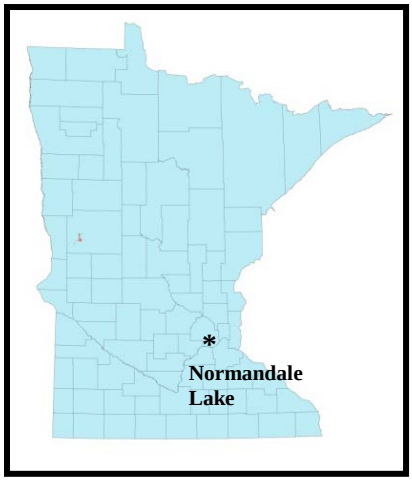
Curly-leaf pondweed (*Potamogeton crispus*) Fall Turion Survey Normandale Lake – DOW: 27104501 Hennepin County, Minnesota

2019 Fall CLP Turion Density

Normandale Lake 11-2-19

Project Initiated by:

Barr Engineering Co. and the Nine-Mile Creek Watershed District



Typical “stick” CLP turion (Berg 2019)

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St. Croix Falls, Wisconsin
November 2, 2019

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CLP LIFE HISTORY AND STUDY OBJECTIVES:

Although Curly-leaf pondweed occasionally reproduces by seed, the vast majority of plants resprout from stiff overwintering buds called turions that are normally produced in number by the plants prior to their late June/early July senescence (Figure 1). After the pinecone-like turions germinate in late fall or early winter, plants continue to grow slowly under the ice. Following ice out, growth accelerates, and plants rapidly canopy allowing them a competitive advantage over slower growing native species (Capers et al. 2005).

Figure 1: Germinating CLP Turion

Research suggests approximately 50% of turions germinate in a growing season while the rest remain dormant until the following growing season when another 50% will germinate (Johnson et al. 2012). Depending on the level of turions at a given location and knowing that latent turions may be able to survive for over 5 years in the sediment, it may take several years of control to exhaust the "turion bank" (R. Newman – U of M unpublished data).

Following the 2019 summer growing season, we conducted a fall turion survey. The goals of the survey were to determine the level of CLP turions within the lake's substrate following the 2018/2019 fall drawdown that resulted in the freezing of much of the lake's substrate. This report is the summary analysis of that survey conducted on November 2, 2019.

METHODS:

Fall Ponar Dredge Turion Survey:

Using the pre-established 125 point survey grid for the lake, we randomly selected 50 points to sample for Curly-leaf pondweed turions (Figure 2) (Appendix I). During the survey, we located each point with a handheld mapping GPS unit (Garmin 76CSx) and used a Petite Ponar dredge with a 0.0232m^2 (36in^2) sample area to take a bottom sediment grab from **each side of the boat at each location**. These samples were then rinsed in a fine sieve to separate out the soft silt sediments (Figure 3). Samples were bagged for later analysis in the lab where we discarded all rotten turions, tallied all live turions, and multiplied the combined total of live turions from the **two** samples by 21.53 to estimate turions/m^2 at each location. This value gives an idea of how many CLP plants will germinate in an area during the 2020 growing season.

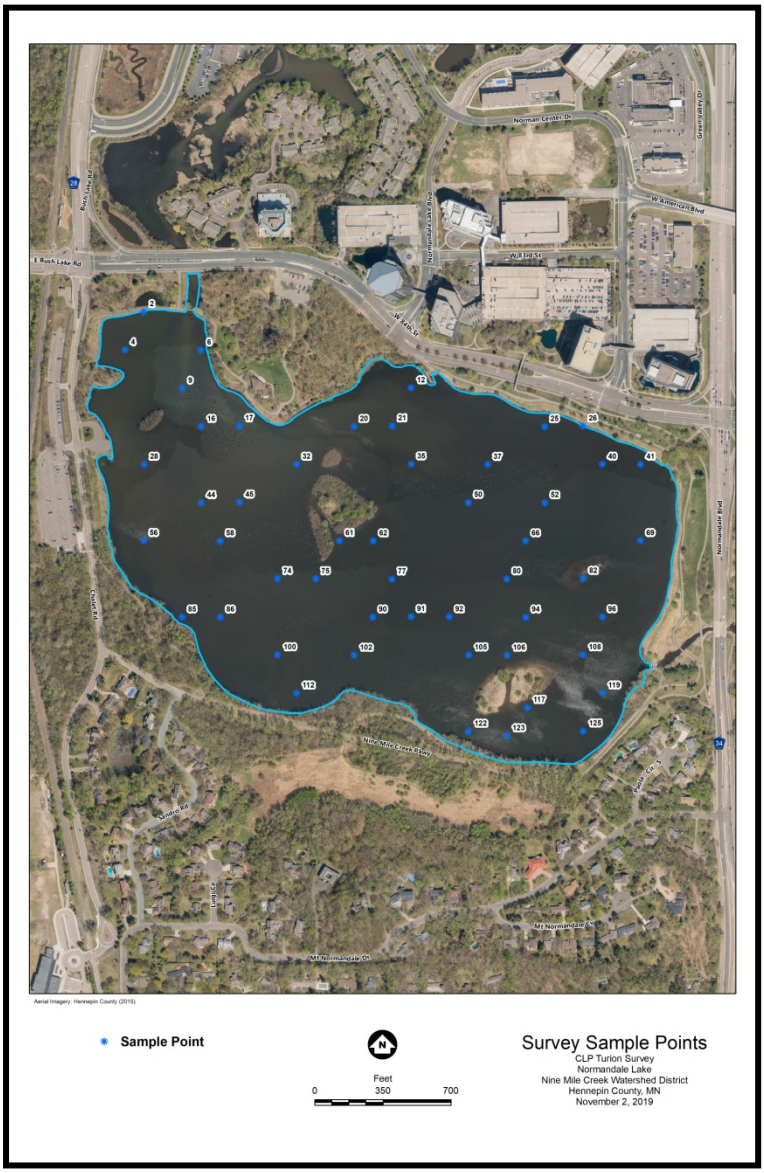


Figure 2: Turion Survey Sample Points

Figure 3: Ponar Grab and Turion Sieving

DATA ANALYSIS:

We entered all data collected into an Excel spreadsheet and used standard formulas in the data analysis tool pack to calculate the following:

Total number of points sampled: This value is the total number of points on the lake within each study area. We took **two** Ponar samples at each point.

Total number of points with live turions: This number includes all survey sites that had at least one turion in **either** of the Ponar samples taken at the site.

Frequency of occurrence: The frequency of turions is generally reported as a percentage of occurrences at all sample points. The value is used to extrapolate coverage within the study area. For example, if 20% of all sample sites have turions, it suggests that 20% of the study area will have at least some Curly-leaf pondweed coverage the following year.

Total number of live turions: This value includes all live turions found at **all** sites within a study area.

Points at or above nuisance level: This value gives the number of survey sites within the study area that were above the predicted nuisance threshold (Figure 4). Research suggests that when the turion density is at or above 200/m^2, the following year's CLP growth has the potential to at least moderately impair navigation (Johnson et al. 2012).

Figure 4: Predicted Navigation Impairment Based on Turion Density

Percent nuisance level: The percentage of nuisance points divided by the total number of survey points can be extrapolated to determine what percent of the study area has the potential to have at least moderate navigation impairment during the next growing season.

Mean turions/m^2: This value is the average number of turions/m^2 when pooling the data from all survey sites regardless of whether or not they had turions present.

Standard deviation of turions/m^2: This value tells us how far apart the data is from the mean. A low standard deviation suggests most points have a turion density that was similar to the mean, while a high value suggests there was greater variability in turion density within the sample area (Table 1).

RESULTS AND DISCUSSION:

We found Curly-leaf pondweed turions at only 19 of 50 survey points (38.0% coverage) (Table 1), and, collectively, there were just 36 live turions present in the samples. Interestingly, we noticed that every viable turion found was the small "stick" variety that we usually find on small parent plants (see front cover). The only large turions (dime-sized or greater) were rotten and disintegrating. This may mean they were killed by the drawdown.

Four of the survey points topped an estimated 50 turions/m^2 meaning they have at least some potential for navigation impairment (8.0% coverage/21.1% of points with turions). However, none of these points exceeded the expected "nuisance level" of 200/m^2 (Figure 5) (Appendix II).

The standard deviation of 26.8 turions/m^2 was more than 50% greater than the overall mean density of 15.5 turions/m^2. This suggests there will be significant variability throughout the study area in the 2020 growing season. Visual analysis of the map suggests the worst areas will be along the northeast shoreline and in the outwash area north and south of the creek channel west and south of the central islands.

Table 1: CLP Turion Survey - Summary Statistics Normandale Lake – Hennepin County, Minnesota November 2, 2019

Summary Statistics:

Total number of points sampled	50
Total # of points with live turions	19
Frequency of occurrence (in percent)	38.0
Total live turions	36
Number of points at or above potential impairment (+50/m^2)	4
% potential impairment	8.0
Number of points at or above predicted nuisance level (+200/m^2)	0
% nuisance level	0.0
Maximum turions/m^2	108
Mean turions/m^2	15.5
Standard deviation/m^2	26.8

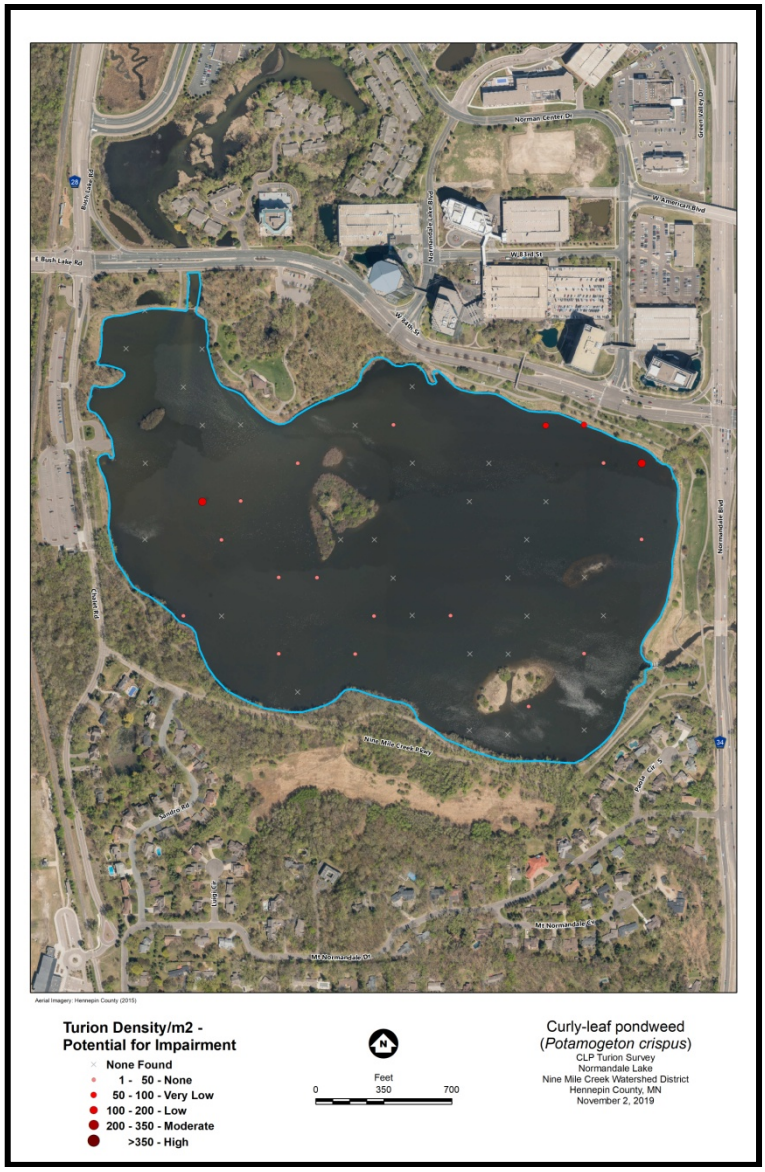


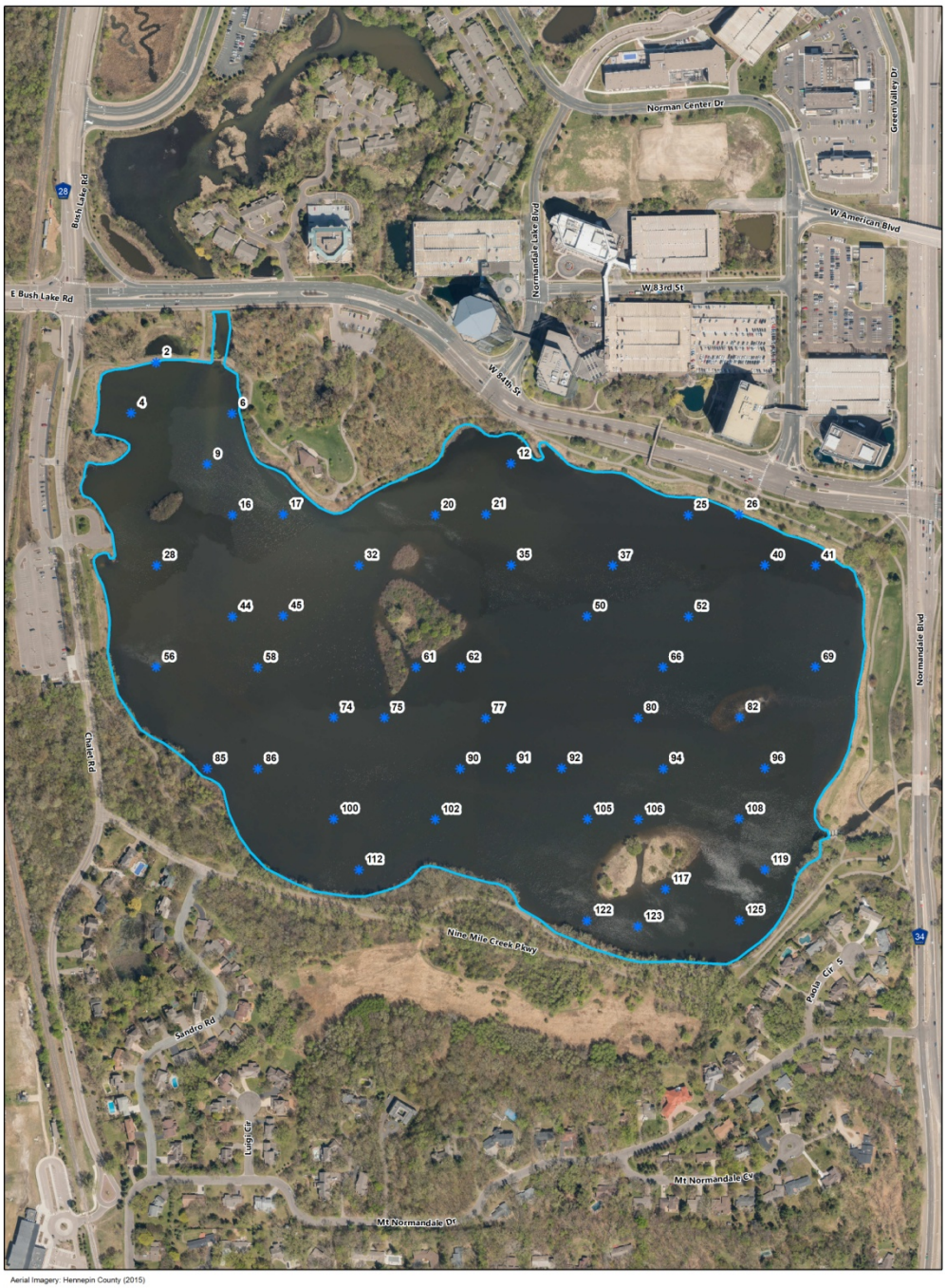
Figure 5: 2019 Fall CLP Turion Survey Density and Distribution

LITERATURE CITED

Capers, R.S., G.J. Bugbee, R. Selsky, and J.C. White. 2005. A guide to invasive aquatic plants of Connecticut. The Connecticut Agricultural Experiment Station. Bulletin 997, New Haven, Connecticut.

Johnson, J.A., A.R. Jones & R.M. Newman (2012): Evaluation of lakewide, early season herbicide treatments for controlling invasive curly-leaf pondweed (*Potamogeton crispus*) in Minnesota lakes, Lake and Reservoir Management, 28:4, 346-363

Appendix I: Turion Survey Sample Points


Norman Center Dr
Green Valley Dr
W American Blvd
Bush Lake Rd
Normandale Lake Blvd
E Bush Lake Rd
W 83rd St
W 84th St
Normandale Blvd
Chalet Rd
Nine Mile Creek Pkwy
Paola Cir S
Sandro Rd
Luigi Cir
Mt Normandale Ct
Mt Normandale Dr
Aerial Imagery: Hennepin County (2015)
Sample Point
Feet
0
350
700
Survey Sample Points
CLP Turion Survey
Normandale Lake
Nine Mile Creek Watershed District
Hennepin County, MN
November 2, 2019

Appendix II: 2019 Fall CLP Turion Density and Distribution

Aerial Imagery: Hennepin County (2015)

Turion Density/m2 - Potential for Impairment

- None Found
- 1 - 50 - None
- 50 - 100 - Very Low
- 100 - 200 - Low
- 200 - 350 - Moderate
- >350 - High

Feet
0 350 700

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(*Potamogeton crispus*)
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