Pleasant Lake Aquatic Vegetation Survey

City of Annandale

Wright County, MN

Prepared For: **Pleasant Lake Association**

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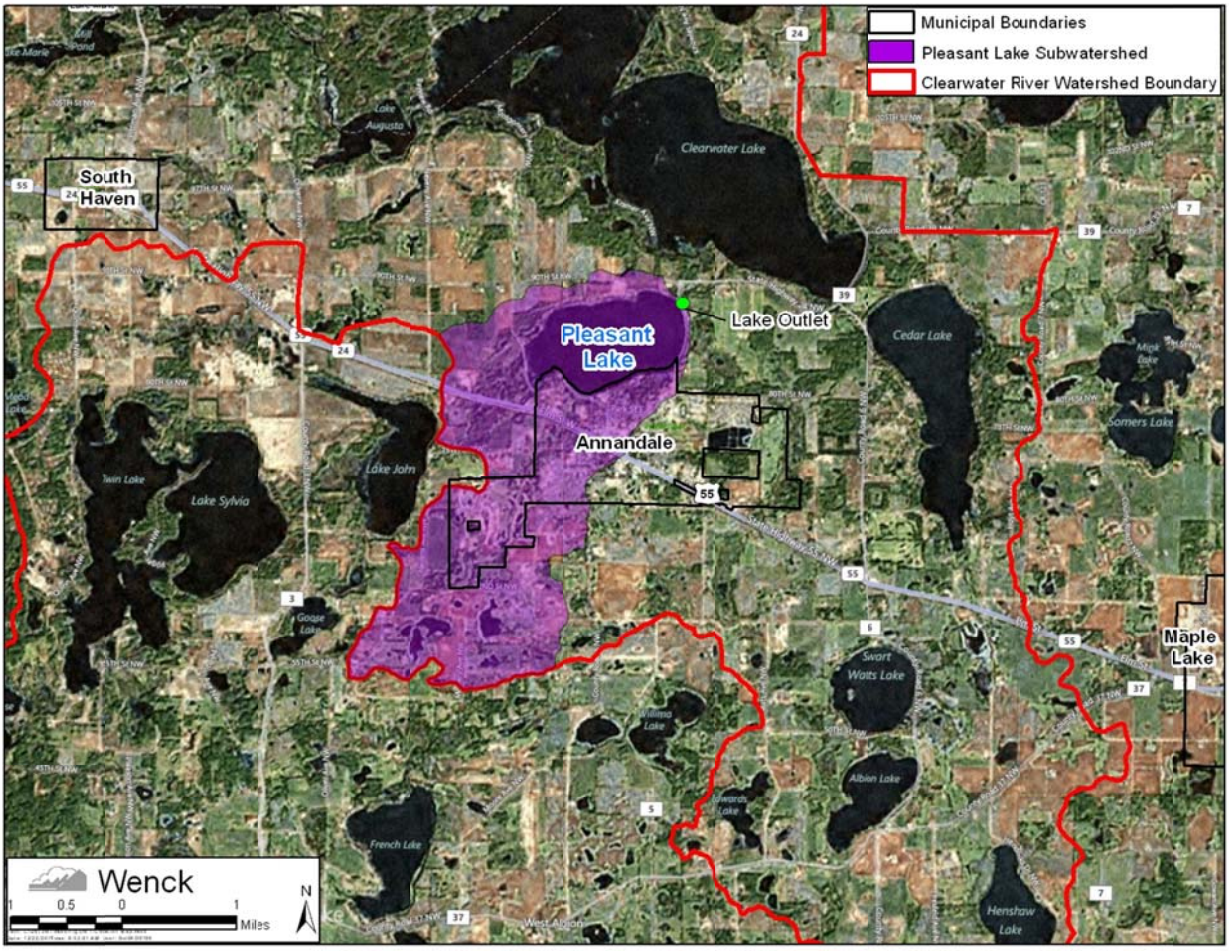
Introduction

Wenck Associates, Inc. was contracted by the Pleasant Lake Association to conduct survey of the aquatic vegetation in Pleasant Lake in 2011.

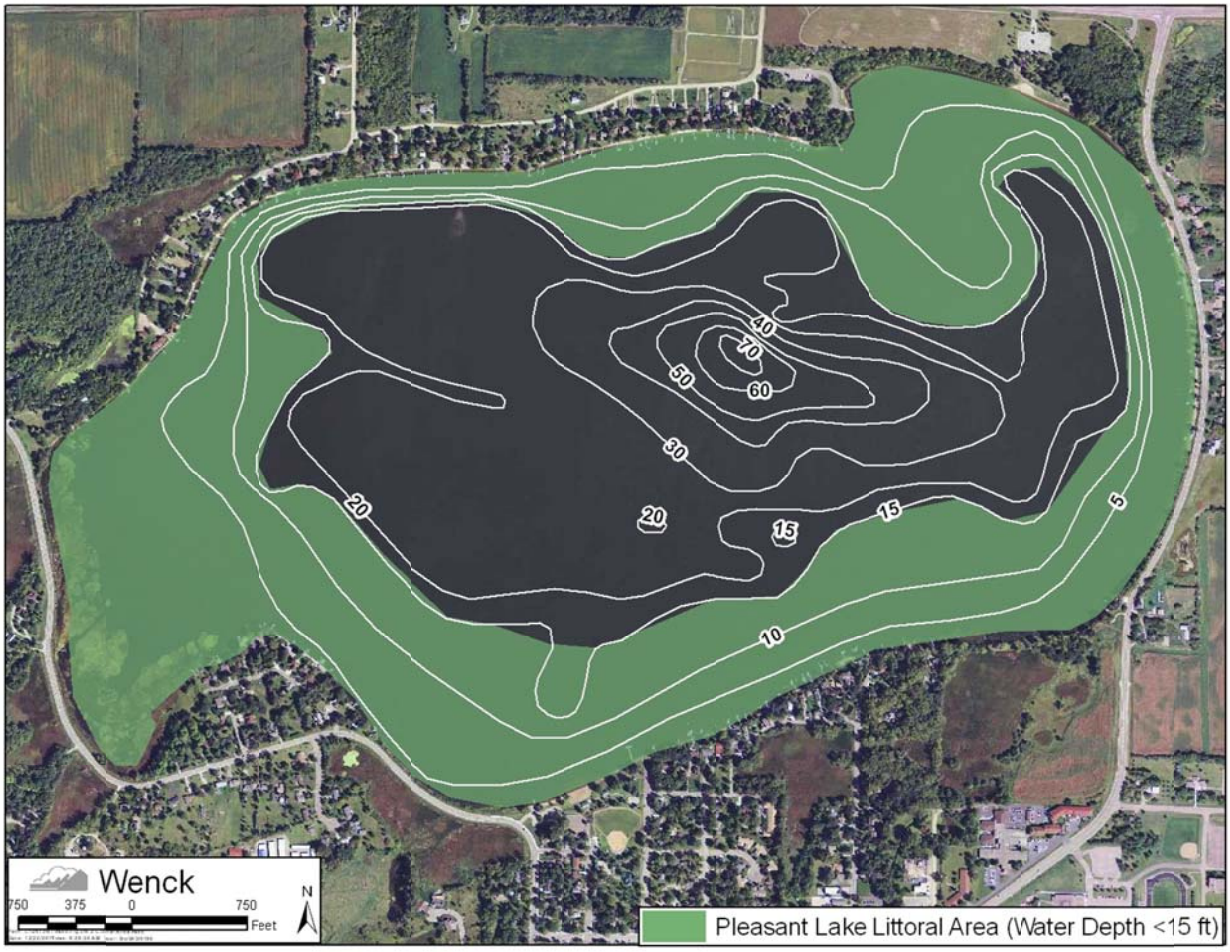
Pleasant Lake is located in the City of Annandale in Wright County (See Figure 1). The lake is in the Clearwater River Watershed District and flows to Clearwater Lake through an outlet channel in the northeast corner of the lake.

Figure 1: Pleasant Lake Location



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 2: Pleasant Lake Littoral Area and Depth Contours



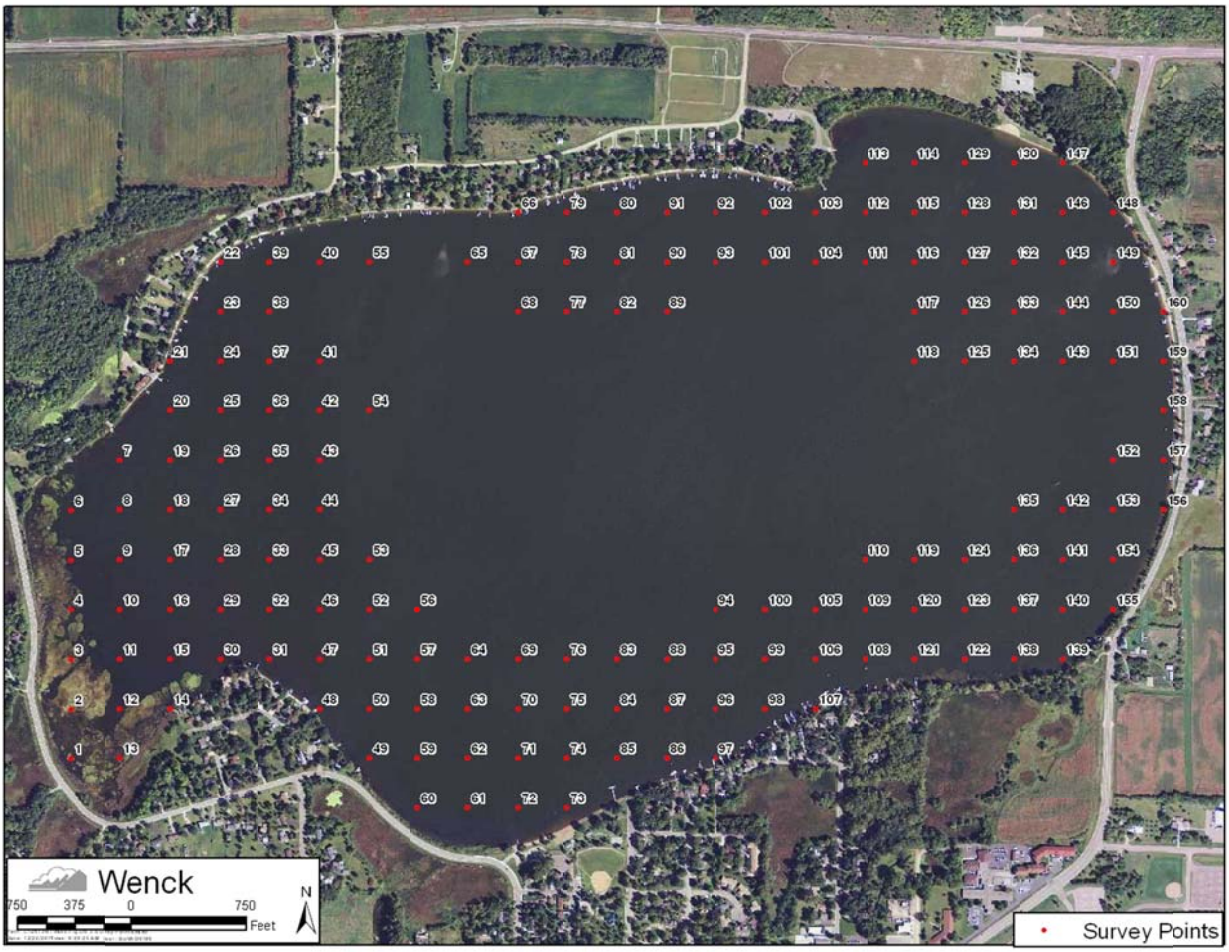
Aquatic Vegetation Survey Methods

A point-intercept survey following the methodology used by the MN DNR was conducted on June 24, 2011 and in late summer on August 17, 2011. 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 130 meter grid using GIS software (See Figure 3). A total of 160 points were sampled for vegetation during each survey date on the lake.

The surveyed grid was then downloaded onto a 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.

Figure 3: Survey Points



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 (See Figure 4). All vegetation species observed were identified to the species level where possible.

Figure 4:Sampling Device

Water clarity was also measured during each survey by measuring the depth at which a Secchi disk was visible when lowered into the water.

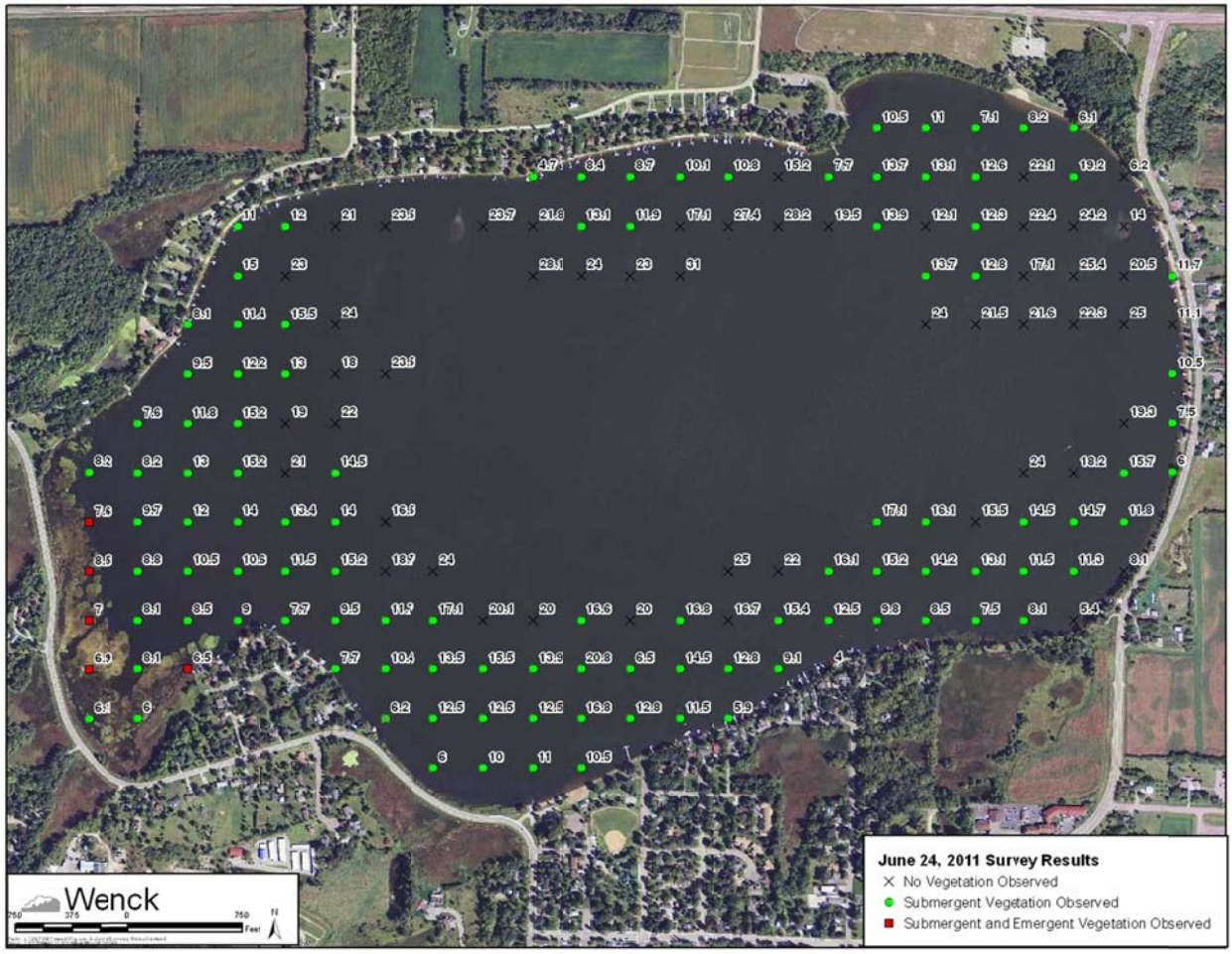
Survey Results

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 submergent and emergent aquatic vegetation and curly leaf pondweed in the lake.

Number of Species Recorded and Frequency of Occurrence

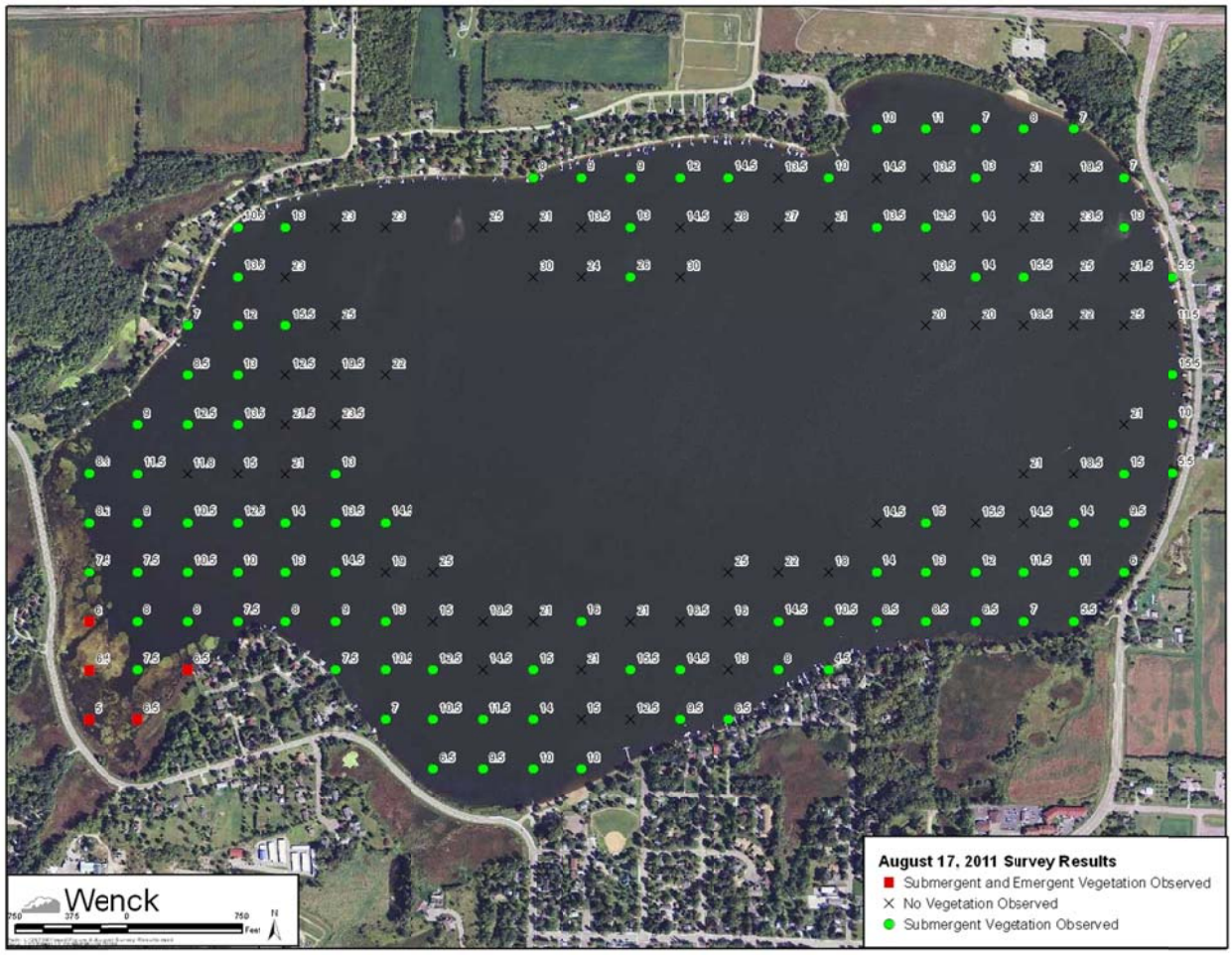
Vegetation was found at 108 of 160 (68%) sampling sites during the June 24, 2011 survey (See Figure 5). In the littoral area of the lake less than 15 feet deep, vegetation was found at 92 of 99 (93%) sites. Nineteen species of aquatic vegetation were documented at sample stations during this survey. An additional 4 species were observed outside of the sampling sites. The maximum depth at which vegetation was found during this survey was 19 feet. In general, vegetation occurrence and diversity decreased with depth, and most points shallower than 15 feet were vegetated. Water clarity was measured at 14 feet during the survey.

Figure 5: June 24, 2011 Survey Results



Vegetation was found at 98 of 160 (61%) sampling sites during the August 17, 2011 survey (See Figure 6). In the littoral area less than 15 feet deep, vegetation was found at 99 of 111 (89%) sites. Twenty species of aquatic vegetation were documented at sample stations during the August 17, 2011 survey. An additional 4 species were observed outside of the sampling sites. The maximum depth at which vegetation was found was 16 feet, with frequency of occurrence and diversity decreasing with depth. Water clarity was measured at 7 feet during this survey.

Figure 6: August 17, 2011 Survey Results



The frequency of occurrence of each species during each survey is summarized in Table 1. During both surveys, vegetation diversity was greatest in the western portion of the lake. While not specifically quantified, it was also noted during both surveys that vegetation density was greatest in the western portion of the lake. Submergent vegetation was very dense in the western bay of the lake (See Figure 7). Mats of floating leaved plants and emergent species were also noted along the shoreline in the western bay of the lake (See Figure 8).

Table 1: Frequency of Occurrence

Common Name	Scientific Name	Percent Occurrence	
		June 24, 2011	August 17, 2011
Coontail	*Ceratophyllum demersum*	19.4%	42.5%
Chara	*Chara sp*	13.1%	16.9%
Canada Waterweed	*Elodea canadensis*	4.4%	1.9%
Northern Milfoil	*Myriophyllum sibericum*	26.3%	20.6%
Bushy Pondweed	*Najas flexilis*	1.9%	5.0%
Spiny Naiad	*Najas marina*	1.3%	1.9%
Yellow Waterlily	*Nuphar variegata*	3.1%	3.1%
Large Leaf Pondweed	*Potamogeton amplifolius*	1.3%	1.9%
Curly Leaf Pondweed	*Potamogeton crispus*	44.4%	10.6%
Fries Pondweed	*Potamogeton friesii*	2.5%	1.3%
Illinois Pondweed	*Potamogeton illinoensis*	1.9%	3.8%
White Stem Pondweed	*Potamogeton praelongus*	3.8%	0.0%
Clasping Leaf Pondweed	*Potamogeton richardsonii*	3.8%	3.1%
Narrow Leaf Pondweeds	*Potamogeton sp.*	10.6%	5.6%
Flat Stem Pondweed	*Potamogeton zosteriformis*	18.1%	8.1%
Sago Pondweed	*S. pectinata*	0.6%	0.6%
Narrow Leaf Cattail	*Typha angustifolia*	0.6%	0.6%
Greater Bladderwort	*Utricularia vulgaris*	16.9%	20.6%
Wild Celery	*Vallisneria americana*	0.0%	3.8%
Water Stargrass	*Zosterella dubia*	4.4%	16.9%
Hardstem Bulrush	*Scirpus acutus*	P	P
Spikerush	*Eleocharis sp.*	P	P
Sedges	*Carex sp.*	P	P
Reed Canary Grass	*Phalaris arundinacea*	P	P

P=Present. Plant was observed outside of specific sampling sites.

Figure 7

Figure 8

The most common species observed in the lake in the June 2011 survey were curly leaf pondweed (44%), northern milfoil (26%), coontail (19%), flat stem pondweed (18.1), and greater bladderwort (17%).

The most common species observed in the August 2011 survey differed slightly from the June 2011 survey. Coontail (43%) 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 northern milfoil (21%), greater bladderwort (21%), chara (17%), and water stargrass (17%). As expected, curly leaf pondweed was much less abundant and was found at only 11% of the survey locations.

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 2011.

Curly leaf Pondweed Distribution

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.

A previous vegetation survey conducted by the MN DNR in June 2007 found curly leaf pondweed in a few small stands totaling approximately 0.8 acres in the lake (See Figure 10).

During the June 24, 2011 survey, curly leaf pondweed appears to have increased since 2007, as it was found at 71 of 160 sampling stations across the lake, and was found growing to a depth of 17 feet (See Figure 11). The species was most abundant in the western and southern portion of the lake, but was found scattered across nearly the entire littoral area of the lake. While density was not quantified, it was noted that curly leaf pondweed was most prevalent in the western portion of the lake in depths of 8-12 feet where it was found growing to the surface in dense mats, as shown in Figure 9.

During the August survey, curly leaf pondweed was much less abundant, as expected due to the plant's life cycle. 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.

Figure 9: Dense Curly Leaf Pondweed Growing to the Surface

Figure 10: 2007 Curly Leaf Pondweed Occurrence (from MN DNR Survey)

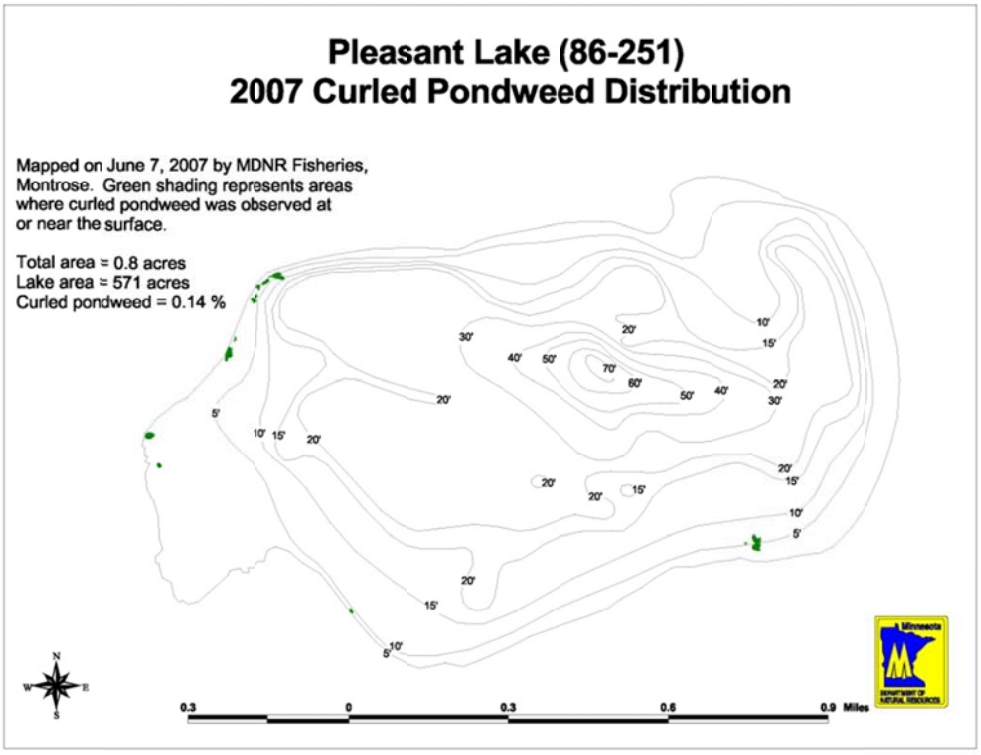
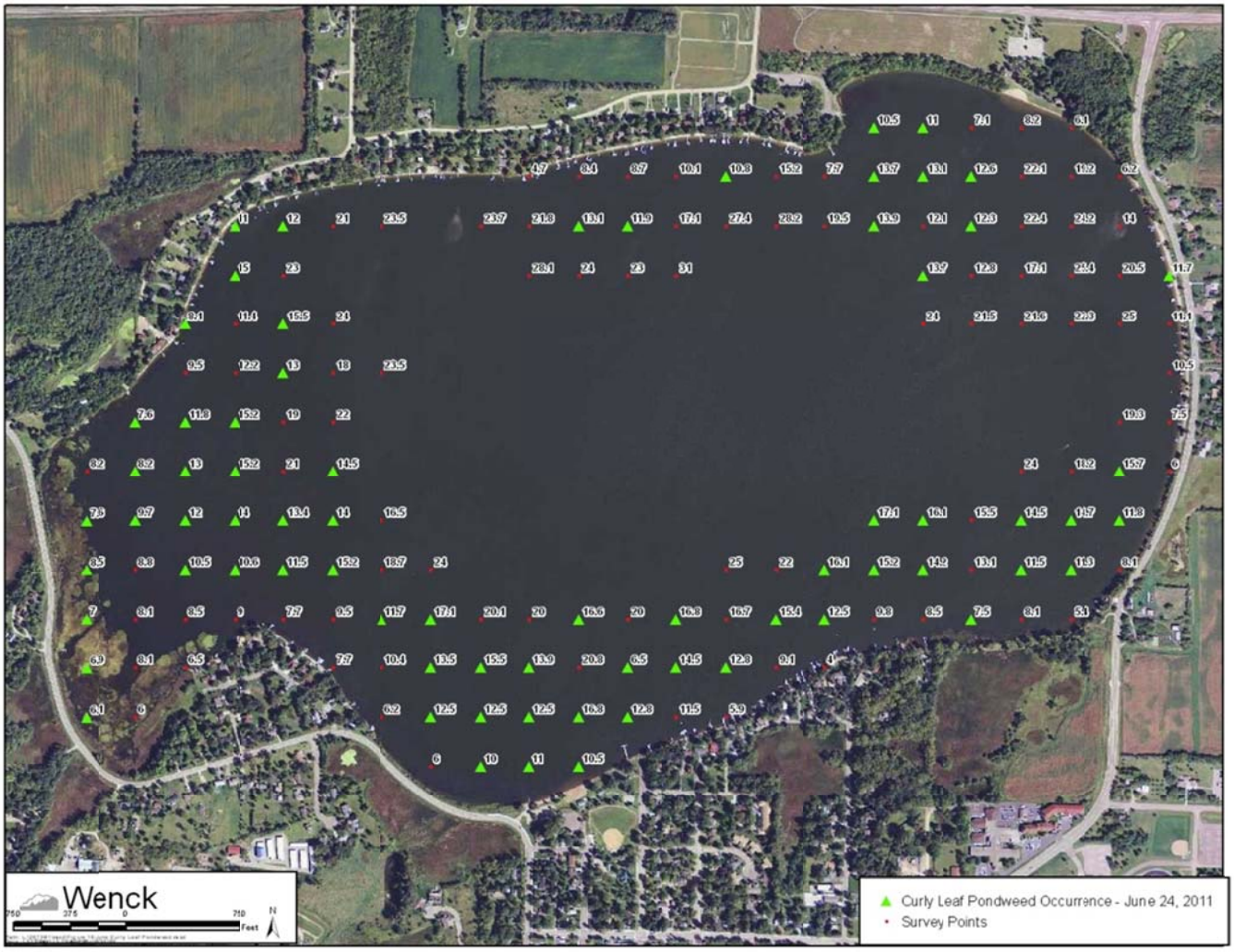


Figure 11: Distribution of Curly Leaf Pondweed During June 24, 2011 Survey



Conclusions

- Pleasant Lake has a fairly diverse aquatic vegetation community as 24 different species of aquatic vegetation were observed during the 2011 surveys conducted on the lake.

- Submerged aquatic plants were found to depths of 19 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 approximately 90% of sample points in the littoral area of the lake had at least one species of submergent vegetation during both surveys in 2011.

- Curly leaf pondweed is abundant in the lake and was found at nearly half of sampled sites during the June 24, 2011 survey. Also, based on past surveys of the lake, curly leaf pondweed appears to be expanding in the lake.

- Eurasian water milfoil, a common exotic species that has become a nuisance on other area lakes, was not found in Pleasant Lake during the 2011 surveys.