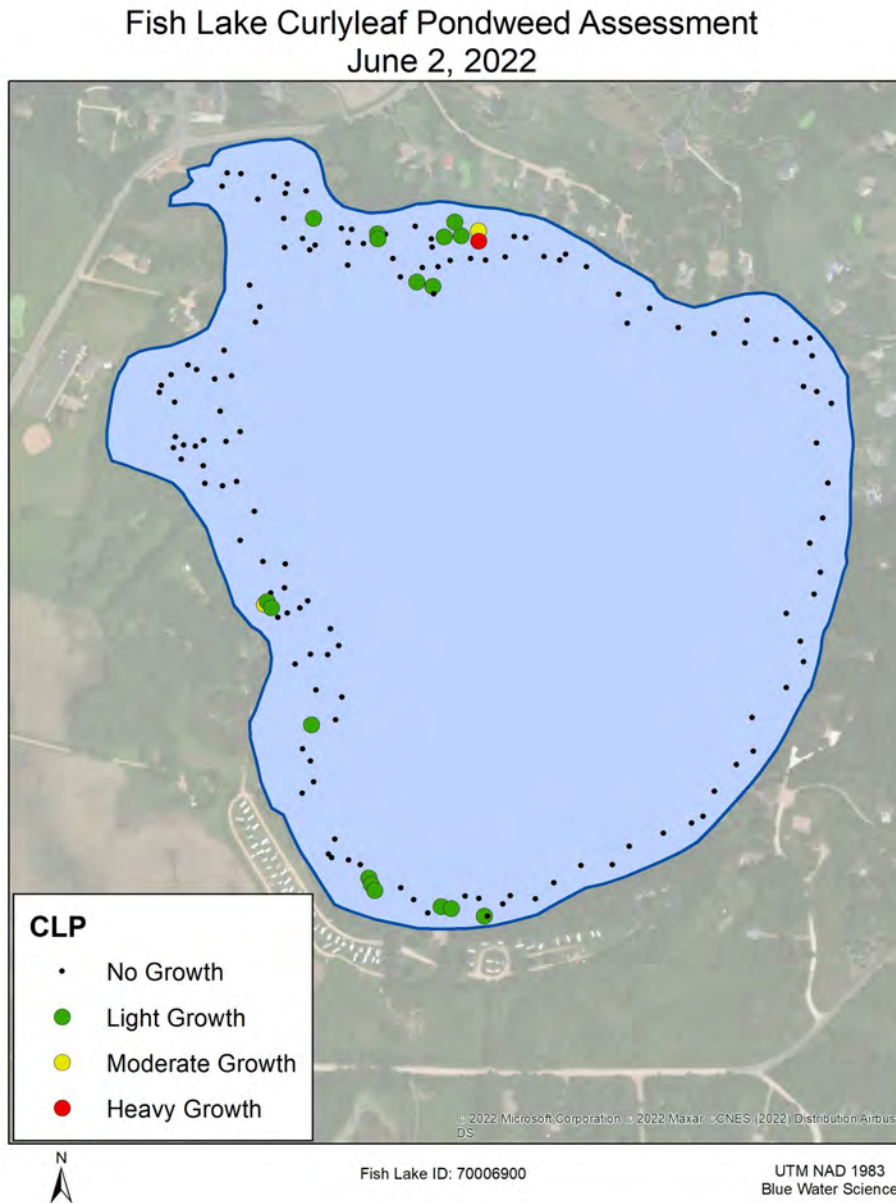


Figure 3. Map of curlyleaf pondweed for June 2, 2022. Key: green = light growth, yellow = moderate growth, red = heavy growth, and black dot = no curlyleaf.

Point Intercept Survey for Fish Lake: August 1, 2022

In Fish Lake, a total of 74 sites were placed on a grid and 30 sites out to 15 feet of water depth were surveyed with rake sampling. In the August survey, curlyleaf was found at 1 of the sample sites growing at light growth. Native plants were observed growing at 26 out of 30 sites. Coontail was the most common plant and was found at 20 out of 30 sample sites (Tables 1, 2, and 3). A map of native plant coverage is shown in Figure 4. A total of 6 submerged species were observed (Table 1) and plants were observed growing to a depth of 7 feet.

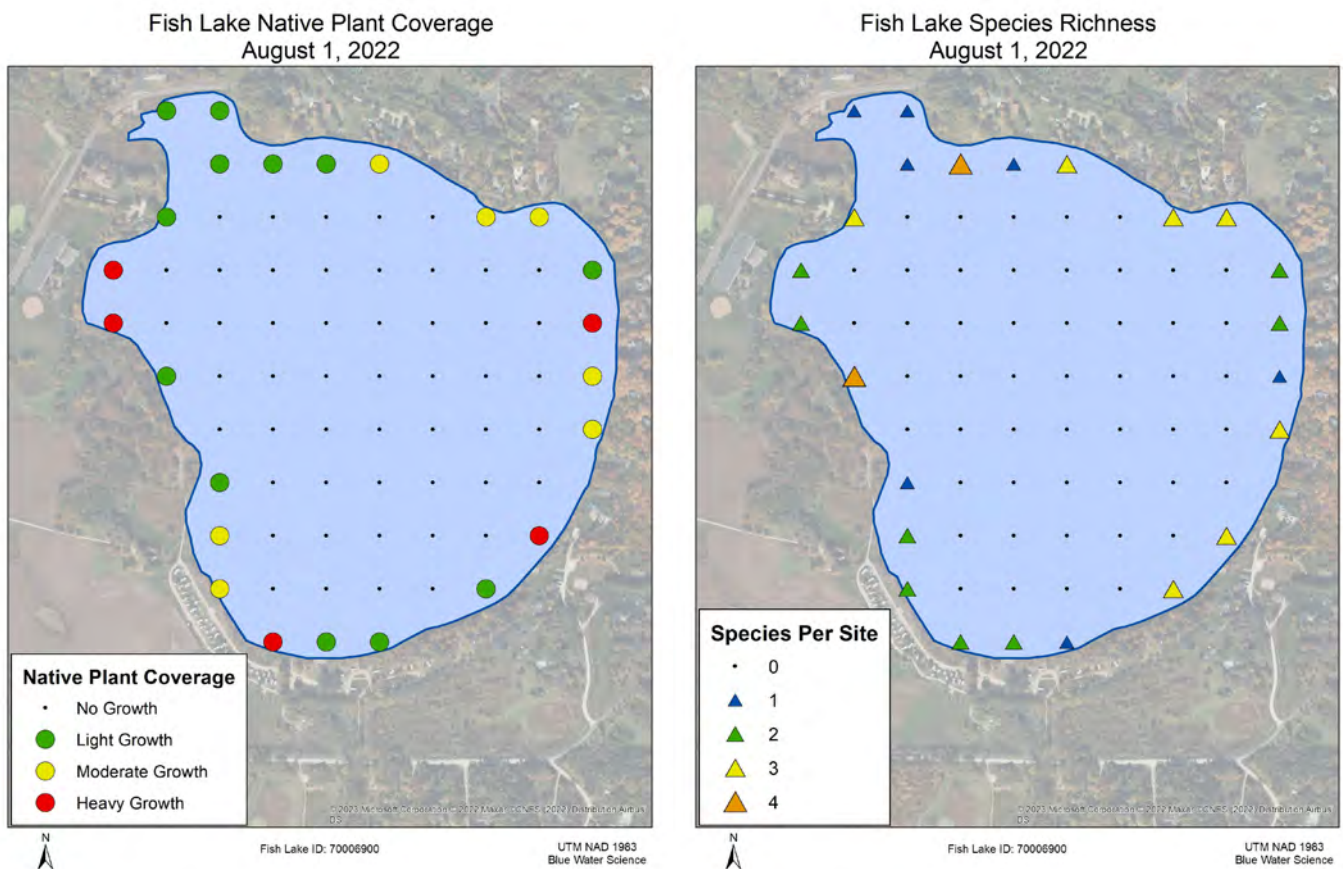


Figure 4. Native aquatic plant distribution (left) and species richness (right) on August 1, 2022. Key: green = light growth, yellow = moderate growth, red = heavy growth, and black = no growth.

Table 1. Fish Lake aquatic plant occurrence and density for the August 1, 2022 survey based on 74 sites. Statistics are based on 30 sites in Fish Lake for 2022. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=30)		
	Occur	% Occur	Average Density
Spatterdock (<i>Nuphar variegata</i>)	2	7	2.0
White water lilies (<i>Nymphaea odorata</i>)	5	17	1.8
Coontail (<i>Ceratophyllum demersum</i>)	20	67	1.6
Curlyleaf Pondweed (<i>Potamogeton crispus</i>)	1	3	1.0
Flatstem pondweed (<i>Potamogeton zosteriformis</i>)	8	27	1.3
Sago Pondweed (<i>Stuckenia pectinata</i>)	4	13	1.0
Water Stargrass (<i>Heteranthera dubia</i>)	1	3	1.0
Water celery (<i>Vallisneria americana</i>)	11	37	1.4

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

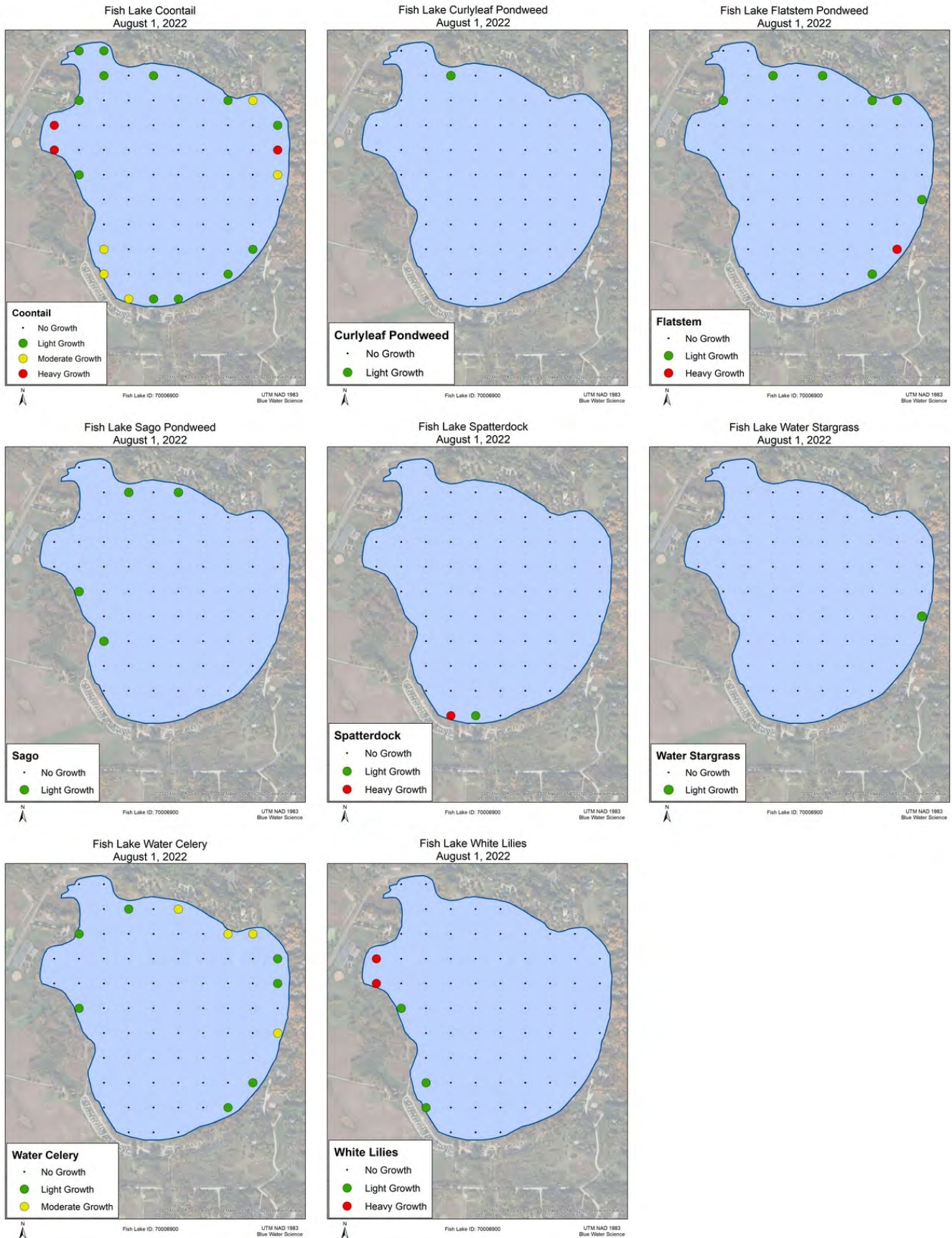
Total # Points Sampled	30
Depth Range of Rooted Veg	2-8 feet
Maximum Depth of Growth (95%) in feet	6.0
# Points in Max Depth Range	24
# Points in Littoral Zone (0-15 feet)	30
% Points w/ Native Submersed Taxa	80%
Mean Native Submersed Taxa/Point	1.5
Mean Density of Native Submersed Taxa	1.2
# Submersed Native Taxa	5

Table 3. Aquatic plants sampled by depth.

Depth Bin (Feet)	# points sampled	% Sampling points with submersed species observed
0	0	
1	0	
2	1	100
3	8	100
4	6	100
5	7	86
6	2	100
7	1	0
8	1	100
9	0	

Depth Bin (Feet)	# points sampled	% Sampling points with submersed species observed
10	0	
11	1	0
12	0	
13	1	0
14	2	0
15	0	
16	0	
17	0	
18	0	

Point Intercept Survey Aquatic Plant Distribution and Abundance



Aquatic Plant Results for 2015, 2018, 2020, and 2022 Point Intercept Surveys:
 The aquatic plant community has been fairly stable from 2015 to 2022 (Figure 5 and Table 2).

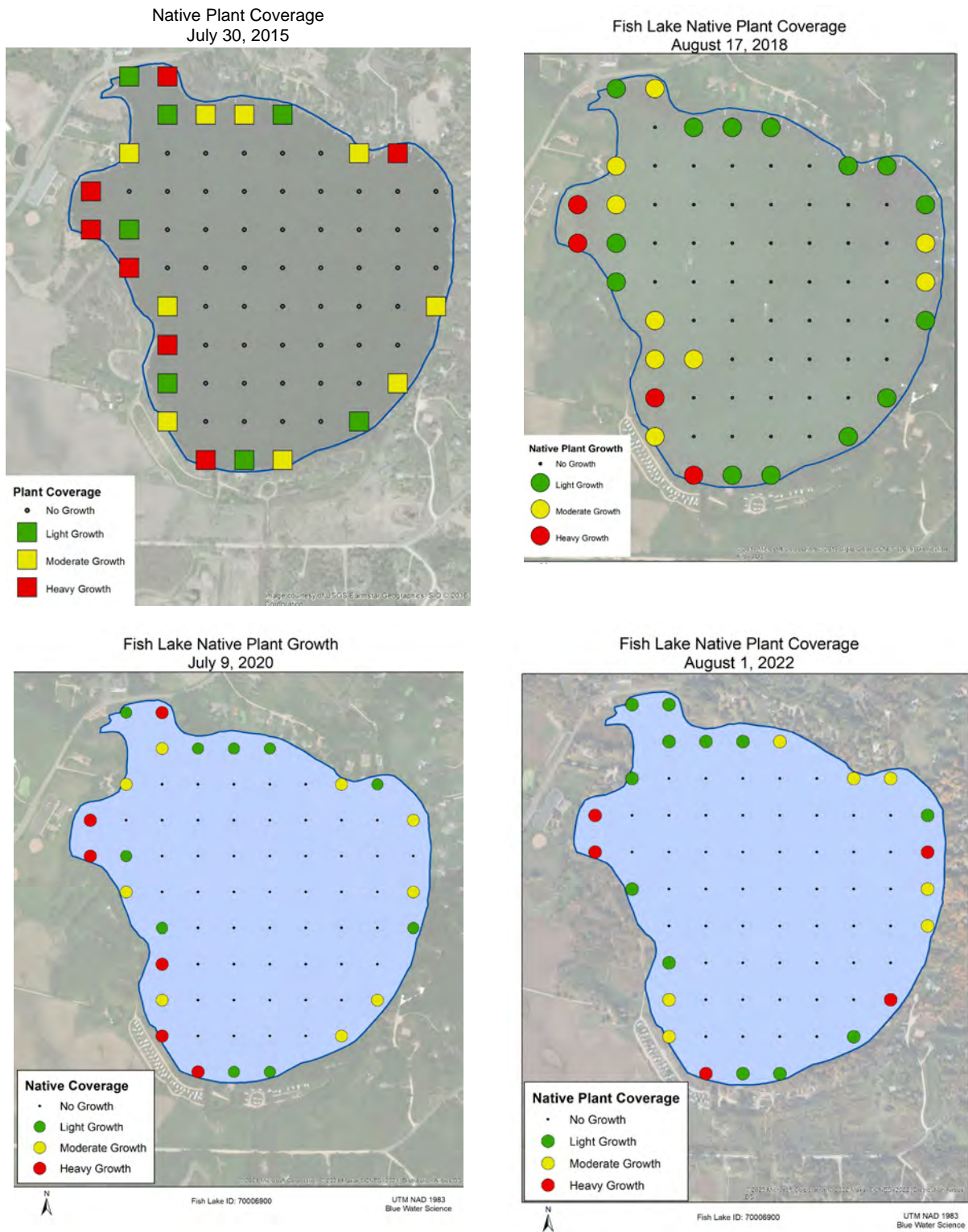


Figure 5. Native aquatic plant distribution and abundance on July 30, 2015 (top-left), August 17, 2018 (top-right), July 9, 2020 (bottom-left), and August 1, 2022 (bottom-right). Key: green = light growth, yellow = moderate growth, red = heavy growth, and black = no growth.

Aquatic Plant Statistics for 2015, 2018, 2020, and 2022 Point Intercept Surveys

Table 4. Fish Lake aquatic plant occurrence and density for the 2015, 2018, 2020, and 2022 point intercept surveys. Density ratings in 2015 are 1-5 with 1 being low and 5 being most dense. In 2018, 2020, and 2022, a density scale of 1 to 3 was used.

	July 30, 2015 All Stations (100 meter spacing)		August 17, 2018 All Stations (100 meter spacing)		July 9, 2020 All Stations (100 meter spacing)		August 1, 2022 All Stations (100 meter spacing)	
	Occur	Average Density	Occur	Average Density	Occur	Average Density	Occur	Average Density
Spatterdock (<i>Nuphar variegata</i>)	4	2.8	2	1.0	3	1.7	2	2.0
White water lilies (<i>Nymphaea odorata</i>)	6	2.0	4	2.8	8	1.3	5	1.8
Coontail (<i>Ceratophyllum demersum</i>)	21	2.9	25	1.4	24	1.8	20	1.6
Chara (<i>Chara sp</i>)	1	1.0						
Curlyleaf pondweed <i>Potamogeton crispus</i>)							1	1.0
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	7	1.3	5	1.0	1	1.0		
Floatingleaf pondweed (<i>Potamogeton natans</i>)	3	1.7						
Flatstem pondweed (<i>Potamogeton zosteriformis</i>)			2	1.0	5	1.6	8	1.3
Sago pondweed (<i>Stuckenia pectinata</i>)	2	2.0			1	1.0	4	1.0
Water celery (<i>Vallisneria americana</i>)	8	1.6	7	1.0	9	1.0	11	1.4
Water stargrass (<i>Zosterella dubia</i>)	3	1.3			1	1.0	1	1.0
number of submerged species	7		4		8		6	

Appendix

Fish Lake individual site aquatic plant data for August 1, 2022.

Site	Depth (ft)	Spatterdock	White lilies	Coontail	CLP	Flatstem	Sago	Water celery	Water stargrass	FA	No plants
1	5	3		2							
2	5	1		1						1	
3	4			1						1	
4	3		1	2							
9	5			1		1		1			
10	4		1	2						1	
16	4			1		3		1			
17	4						1			2	
24	5									2	1
31	3					1		2	1		
32	4		1	1			1	1			
40	8			2							
41	3		3	3							
42	7									2	1
50	6			3				1			
51	3		3	3						2	
52	11										1
60	6			1				1			
61	3			1		1		1			
62	14										1
64	13										1
66	14										1
67	3			1		1		2			
68	3			2		1		2			
69	5			1						2	
70	4				1	1	1	1		1	
71	5			1						2	
72	5					1	1	2			
73	2			1						2	
74	3			1						3	
Average		2.0	1.8	1.6	1.0	1.3	1.0	1.4	1.0	1.8	
Occur (30 sites)		2	5	20	1	8	4	11	1	12	6
% occur		7	17	67	3	27	13	37	3	40	