
McMAHON LAKE, SCOTT COUNTY: 2018 AQUATIC VEGETATION REPORT

Report by the Invasive Species Program – Division of Ecological and Water Resources
Minnesota Department of Natural Resources

Lake: McMahon (DOW# 7000500)

Lake Surface Area: 195 acres

Littoral Area: 162 acres

County: Scott

Survey Type: Point-intercept

Date of Survey (most recent): July 12, 2018

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2018 Summary:

The most recent aquatic vegetation point-intercept survey of McMahon Lake (DOW# 70005000) was completed on July 12, 2018. Plants were present throughout the lake to a maximum depth of 2.7 meters (9 feet). Within the littoral zone (depth range in lake from the 0-4.5 meter [0-15 feet]), 45% of sample points contained native submersed taxa. The average number of native submersed species per sample point was 0.8. Ten submersed plant species were documented during the 2018 survey and include two invasive plant species: Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP). Since 2014, curly-leaf pondweed has been managed with herbicides near the public access to control nuisance surface matting.

Summary Table. Summary of aquatic submersed plants in McMahon Lake, Scott County, Minnesota (DOW# 70005000) as indicated by results of Point-Intercept surveys. Values were calculated from littoral depth range (0-15 feet).

PI Survey Date	Treatment Date	CLP* Acres Treated	Max Depth of Growth in feet [95%] [†]	% Points w/ Native Submersed Taxa	Mean Native Submersed Taxa/ Point	# Submersed Taxa	AVG Secchi Depth [m]
2014 MAY 19	2014 MAY 28*	16.5	15	31	0.5	7	1.6
2015 MAY 15	2015 MAR *	16.5	11	20	0.3	5	1.7
2016 MAY 24	2016 APR *	16.5	11	36	0.6	7	2.2
2017 APR 28	2017 MAY 5*	16.5	11	34	0.4	6	2.4
2018 JUL 12	2018 MAY 29*	16.6	9	45	0.8	10	1.8

*CLP is short for Curly-leaf pondweed

[†]95th percentile calculated based on all vegetated sampling points

Taxa refers to groups of submersed aquatic plant species or genera

AVG- average Secchi depth (water clarity measurement) from May-September

Lake Description:

McMahon Lake is a 195-acre lake located four miles south of Prior Lake, Minnesota in Spring Lake Township in the North Central Hardwoods Forest ecoregion. Approximately 83% of the lake is littoral. Secchi data has been collected by the Minnesota Pollution Agency and SCWMO (see **Table 1-Secchi Averages** below for historic Secchi disk observations). Historically, Lake McMahon has been listed as impaired for excessive nutrients – phosphorous. In 2018, McMahon Lake was delisted as impaired from excessive nutrients. More information on water quality in McMahon Lake see:

<http://cf.pca.state.mn.us/water/watershedweb/wdip/waterunit.cfm?wid=70-0050-00>.

Table 1-Secchi Averages. Average Secchi disk observations in meters for McMahon Lake (DOW #70005000). Data gathered from the Minnesota Pollution Control Agency and SCWMO.

YEAR	MAY	JUNE	JULY	AUG	SEPT	Secchi Depth Average [May-Sept]
2013	3.0	3.0	1.5	1.0	0.5	1.8
2014	3.0	1.7	1.0	1.1	1.5	1.6
2015	3.2	2.1	1.5	0.7	1.0	1.7
*2016	4.5	2.9	2.0	0.8	0.6	2.2
*2017	5.0	3.0	1.9	0.6	1.3	2.4
*2018	3.9	2.5	1.4	0.9	0.4	1.8

* data collected by SCWMO

Management History:

McMahon Lake is classified by the DNR as a natural environment lake which restricts shoreline development and also the use of herbicides. In 2014, the DNR granted a 2-year variance to control curly-leaf pondweed using herbicide in up to 15% of the littoral area of the lake (west bay near the public access). In 2016, a variance was extended another 3 years for CLP management. The most recent CLP herbicide treatment of 16.5 acres was organized by the Scott Watershed Management Organization in 2018 (see **Table 2-Invasive Plant Management Summary**). Evaluation on whether a variance shall be renewed or a more comprehensive Lake Vegetation Management Plan will be discussed in 2019.

Table 2-Invasive Plant Management Summary. Characteristics and history of herbicide treatment for McMahon Lake (DOW# 70005000, Total acres: 195, Littoral acres: 162, 15% Littoral acres: 24.3).

Date	Treatment [W,P,N]	Target Species	Total Acres Treated	Herbicide	Licensed Commercial Applicator
2014 MAY 28*	P	CLP	16.5	Endothall	PLM Lake and Land Mgmt Corp
2015 MAR *	P	CLP	16.5	Endothall	PLM Lake and Land Mgmt Corp
2015 APR *	P	CLP	16.5	Endothall	PLM Lake and Land Mgmt Corp
2017 MAY 5*	P	CLP	16.5	Endothall	PLM Lake and Land Mgmt Corp
2018 MAY 29*	P	CLP	16.5	Endothall	PLM Lake and Land Mgmt Corp

Treatment: P (partial lake)

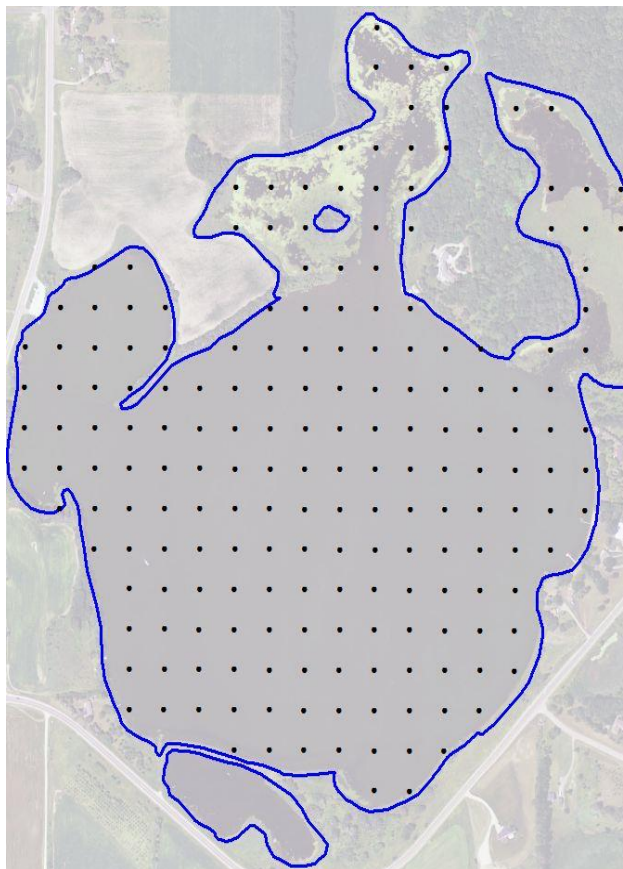
CLP is an abbreviation for curly-leaf pondweed.

* variance year

Survey Objectives:

Point-intercept surveys were used to assess the distribution of aquatic plants in McMahon Lake. The primary purpose for this type of survey is to 1) develop baseline knowledge of the current plant community in a lake, and over time, 2) compare year to year plant variation (in plant presence and spatial location). Moreover, this survey will help the DNR and our partners monitor native plant communities and evaluate possible responses to invasive aquatic plant management efforts. It is important to note that distributions of aquatic plants may vary from year to year due to effects such as differences in weather, as well as the effects from management.

Survey Methods:



We used a point intercept survey method developed by John Madsen in [“Aquatic Plant Control Technical Note MI-02, 1999”](#). Survey points were placed 60 meters apart using a Geographic Information System (GIS). This spacing allowed for placement of 187 points. Plant samples were collected by throwing and dragging a double-sided rake along the lake bottom at each point. Plant samples were assessed on the boat to determine species and density (scale of zero [no plants] to 3 [abundant or matted on the surface]). Frequencies of occurrence percentages (i.e. how often a plant species was found in the lake) were calculated based on the littoral zone (the portion of the lake is less than 15 feet in depth).

Survey Observations:

The MnDNR together with SCWMO have conducted point-intercept surveys on Lake McMahon since 2014. Maximum depth of rooted vegetation was observed between 3.3-3.5 meters (11-15 feet) from 2014-2018 (see **Figure 3** for maximum plant growth depth from the 2018 survey). Data from historic plant surveys (2007 & 2012) organized by Scott County Watershed Management Organization (SCWMO) are not presented in this report but may be provided upon request.

The 2018 survey was the first survey conducted mid-summer and as expected, showed the highest species diversity (8 submersed native taxa observed) compared to previous spring surveys (See **Table 3-Point Intercept Metrics** for historical point-intercept survey calculations). The intent was to document other native taxa in McMahon Lake such as water stargrass and leafy pondweed which dominated the lake in July. Other dominant species included coontail similar to previous years (see **Table 4** below for more information). Naiad and large-leaf pondweed were also noted for the first time. The spatial distribution of curly-leaf pondweed has remained constant from year to year with some differences in density in 2018 due to natural senescence occurring prior to survey (see **Figure 2**). A total of 10 submersed species were observed, including EWM and CLP during the most recent point intercept survey.

Table 3- Point Intercept Metrics. Point Intercept Metrics. Summary of point intercepts metrics for McMahon Lake, Scott County, Minnesota (DOW# 70005000). Shaded values were calculated from littoral depth range.

Survey Metrics	MAY 19 2014	MAY 15 2015	MAY 24 2016	APR 28 2017	JUL 12 2018
Treated (Y/N)	Y	Y	Y	Y	Y
Surveyor	MN DNR	MN DNR	MN DNR	MN DNR	MN DNR
Total # Points Sampled	187	186	185	195	183
Max Depth of Growth (95%)	15	11	11	11	9
# Point in Max Depth Range	113	92	86	99	77
# Points in Littoral (0-15 feet)	117	127	123	136	152
% Points w/ Submersed Native Taxa	31	20	36	34	45
Mean Submersed Native Taxa/ Point	0.5	0.3	0.6	0.4	0.8
# Submersed Native Taxa	5	3	5	4	8
# Submersed Non-Native Taxa	2	2	2	2	2



Photo of sampling rake with abundant Canadian waterweed following a CLP treatment in 2017 (Left). Photo of dense curly-leaf pondweed mats observed near the surface during 2016 PI survey. Floating mats of filamentous algae were also observed at the lake surface (Right). McMahan Lake, Scott County (DOW# 70005000).

Table 4- Plant Frequency Occurrence. Historic percent frequency of occurrence for submersed vegetation within the littoral zone (0-15 feet) in McMahan Lake, Scott County, Minnesota (DOW# 70005000).

Taxonomic Name	Common Name	MAY 19 2014	MAY 15 2015	MAY 24 2016	APR 28 2017	JUL 12 2018
SUBMERSED PLANTS						
<i>Myriophyllum spicatum</i> *	Eurasian watermilfoil*	7	4	17	5	3
<i>Potamogeton crispus</i> *	Curly-leaf pondweed*	66	51	49	53	29
<i>Ceratophyllum demersum</i>	Coontail	26	17	28	28	31
<i>Elodea canadensis</i>	Canadian waterweed	1	1	13	7	8
<i>Heteranthera dubia</i>	Water stargrass	0	0	2	0	16
<i>Najas sp.</i>	Naiad	0	0	0	0	7
<i>Potamogeton foliosus</i>	Leafy pondweed	0	0	0	0	12
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed	18	11	15	7	8
Floating, Free-floating & Emergent plants observed: <i>Nymphaea odorata</i> (White waterlily), <i>Persicaria amphibia</i> (Water smartweed), <i>Lemna trisulca</i> (Forked duckweed), <i>Schoenoplectus acutus</i> (Hardstem bulrush), <i>Schoenoplectus tabernaemontani</i> (Softstem bulrush)						
Less common (< 5% frequency) submersed vegetation observed: <i>Utricularia macrorhiza</i> (Common bladderwort) in 2014, <i>Macroalgae</i> (Muskgrass and Stonewort) in 2016- 2018, <i>Potamogeton amplifolius</i> (Large-leaf pondweed) in 2018.						

* denotes invasive aquatic plant

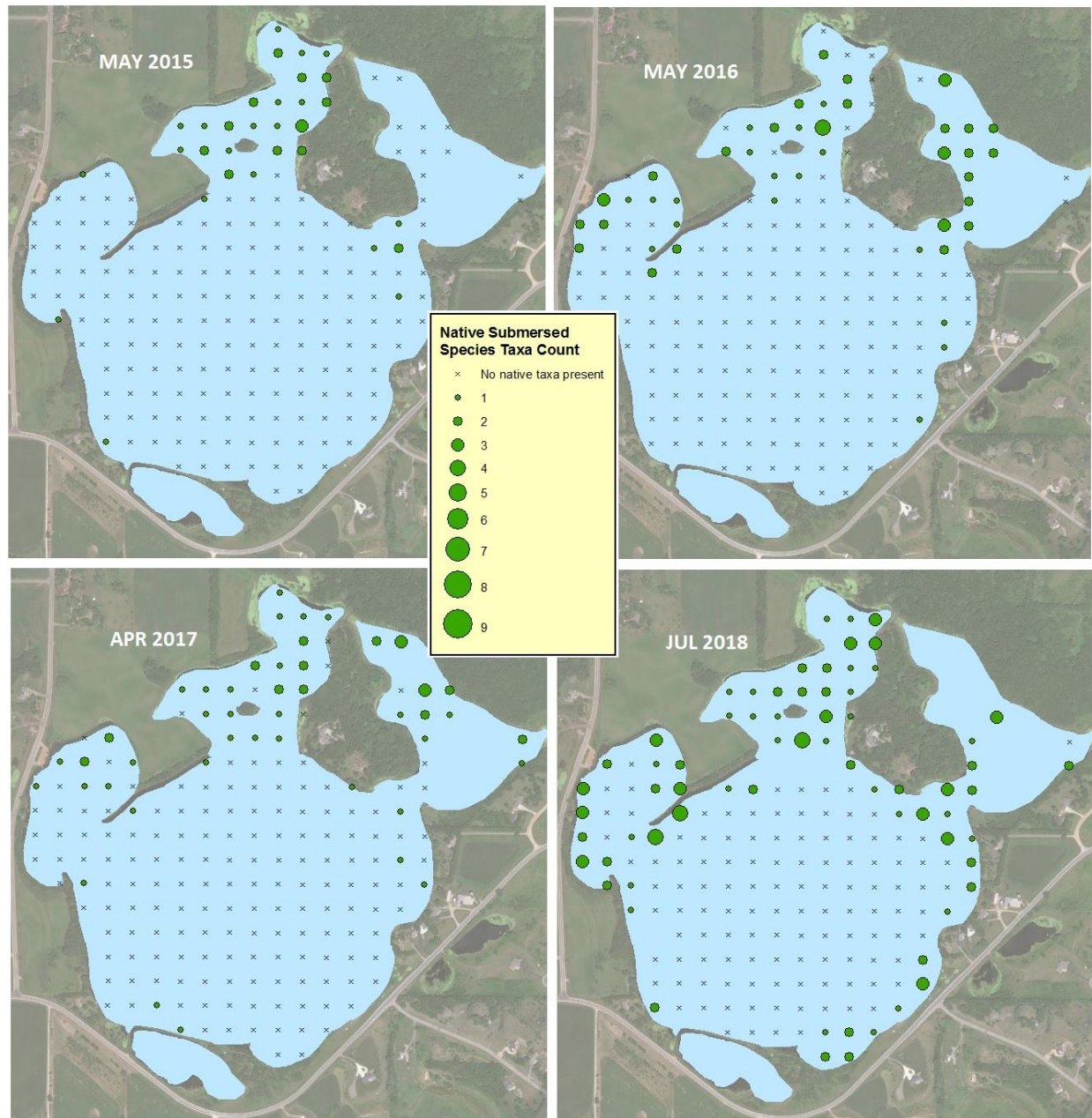


Figure 1. Spatial distribution and rake density rating of native aquatic plants from May 2015-2018. McMahon Lake, Scott County (DOW# 70005000).

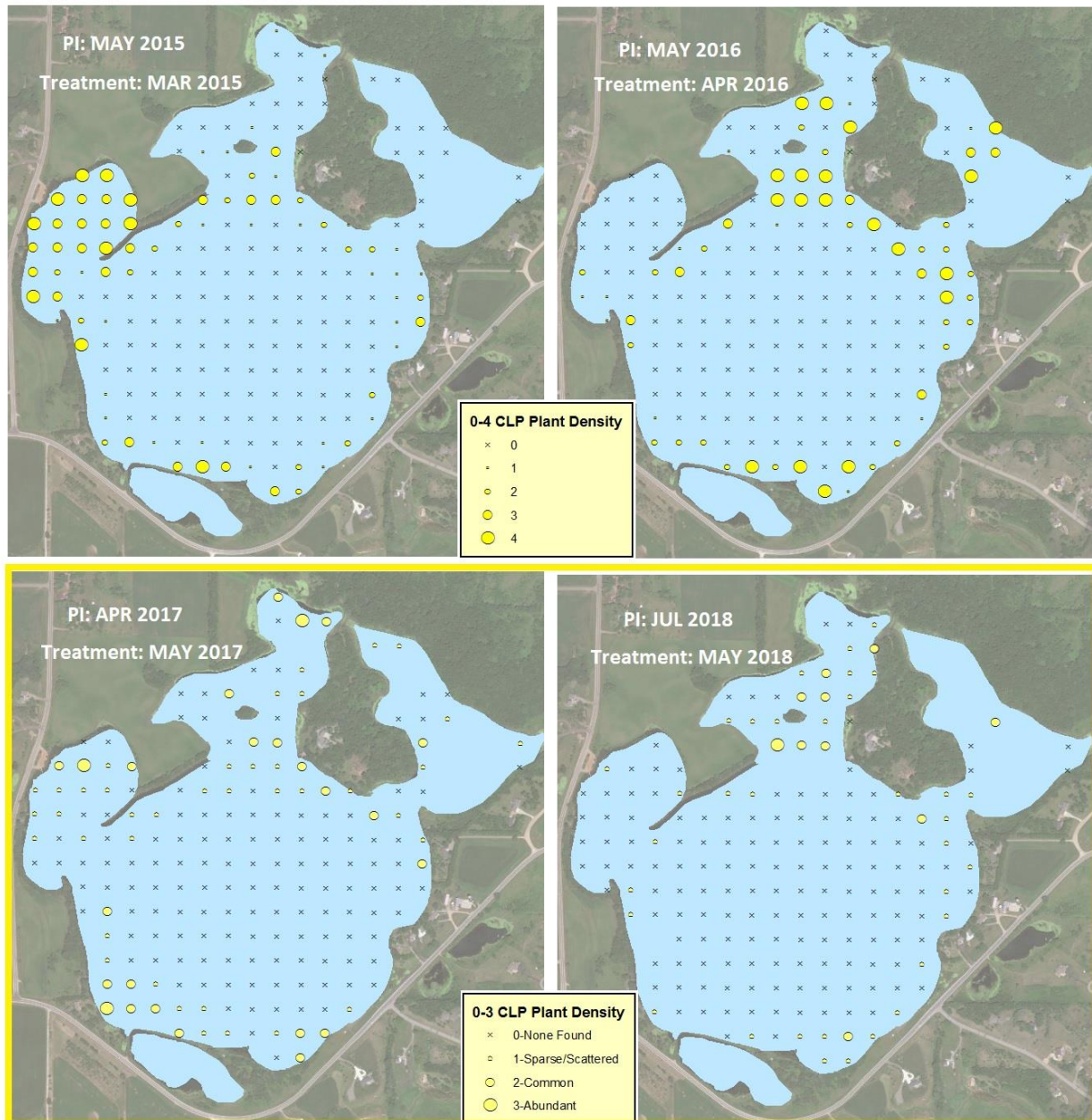


Figure 2. Spatial distribution and rake density rating of curly-leaf pondweed from 2015-2018. Variance issued to control CLP from 2014-2018. 2017 surveyed pre-treatment and all other years was surveyed post-treatment. Dates correspond to month of point intercept survey. Years 2014-2016 were surveyed on a 1-4 density rake rating scale while 2017-2018 were rated on a 1-3 density rake rating. McMahon Lake, Scott County (DOW# 70005000).

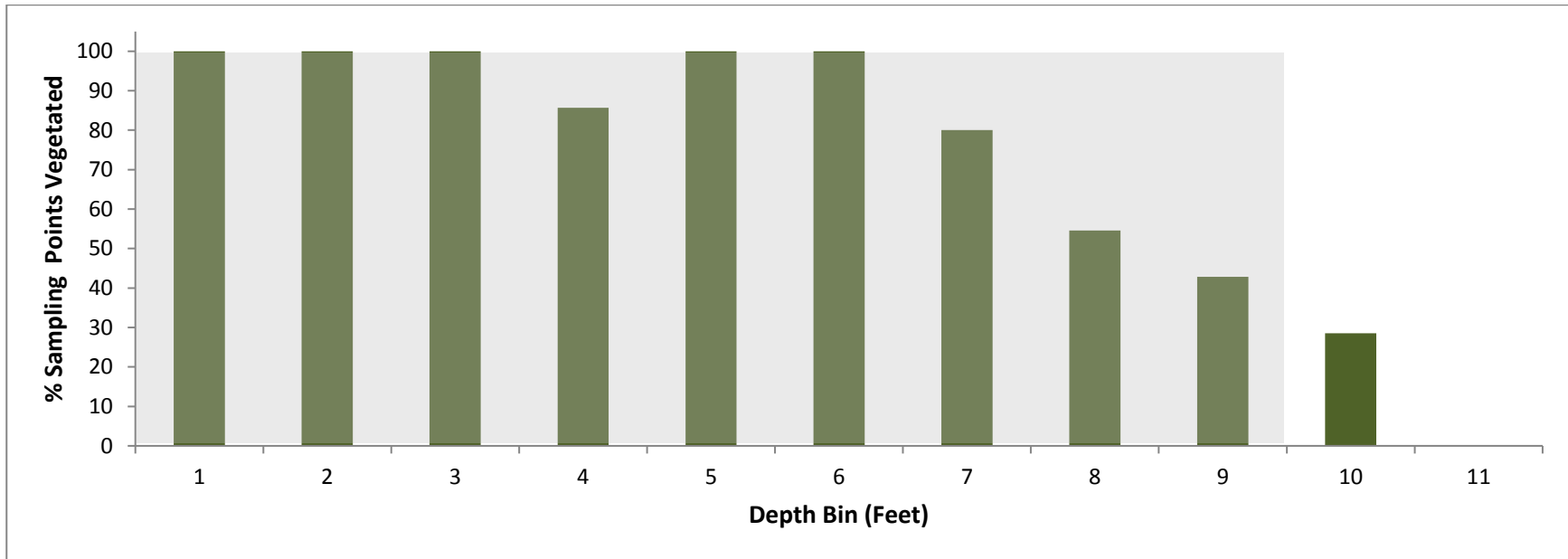


Figure 3. Maximum depth of plant colonization in feet during 2018 point intercept survey. Depths were binned in feet. Percent sampling points vegetated is defined as the number of sampling points with submersed vegetation divided by the total number of sampling points for each depth. Shaded area represents depth range of the 95th percentile of all submersed plants observed. McMahon Lake, Scott County (DOW# 70005000).

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