

Aquatic Plant Community of Crooked Lake: 2018

Anoka County, MN (#02-0084)

Surveyed August 14, 2018



Surveying, Analysis, and Reporting by:
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Funded by:
Crooked Lake Area Association

Survey & Analysis Methods

Point-Intercept Aquatic Plant Survey

Freshwater Scientific Services conducted a lake-wide aquatic plant survey for Crooked Lake on August 14, 2018 using the point-intercept method described by Madsen (1999). This survey incorporated assessments at a total of 180 sample points (158 littoral; ≤ 15 ft) arranged in a uniform grid (45-m spacing; Figs 1 and 2). We generated these sample points using desktop GIS software to project a grid of points over an aerial image of the lake. We then loaded the selected sample locations onto a handheld GPS unit (Garmin GPSMAP-78) for navigation to each point while in the field.

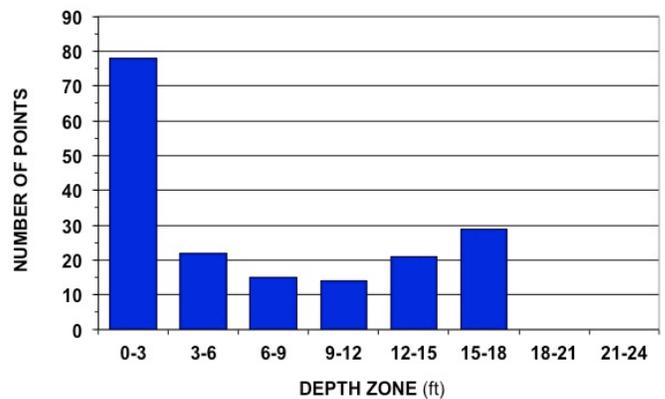
At each designated sample location, we collected plants using a double-headed, 14-tine rake on a on a rope. For each rake sample, we dragged the rake over the lake bottom for approximately 5 ft before retrieving. Retrieved plants were piled on top of the rake head and assigned density scores from 1 to 4 based upon rake head coverage (Table 3) for each individual species and for all plants collectively.

We calculated the littoral frequency (≤ 15 ft, % occurrence) and littoral mean density score (plant abundance) for each encountered plant species (Table 1), as well as lake-wide and littoral plant community metrics (Table 2). We also used desktop GIS software to map the distribution and abundance of plants in the lake (pages 5–9). Additional species that were observed floating or growing in the vicinity of a sample point but not retrieved on the rake were given a rating of zero for that location. These “zero” species were noted as being present on the plant distribution maps (shown as an “X”), but “zero” ratings were excluded from calculations of plant community metrics and statistics (not treated as denoting presence). At each location, we also documented water depth and overall plant height.

Figure 1. Designated sample locations for the 2018 Crooked Lake plant survey. Darker shaded area >15 ft (based upon MDNR bathymetric map).



Figure 2. Sampling effort (number of locations sampled) within successive 3-ft depth zones



Results

Statistical Summary of Findings

Table 1. Littoral frequency (% occurrence) and abundance (mean density score) of plant species found in Crooked Lake (Anoka Co., MN) during surveys conducted in August of 2016, 2017, and 2018. % Occurrence and Mean Density (0-4 scale) were calculated using all littoral points (water depth ≤15 ft). Plant taxa that were observed growing in the lake but not retrieved in any rake samples are noted as being present (P).

PLANT TAXA	COMMON NAME	% OCCURRENCE		
		2016	2017	2018
ALL TAXA (combined)		72	73	75
SUBMERSED TAXA				
<i>Myriophyllum spicatum</i> *	Eurasian watermilfoil	60	1	6
<i>Ceratophyllum demersum</i>	Coontail	50	25	26
<i>Chara</i> sp.	Muskgrass	41	42	42
<i>Potamogeton illinoensis</i>	Illinois pondweed	29	38	28
<i>Stuckenia pectinata</i>	Sago pondweed	17	38	23
<i>Najas guadalupensis</i>	Southern naiad	6	3	18
<i>Eleocharis acicularis</i>	Needle spikerush	1	1	1
<i>Potamogeton crispus</i> *	Curly-leaf pondweed	1	16	1
<i>Potamogeton pusillus</i>	Small pondweed	1	5	4
<i>Heteranthera dubia</i>	Water stargrass	1	5	14
<i>Najas flexilis</i>	Slender naiad	–	6	15
<i>Utricularia vulgaris</i>	Common bladderwort	–	3	5
<i>Potamogeton gramineus</i>	Variable pondweed	–	P	3
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed	–	2	1
<i>Utricularia minor</i>	Small bladderwort	–	–	1
<i>Potamogeton nodosus</i>	Long-leaf pondweed	–	–	1
FLOATING TAXA				
<i>Nymphaea odorata</i>	White waterlily	17	22	20
<i>Lemna minor</i>	Small duckweed	13	5	1
<i>Spirodela polyrhiza</i>	Large Duckweed	7	2	1
<i>Wolffia columbiana</i>	Common watermeal	4	2	1
<i>Nuphar variegata</i>	Spatterdock	1	P	1
<i>Lemna trisulca</i>	Star duckweed	–	1	1
EMERGENT TAXA				
<i>Typha</i> sp.	Cattail	2	1	1
<i>Lythrum salicaria</i>	Purple loosestrife	–	–	P
<i>Schoenoplectus acutus</i>	Hard-stem Bulrush	P	P	P

* Invasive, non-native species

Table 2. Summary of Crooked Lake plant community metrics from surveys in August of 2016, 2017, and 2018.

CROOKED LAKE

WHOLE-LAKE METRICS	2016	2017	2018
Lake Area (acres)	116	116	116
Total Points Sampled	179	177	180
Vegetated Area (acres)	80	70	66
Area with Veg. to Surface (acres)	36	24	23
Max Depth of Growth (95%)	14.0 ft	12.5 ft	9.9 ft
Native Submersed Taxa	10	12	14
Native Floating/Emergent Taxa	7	8	8
Non-Native Submersed Taxa	2	2	2

LITTORAL METRICS	2016	2017	2018
Littoral Area (≤15 ft, acres)	84	85	87
Littoral Points Sampled	151	154	158
% Littoral Points Vegetated	95%	82%	75%
Mean Plant Height	2.7 ft	1.4 ft	1.0 ft
% of Max Littoral Biovolume	52%	34%	28%
Mean Native Taxa / Point	1.5	2.0	2.0
Simpson's Diversity	0.85	0.87	0.89
Floristic Quality (FQI)	17.9	22.0	24.0
AMCI Score (Nichols et al. 2000)	47	51	52

Table 3. Overview of rake density scores used to document plant abundance

Density Score	Rake Coverage	Description
1		Only a few plants retrieved
2		Full length of rake head covered, but tines only partially covered
3		Plants completely cover the rake head and tines
4		Enough plants to cover rake head and tines multiple times

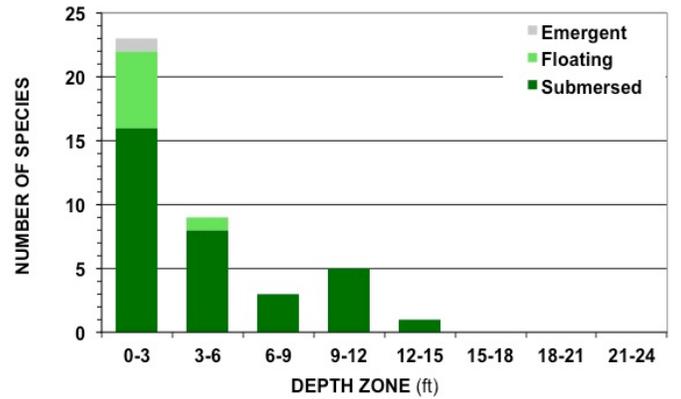
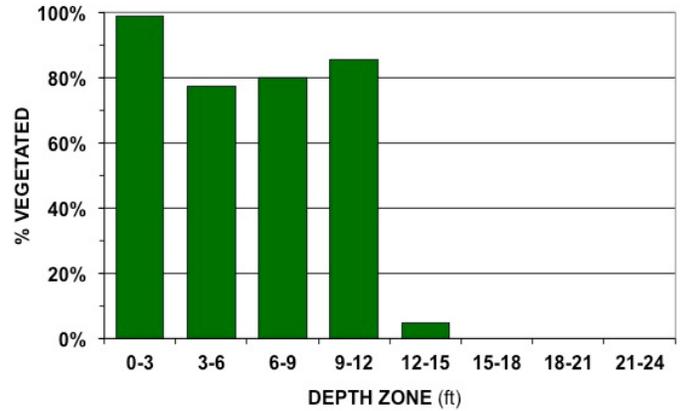
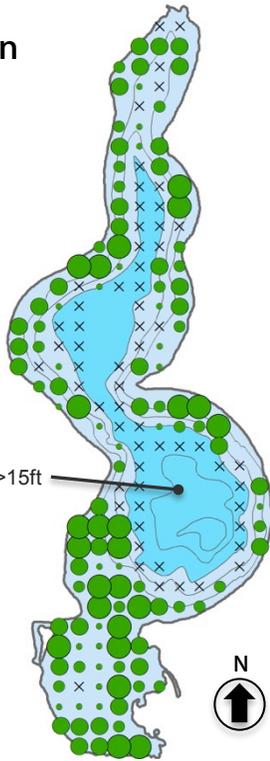
2018: Crooked Lake – Aquatic Plant Community

All Vegetation

Density (1-4)

- × No plants
- 1
- 2
- 3
- 4

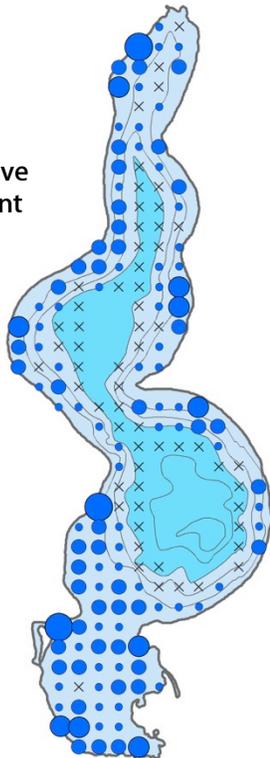
Darker shaded area >15ft



Native Plant Diversity

Number of Native Species per point

- × None
- 1-2
- 3-4
- 5-6
- 7-8



Surveyed: Aug 14, 2018

Methods: Rake, Sonar

Surveyor: JA Johnson



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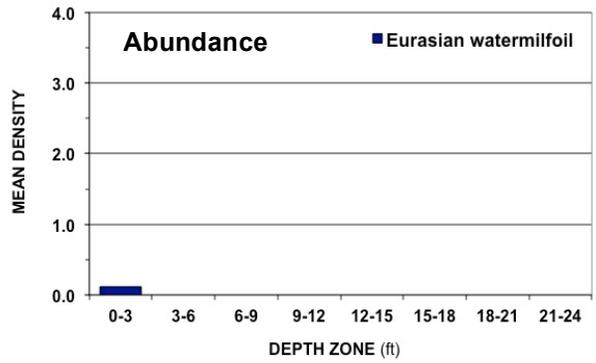
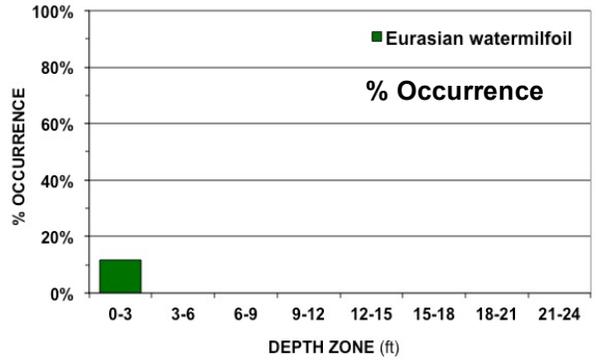
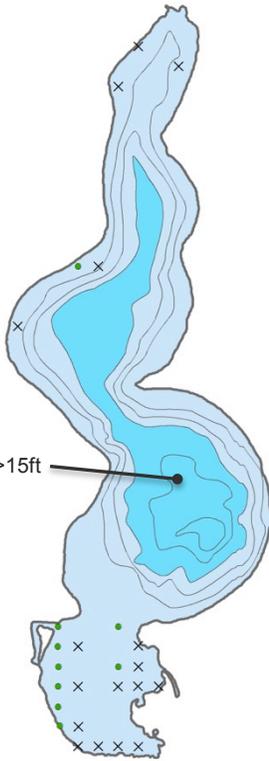
2018: Crooked Lake – Invasive Aquatic Plants

Eurasian Watermilfoil

Density (1-4)

- × In vicinity
- 1
- 2
- 3
- 4

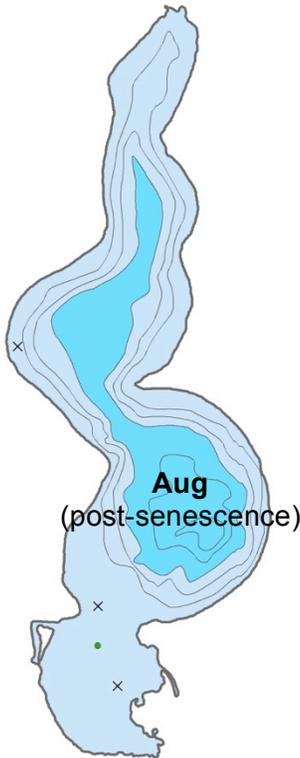
Darker shaded area >15ft



Curlyleaf Pondweed

Density (1-4)

- × In vicinity
- 1
- 2
- 3
- 4



2018: Crooked Lake – Native Aquatic Plants

Muskgrass (Chara)

Density (1-4)

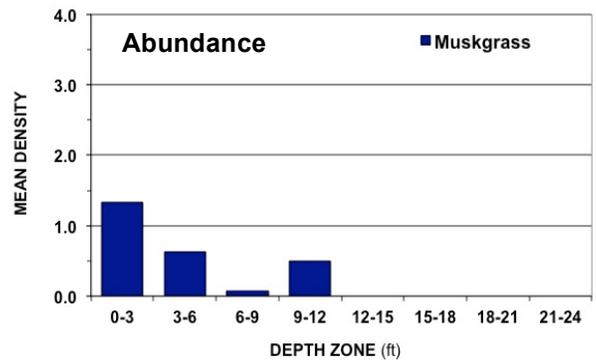
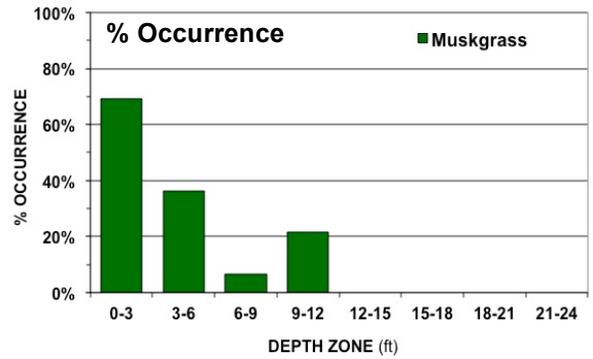
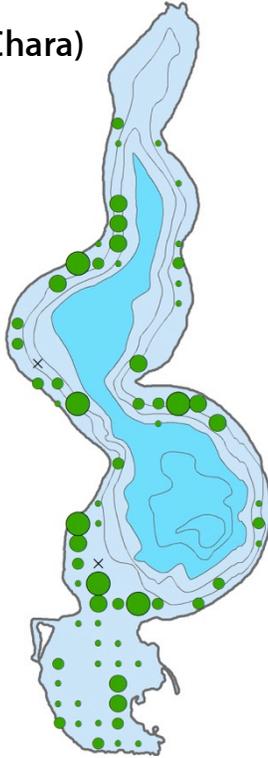
× In vicinity

● 1

● 2

● 3

● 4



Illinois Pondweed

Density (1-4)

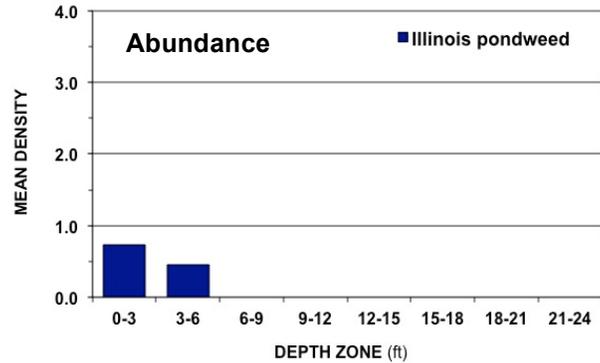
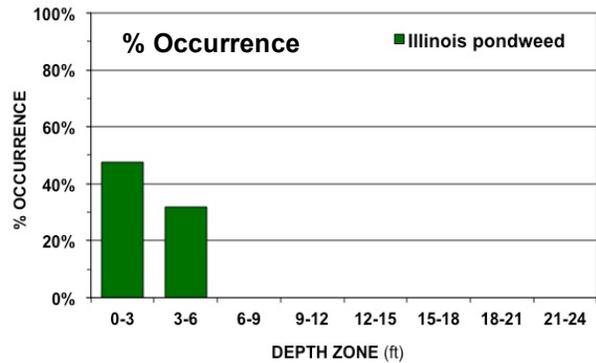
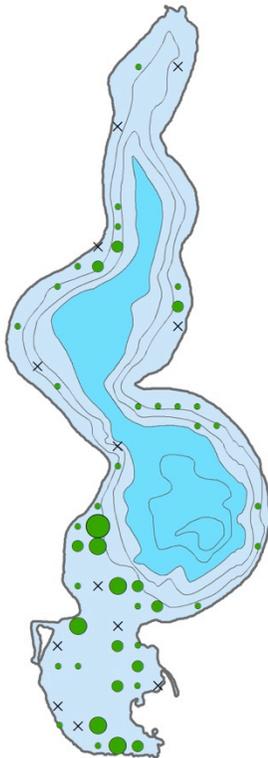
× In vicinity

● 1

● 2

● 3

● 4

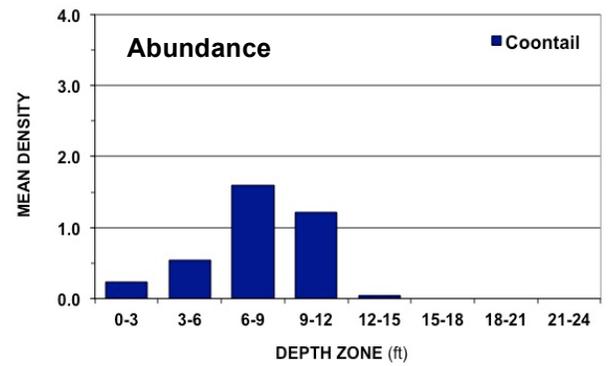
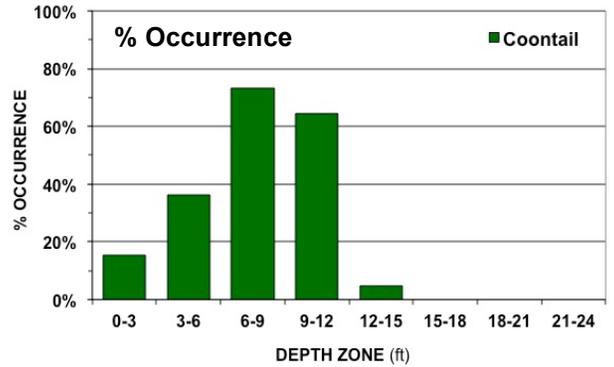
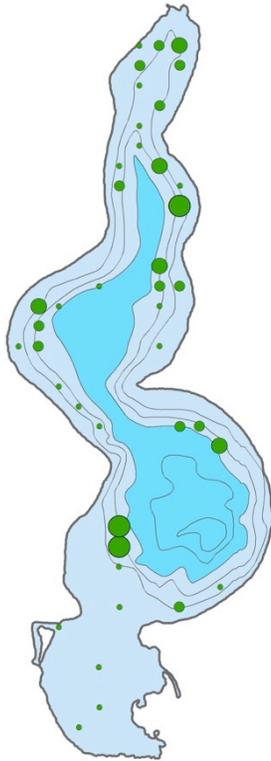


2018: Crooked Lake – Native Aquatic Plants

Coontail

Density (1-4)

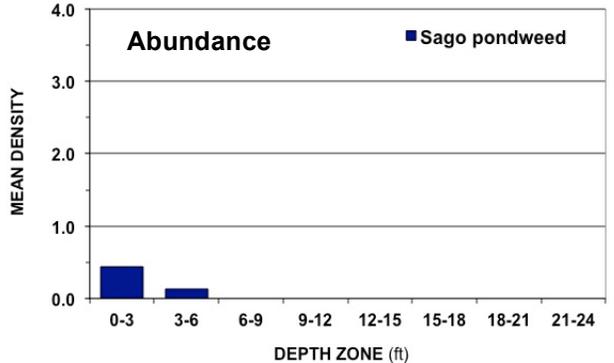
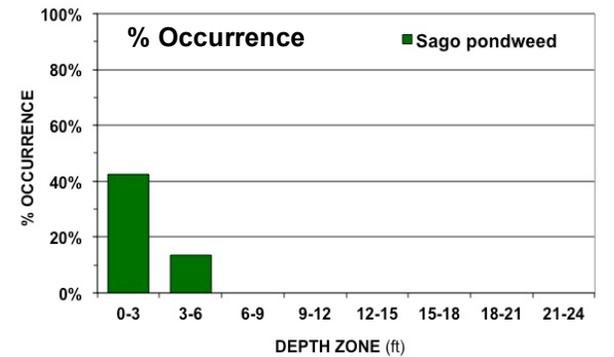
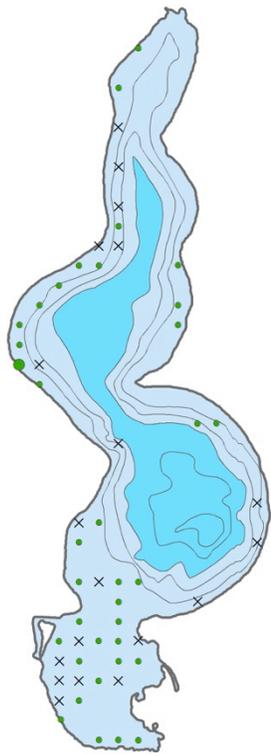
- × In vicinity
- 1
- 2
- 3
- 4



Sago Pondweed

Density (1-4)

- × In vicinity
- 1
- 2
- 3
- 4



2018: Crooked Lake – Native Aquatic Plants

