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Aquatic Plant Community of Crooked Lake: 2019

Anoka County, MN *(#02-0084)*

Surveyed August 8, 2019

Surveying, Analysis, and Reporting by:

James A. Johnson – Freshwater Scientific Services, LLC

Certified Lake Manager
www.NALMS.org

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 8, 2019 using the point-intercept method described by Madsen (1999). This survey incorporated assessments at a total of 183 sample points (149 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 2019 Crooked Lake plant survey. Darker shaded area >15 ft (based upon MDNR bathymetric map).

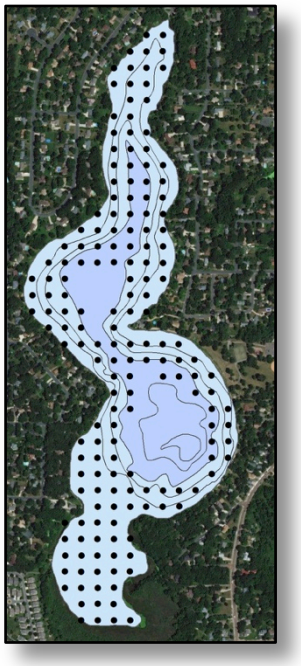
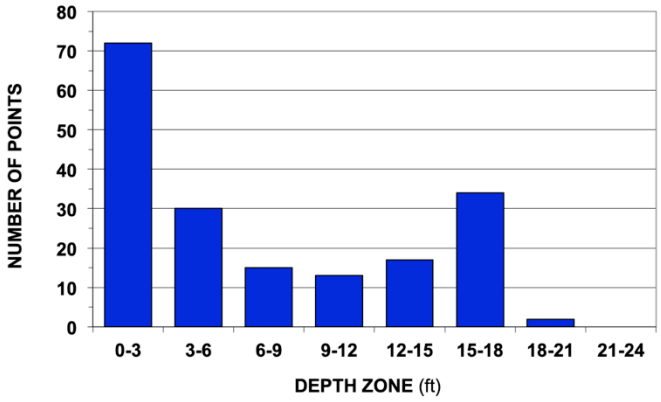


Figure 2. Sampling effort (number of locations sampled) within successive 3-ft depth zones



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 to 2019. *% 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	2019
ALL TAXA (combined)		**72**	**73**	**75**	**85**
SUBMERSED TAXA					
*Myriophyllum spicatum**	Eurasian watermilfoil	60	1	6	P
Ceratophyllum demersum	Coontail	50	25	26	31
Chara sp.	Muskgrass	41	42	42	46
Potamogeton illinoensis	Illinois pondweed	29	38	28	28
Stuckenia pectinata	Sago pondweed	17	38	23	11
Najas guadalupensis	Southern naiad	6	3	18	38
Eleocharis acicularis	Needle spikerush	1	1	1	P
*Potamogeton crispus**	Curly-leaf pondweed	1	16	1	P
Potamogeton pusillus	Small pondweed	1	5	4	5
Heteranthera dubia	Water stargrass	1	5	14	14
Najas flexilis	Slender naiad	–	6	15	1
Utricularia vulgaris	Common bladderwort	–	3	5	3
Potamogeton gramineus	Variable pondweed	–	P	3	–
Potamogeton zosteriformis	Flat-stem pondweed	–	2	1	6
Utricularia minor	Small bladderwort	–	–	1	–
Potamogeton nodosus	Long-leaf pondweed	–	–	1	–
FLOATING TAXA					
Nymphaea odorata	White waterlily	17	22	20	18
Lemna minor	Small duckweed	13	5	1	1
Spirodela polyrhiza	Large duckweed	7	2	1	5
Wolffia columbiana	Common watermeal	4	2	1	P
Nuphar variegata	Spatterdock	1	P	1	1
Lemna trisulca	Star duckweed	–	1	1	–
EMERGENT TAXA					
Typha sp.	Cattail	2	1	1	P
Lythrum salicaria	Purple loosestrife	–	–	P	–
Schoenoplectus acutus	Hard-stem bulrush	P	P	P	P

*** Invasive, non-native species**

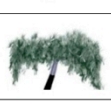
Table 2. Summary of Crooked Lake plant community metrics from surveys in August of 2016–2019.

CROOKED LAKE

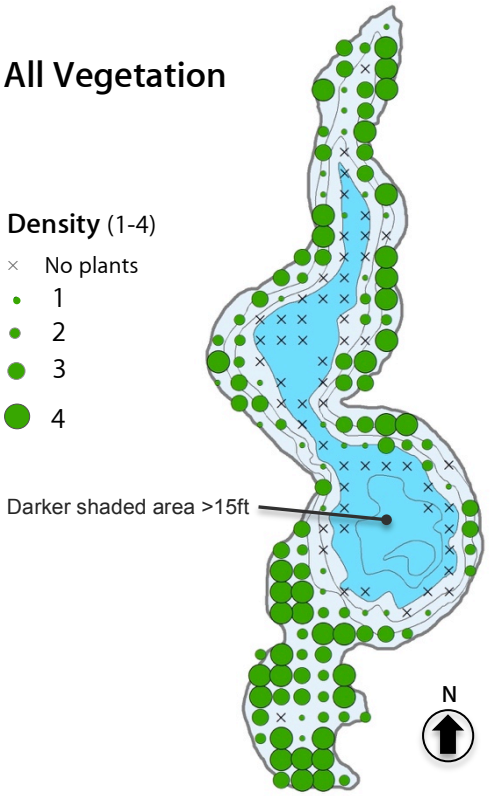
WHOLE-LAKE METRICS	2016	2017	2018	2019
Lake Area (acres)	116	116	116	116
Total Points Sampled	179	177	180	183
Vegetated Area (acres)	80	70	66	61
Area with Veg. to Surface (acres)	36	24	23	16
Max Depth of Growth (95%)	14.0 ft	12.5 ft	9.9 ft	11.6 ft
Native Submersed Taxa	10	12	14	13
Native Floating/Emergent Taxa	7	8	8	7
Non-Native Submersed Taxa	2	2	2	2

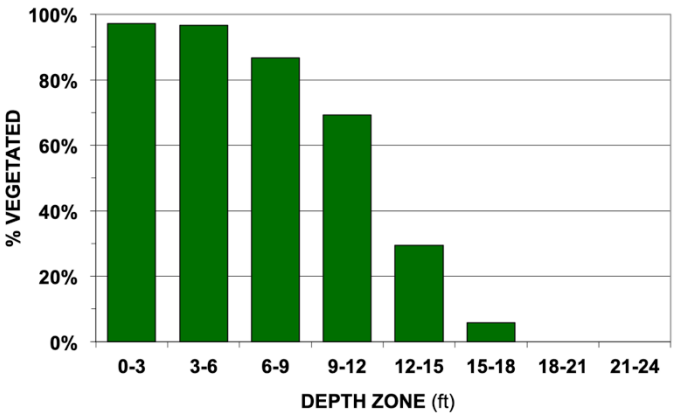
LITTORAL METRICS	2016	2017	2018	2019
Littoral Area (≤15 ft, acres)	84	85	87	83
Littoral Points Sampled	151	154	158	149
% Littoral Points Vegetated	95%	82%	75%	85%
Mean Plant Height	2.7 ft	1.4 ft	1.0 ft	1.2 ft
% of Max Littoral Biovolume	52%	34%	28%	29%
Mean Native Taxa / Point	1.5	2.0	2.0	2.1
Simpson's Diversity	0.85	0.87	0.89	0.87
Floristic Quality (FQI)	17.9	22.0	24.0	21.6
AMCI Score (Nichols et al. 2000)	47	51	52	47

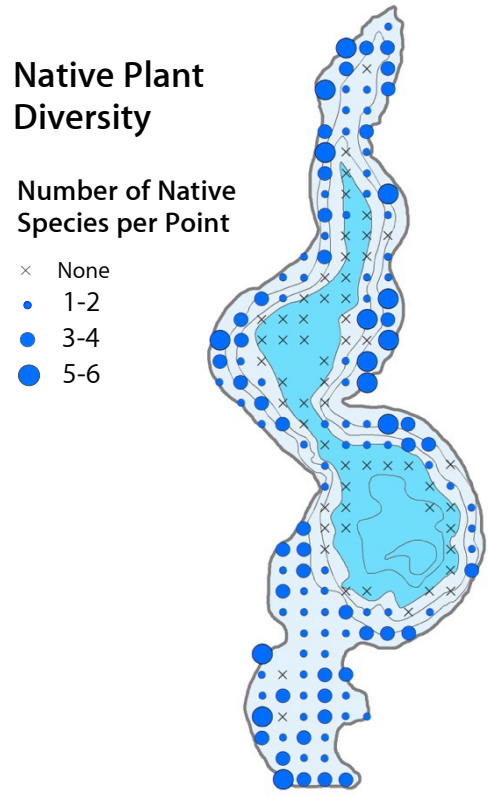
Table 3. Overview of rake density scores used to document plant abundance

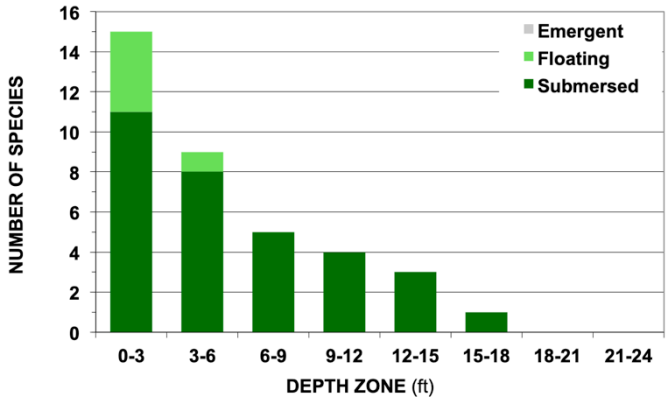
Density Score	Rake Coverage	Description
1		Only a few plants retrieved
2		Full length of rake head covered, but tines only partially covered
3		Plants completely cover the rake head and tines
4		Enough plants to cover rake head and tines multiple times

2019: Crooked Lake – Aquatic Plant Community









Surveyed: Aug 8, 2019
Methods: Rake, Sonar
Surveyor: JA Johnson

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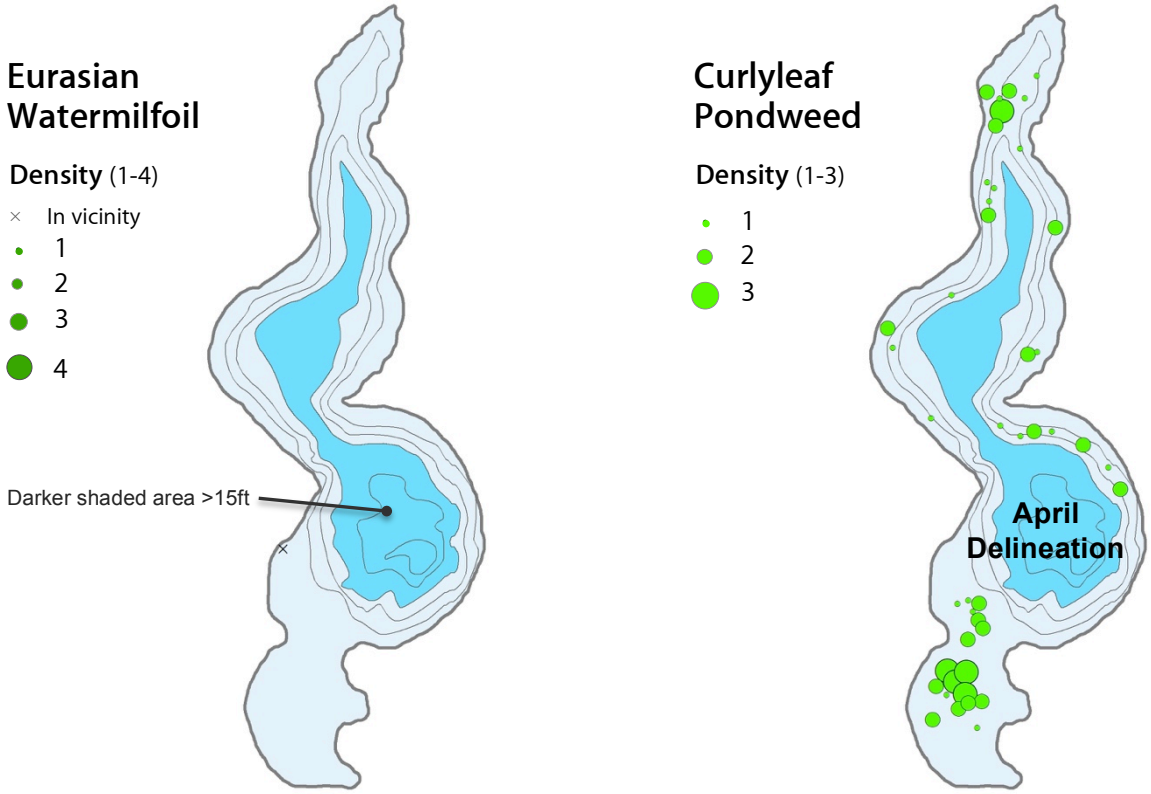
2019: Crooked Lake – Invasive Aquatic Plants

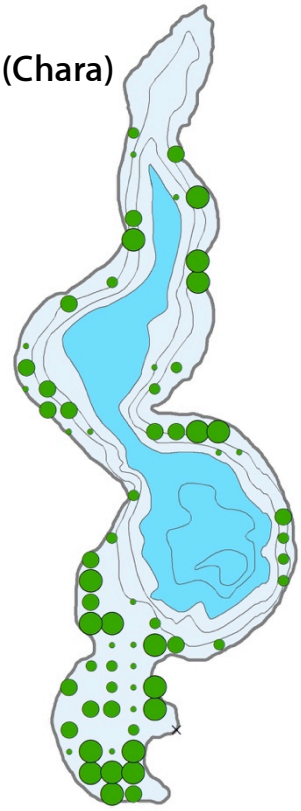


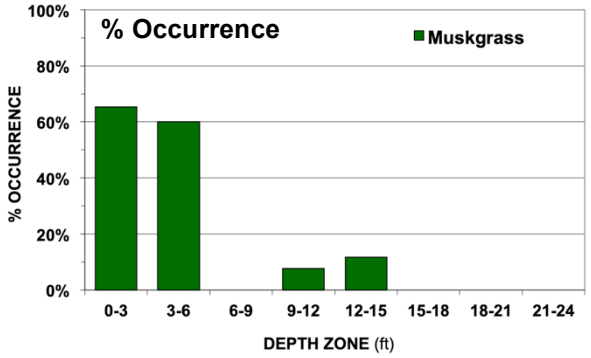
2019: Crooked Lake – Native Aquatic Plants

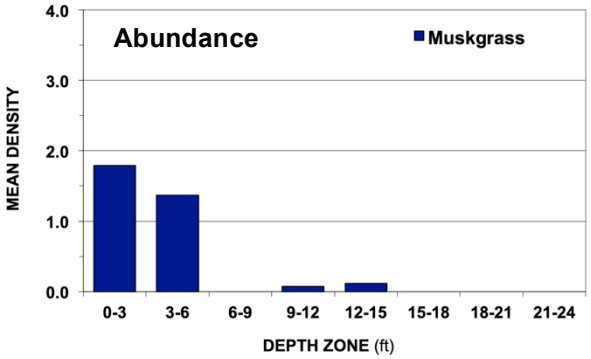
Muskgrass (Chara)

Density (1-4)

- × In vicinity
- 1
- 2
- 3
- 4



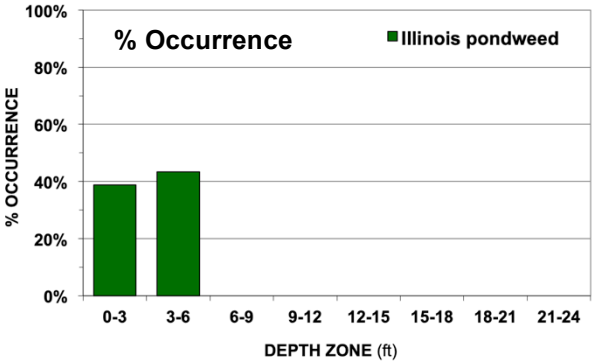


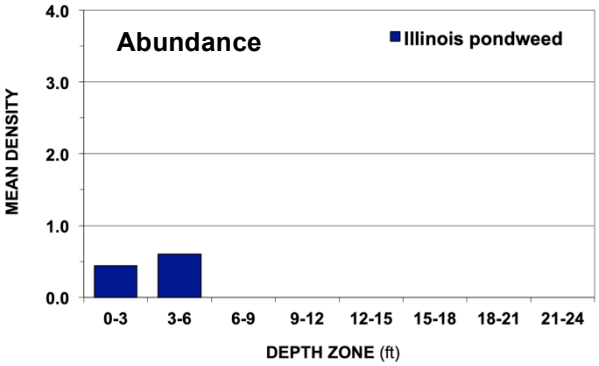


Illinois Pondweed

Density (1-4)

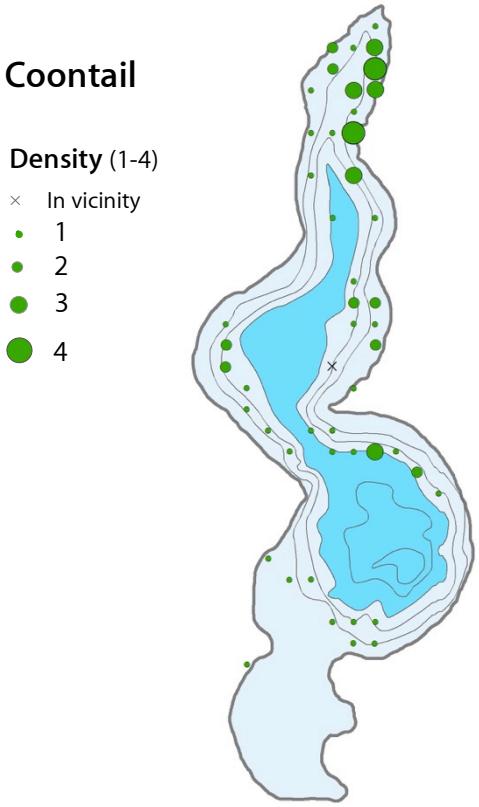
- × In vicinity
- 1
- 2
- 3
- 4

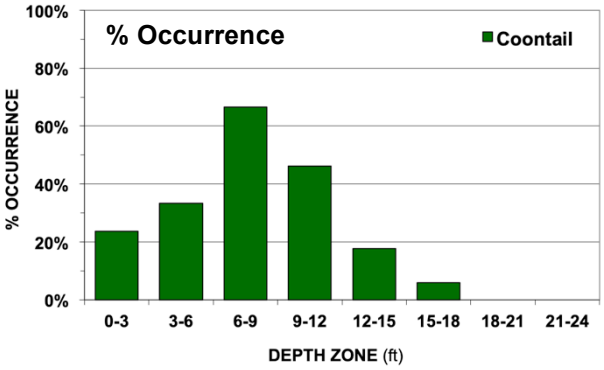


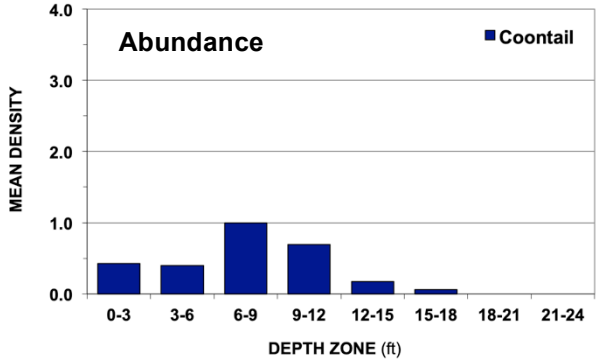


2019: Crooked Lake – Native Aquatic Plants

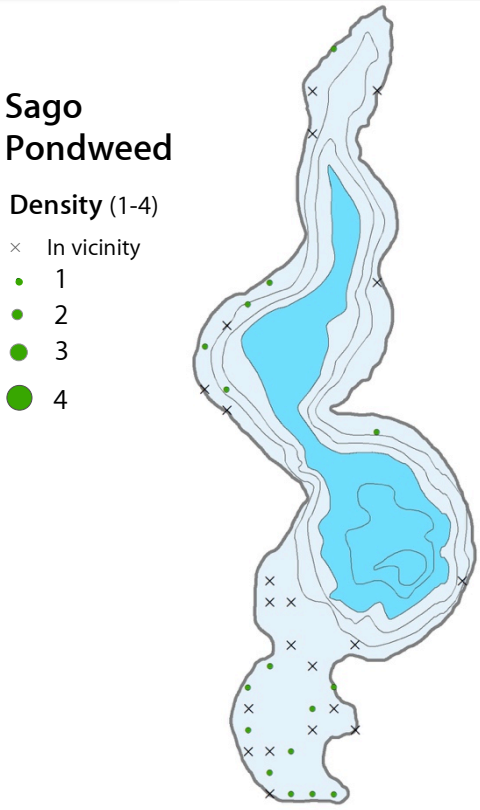
Coontail

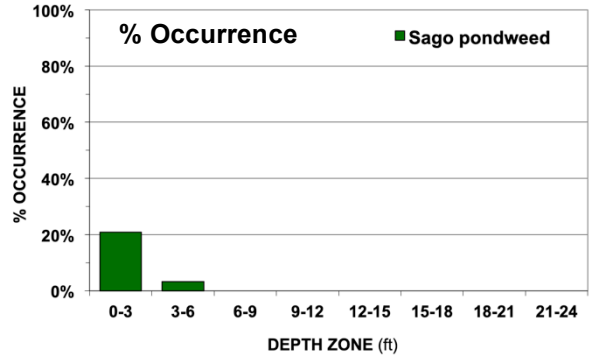


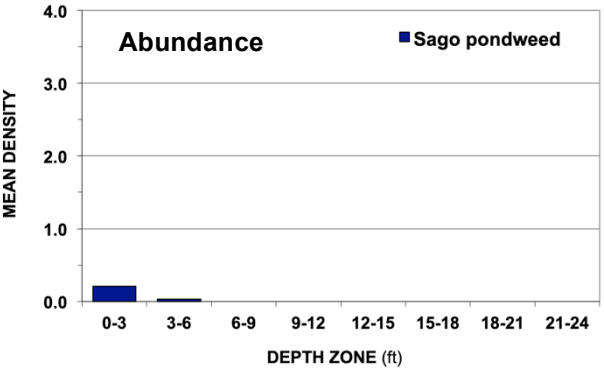




Sago Pondweed







2019: Crooked Lake – Native Aquatic Plants