2015 Pleasant Lake Aquatic Vegetation Survey



Prepared for: Pleasant Lake Association

Annandale, Minnesota



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1.0	INTRODUCTION 1				
2.0	AQUATIC VEGETATION SURVEY METHODS2-				
3.0	SURVEY RESULTS				
	3.1 3.2	Vegetation cover and Frequency of Occurrence 3-1 Curly leaf Pondweed Distribution 3-3			
4.0	CONC	LUSIONS			

TABLES

Table 1-Frequency of Occurrence

FIGURES

Figure 1-Pleasant Lake Location Figure 2-Pleasant Lake Littoral Area and Depth Contours Figure 3-June 15, 2015 Vegetation Survey Results Figure 4-June 15, 2015 Vegetation Biovolume Figure 5-August 26, 2015 Vegetation Survey Results Figure 6-August 26, 2015 Vegetation Biovolume Figure 7-June 15, 2015 Curly Leaf Pondweed Extent Figure 8-Curly Leaf Pondweed Surveys Summary



Wenck Associates, Inc. was contracted by the Pleasant Lake Association to conduct a survey of the aquatic vegetation in Pleasant Lake in 2015. Pleasant Lake is located in the City of Annandale in Wright County (See Figure 1). The lake is in the Clearwater River Watershed District and flows northeast to Clearwater Lake through an outlet channel in the northeast corner of the lake. Pleasant Lake has an approximate surface area of 571 acres, with a maximum depth of 71 feet. About 55% (312 acres) of the lake is littoral, or less than 15 feet deep (See Figure 2).



Figure 1: Pleasant Lake Location





Figure 2: Pleasant Lake Littoral Area and Depth Contours



A point-intercept survey following methodology used by the MN DNR was conducted on June 15, 2015 and again in late summer on August 26, 2015. The early summer survey was conducted specifically to estimate the distribution and abundance of curly leaf pondweed, a non-native species known to be detrimental to lake water quality that peaks in growth in early summer. The late summer survey was conducted to assess the native plant community in the lake.

Sample points were established across the portion of the lake shallower than 20 feet on a 100 meter grid using GIS software. A total of 154 points shallower than 20 feet were sampled for vegetation during the surveys.

The surveyed grid was uploaded to a Lowrance HDS Sonar/GPS unit that was used to navigate to each sample point during the survey. One side of the boat was designated as the sampling area. Water depth was recorded at each sample point in increments estimated to the nearest tenth of a foot using a survey range pole and electronic depth finder. While conducting the survey, the sonar also continuously logged data that was analyzed using CiBioBase software to determine vegetation biovolume and water depth.

Wenck staff identified all plant species found within a one meter squared sample site at each survey point. A weighted sampling hook attached to a rope was used to survey vegetation not visible from the surface. All vegetation species observed were identified to the species level where possible.



Following each survey, the data was entered into a spreadsheet and frequency of occurrence was calculated for each species. The spreadsheet was also integrated into GIS to create maps showing the extent of aquatic vegetation and curly leaf pondweed in the lake.

3.1 VEGETATION COVER AND FREQUENCY OF OCCURRENCE

The frequency of occurrence of each species during each survey is summarized in Table 1. During both surveys, vegetation diversity was generally greatest in the nearshore areas of the lake. Submergent vegetation was very dense in the western bay of the lake. Mats of floating leaved plants and emergent species were also noted along the shoreline in the western bay of the lake.

Although it has recently become more prevalent and has reached nuisance levels in some nearby lakes, it is notable that the exotic species Eurasian water milfoil was not found at any of the survey points in Pleasant Lake during either survey in 2015.

Common Name	Scientific Name	Percent Occurrence		
		June 15, 2015	August 25, 2015	
Bushy Pondweed	Najas flexilis	9.1%	22.1%	
Canada Waterweed	Elodea canadensis	1.3%	5.8%	
Chara	Chara sp 22.1%		18.2%	
Clasping Leaf Pondweed	Potamogeton richardsonii	3.2%	10.4%	
Coontail	Ceratophyllum demersum	65.6%	68.2%	
Curly Leaf Pondweed	Potamogeton crispus	64.3%	6.5%	
Flat Stem Pondweed	Potamogeton zosteriformis	9.7%	6.5%	
Greater Bladderwort	Utricularia vulgaris	16.2%	6.5%	
Large Leaf Pondweed	Potamogeton amplifolius	2.6%	0.9%	
Narrow Leaf Cattail	Typha angustifolia	0.3%	0.3%	
Narrow Leaf Pondweeds	Potamogeton sp.	11.7%	1.5%	
Northern Milfoil	Myriophyllum sibericum	37.7%	18.5%	
Sago Pondweed	S. pectinata	3.9%	1.2%	
Star Duckweed	Lemna trisulca	6.5%	6.2%	
Water Moss	Fontinalis antipyretica	0.6%	0.9%	

Table 3-1: Vegetation Species Frequency of Occurrence

November 2015 T:\2673\02\Pleasant Lake Aquatic Veg Survey Report_Updated Template.docx



Water Stargrass	Zosterella dubia	0.6%	0.0%	
White Water Crowfoot	Ranunculus aquatilis	2.6%	1.5%	
White Stem Pondweed	Potamogeton praelongus	20.8%	3.4%	
White Water Lily	Nymphaea alba	2.6%	0.3%	
Wild Celery	Vallisneria americana	3.9%	5.5%	
Yellow Waterlily	Nuphar variegata	3.9%	3.4%	

<u>June 15, 2015</u>

Vegetation was found at 94% of sampling sites during the June 15, 2015 survey (See Figure 3). Vegetation was observed at every sample point in the littoral area of the lake less than 15 feet deep. 21 species of aquatic vegetation were documented at sample stations during this survey. The maximum depth at which vegetation was found during this survey was 19.5 feet. In general, vegetation diversity and density decreased with depth.

The most common species observed in the lake in the June 2015 survey were coontail (66%), curly leaf pondweed (64%), and northern milfoil (38%). Chara (22%), greater bladderwort (16%), and white stem pondweed (21%) were also commonly observed.

Several native submerged aquatic vegetation species were observed in dense stands in areas near shore that were shallower than 6 feet around the lake.

Figure 4 shows the vegetation biovolume analysis from CiBioBase ranging from 0% (colored in blue) to 100% (colored in red). Biovolume is a measurement of vegetation density that is the amount of the water column that is taken up by vegetation with 0% being no vegetation and a measurement of 100% meaning that vegetation growth is present throughout the entire water column. This analysis accurately shows the area of the lake that was vegetated at the time of the survey. This analysis also shows the dense vegetation observed in the western bay of the lake, nearshore areas, and areas dominated by curly leaf pondweed. Note that areas with biovolume near 100% from 6 to 12 feet of depth are generally representative of areas that had dense curly leaf pondweed growing near the surface at the time of this survey.

August 26, 2015

Vegetation was found at 88% of sampling sites during the August 26, 2015 survey (See Figure 5). Vegetation was found at 97% of sites in the littoral zone less than 15 feet deep. Twenty species of aquatic vegetation were documented at sample stations during the survey. The maximum depth at which vegetation was found was 18.5 feet, with frequency of occurrence and diversity generally decreasing with depth.

The frequency of occurrence and density of several species varied from the June 2015 survey to the August 2015 survey. As anticipated, curly leaf pondweed was much less abundant due to the seasonal senescence of this species. Coontail (68%) was the most common species observed during the August survey and appeared to be growing in many of the areas where curly leaf pondweed was abundant during the June survey. Other species



commonly observed in the August survey included bushy pondweed (22%), northern milfoil (19%), and chara (18%).

Figure 6 shows the vegetation biovolume from CiBioBase analysis that was observed during the August 2015 survey. This analysis demonstrates that the area of greatest vegetation density occurred in areas near shore and in the western bay of the lake. Note that areas with biovolumes near 100% in depths ranging from 6 to 12 feet around the lake during the June survey had biovolumes closer to 50% during the August 2015 survey. This demonstrates the change in vegetation species composition from a dominance of curly leaf pondweed in June to a dominance of coontail and northern milfoil in August.

3.2 CURLY LEAF PONDWEED DISTRIBUTION

Life Cycle Summary

Curly leaf pondweed is a perennial non-native submergent plant that has been noted to be recently becoming more abundant in some lakes in the Clearwater River Watershed District. The presence of dense curly leaf pondweed has been linked to increased nutrient concentrations and periodic poor water quality in lakes due to the plant's unique life cycle. Curly leaf pondweed is dormant through late summer and begins growing in the fall. The plant grows under the ice and reaches its maximum growth in May and June, when most native plant growth is still hindered by cool water temperatures. Since it has little competition from native species, curly leaf pondweed can form dense stands that incorporate nutrients from the lake sediments. When the plants begin to die back in early summer the nutrients stored in the stems and leaves of the plants are released back into the lake. The timing of the large pulse of nutrients to the lake (typically mid-summer) can cause excess algal blooms or impact water quality negatively in other ways.

Curly leaf pondweed spreads across the lake by forming "turions" at the end of each stem tip in early summer which break off and fall to the lake bottom. The turions are distributed across the lake by currents and wave action and germinate into new plants in the early fall.

June 2015 Distribution

Sample points where curly leaf pondweed was observed during the June 2015 survey are overlaid on the biovolume data on Figure 7. Overall, curly leaf pondweed was observed at 64.3% of sampled points during this survey. Curly leaf pondweed was near peak growth at the time of the survey, as it was observed in dense mats growing to or near the surface in several locations. While it was observed from depths of 3 to 18 feet, curly leaf pondweed was observed was observed to be most prevalent in depths ranging from 6 to 12 feet.

The areas that were dominated by curly leaf pondweed were delineated as shown on Figure 7. While curly leaf pondweed was identified in other points outside of these delineated areas, it was interspersed with native species in these areas and did not completely dominate the vegetation community.

As anticipated due to the plant's life cycle, curly leaf pondweed was much less abundant during the August 2015 survey. However, turions and young plants were found distributed in locations around the lake, indicating that the plant has likely established itself across wherever suitable habitat exists in the entire basin.

Previous Distribution

Previous vegetation surveys conducted on the lake in 2007 and 2011 estimated the extent of curly leaf pondweed in the lake. Figure 8 compares the extent of curly leaf pondweed in **VENCK**

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previous surveys to the 2015 survey. A June 2007 survey conducted by the MN DNR found curly leaf pondweed limited to a few small stands totaling approximately 0.8 acres in the lake. A 2011 survey conducted by Wenck found that curly leaf pondweed was generally distributed across the lake in a similar extent to what was observed in 2015. The plant occurred slightly more frequently and in several new locations in 2015.

While curly leaf pondweed is distributed across nearly the entire lake and grows at a density that reaches nuisance levels in early summer, a high quality and diverse native plant community was also observed in Pleasant Lake in 2015. This demonstrates that the observed increase in curly leaf pondweed in the lake over the last ten years has not totally displaced native vegetation in the lake.



- Pleasant Lake has a diverse aquatic vegetation community as 21 different species of aquatic vegetation were observed during the 2015 surveys conducted on the lake.
- Submerged aquatic plants were found to depths of 19.5 feet but are especially abundant in areas of the lake shallower than 15 feet (littoral area). The littoral area of Pleasant Lake is well vegetated as nearly 100% of sample points in the littoral area of the lake had at least one species of submergent vegetation during both surveys in 2011.
- The nearshore areas of the lake shallower than 6 feet are dominated by dense stands of native vegetation dominated by native species in many locations.
- Curly leaf pondweed is abundant in the lake and was found at approximately 65% of sampled sites during the June 2015 survey. Based on past surveys of the lake, curly leaf pondweed appears to have expanded significantly since the 2007 survey, but only moderately since the 2011 survey.
- Eurasian water milfoil, a common exotic species that has become a nuisance on other area lakes, was not found in Pleasant Lake during the 2015 surveys.



Figures





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