

Assessment of Native Transplantings in Crooked Lake: 2017 Anoka County, MN (#02-0084)



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Background & Methodology

Management of Eurasian Watermilfoil in Crooked Lake

Crooked Lake has a long history of battling widespread growth of invasive Eurasian watermilfoil (EWM, *Myriophyllum spicatum*). In recent years, EWM has dominated the littoral area of the lake, and has impaired lake access and recreation for lake users. Over the past 20 years, the lake has tried using several different herbicides (fluridone, 2,4-D, and triclopyr) at different scales (lake-wide and smaller spot treatments) to reduce the abundance of EWM in the lake. Past lake-wide use of fluridone (in 1992) resulted in undesirable reductions of all plants in the lake, and did not provide lasting control of EWM. Since that time, the lake has used spot-treatments with 2,4-D or triclopyr to control dense patches of EWM. Although this spot-treatment approach resulted in localized control of EWM within each year of treatment, these treatments did not provide long-term control in treated locations, and surveys showed that the overall level of infestation was not being reduced.

Granular Fluridone Treatment

In early 2016, the Crooked Lake Area Association met with staff from the Minnesota DNR, Freshwater Scientific Services, Coon Creek Watershed District, and city representatives from Coon Rapids and Andover to discuss the ongoing management of EWM in the lake. At this meeting, Keegan Lund (MNDNR) indicated that the DNR would support an experimental lake-wide treatment to control EWM in Crooked Lake, but would require additional plant monitoring and subsequent transplantings of native plants in the year following treatment to ensure that the native plant community was not reduced by the fluridone treatment.

In the spring of 2016, PLM Lake & Land Management (herbicide applicator) worked with SePRO (herbicide manufacturer) to plan an experimental lake-wide treatment of Crooked Lake using a granular fluridone product (SonarOne). The herbicide fluridone requires a long contact time (weeks to months) at a low concentration (2-4 ppb) to provide selective control of EWM. In the past, this requirement for a long contact time has meant that the herbicide would mix throughout the lake, exposing all of the plants, both invasive and native, to the same herbicide concentration. The planned 2016 experimental lake-wide treatment in Crooked differed from these past treatments in that granular fluridone would only applied to delineated beds of EWM, but the total amount of herbicide applied would be limited to the amount needed to achieve a lake-wide concentration of only 4 ppb. This approach was intended to provide enhanced control of EWM by exposing EWM beds to a higher concentration of fluridone while minimizing the exposure of native plants in the lake.

PLM Lake & Land Management applied SonarOne herbicide (granular fluridone product) on May 17, 2016 with a subsequent bump treatment on June 28, 2016 to maintain the target fluridone concentration of 2-4 ppb for the required exposure time. Water samples collected over the course of the summer showed that the concentration generally remained between 1 and 3 ppb (see table below; DAT=days after treatment).

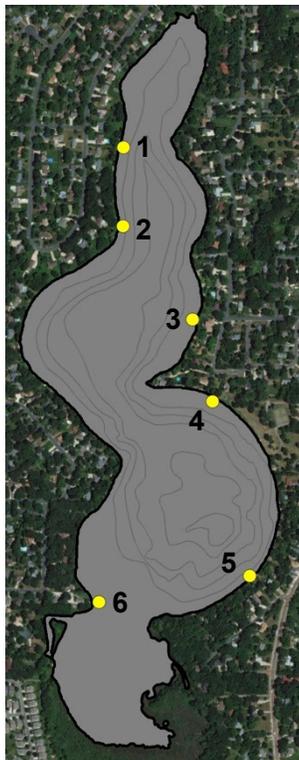
| | TREATED 4ppb | DAT | | | | BUMP +1 ppb | DAT | | | | |
|-------------------|--------------|------------|------------|------------|------------|-------------|------------|------------|------------|------------|------------|
| | | 7 | 14 | 21 | 35 | | 48 | 69 | 83 | 111 | 139 |
| A (North) | | 2.7 | 0.5 | 1.9 | 1.1 | | 2.2 | 2.4 | 2.2 | 1.2 | 1.6 |
| B (West) | | 1.2 | 0.5 | 1.2 | 1.4 | | | | | | |
| C (Deep Hole) | | 1.3 | 0.5 | 1.2 | 1.2 | | 1.9 | 1.5 | 1.6 | 1.5 | 2.0 |
| D (South Bay) | | 0.5 | 1.0 | 2.0 | 1.4 | | | | 3.2 | | |
| Mean (ppb) | | 1.4 | 0.6 | 1.6 | 1.3 | | 2.1 | 2.0 | 2.3 | 1.4 | 1.8 |
| Std Error | | ±0.46 | ±0.13 | ±0.22 | ±0.07 | | ±0.15 | ±0.45 | ±0.47 | ±0.15 | ±0.2 |

Post-treatment plant surveys conducted in the late-summer of 2016 found that EWM in the lake was severely damaged by the fluridone treatment (defoliated stems and loss of buoyancy), while many of the native pondweeds and lilies showed little or no signs of herbicide damage (yellowing or loss of photopigments). Subsequent plant surveys conducted in 2017 found that EWM %occurrence had decreased from 60% in Aug 2016 to 1% in Aug 2017, with only a few areas of light, sporadic EWM growth isolated to the far southern bay in 2017 (see 2017 Crooked Lake aquatic vegetation report).

Native Transplantings

On June 29, 2017, staff from the MNDNR, Freshwater Scientific Services, and Coon Creek Watershed District collected 5 species of native aquatic plants (see table below) from Norris Lake in Anoka County (selected for its diverse plant community and lack of invasive species). Plants were collected by wading in shallower areas or by divers in deeper areas. Each collected plant was carefully dug up from the lake sediment to keep the roots intact, rinsed in the lake water to remove attached sediment and debris, and then placed into a cooler containing a few inches of water for transport to Crooked Lake immediately following collection.

Prior to planting the collected specimens in Crooked Lake, we installed wire-mesh enclosures (4ft x 4ft) at 6 nearshore locations. Each enclosure consisted of vinyl-coated wire mesh fencing attached to metal fenceposts at each corner of the plot (see photo and map below). To help anchor the transplantings into each plot, we “pre-planted” 5 specimens of each collected species into a 3ft x 3ft piece of light burlap cloth. We then gently rolled up the cloth along with the installed plants, and placed the roll into a cooler with a few inches of water. At each fenced plot, we unrolled one of these burlap squares, placed it inside the enclosure, and then placed a few bricks on the corners and middle to keep it in contact with the sediment.



Map showing the location of each transplanted plot (left), and photos showing the method for pre-installing transplanted specimens into burlap cloth, and then into each fenced plot.



Results

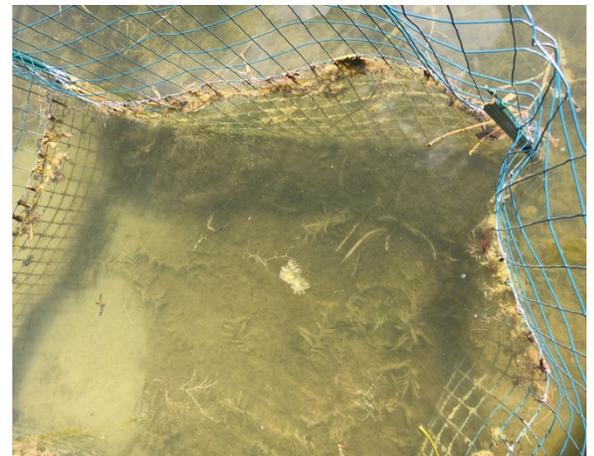
Plant Survival & Spread in Plots

The transplanted plants were allowed to grow through the summer and then assessed in late August to determine survival and growth of the transplanted specimens. The table and photos below show that although not all of the transplantings survived the summer, several of the plant species consistently showed signs of survival, growth, and spreading within the plots. This suggests that these plant species will be able to colonize additional areas outside of the transplanted plots. Future aquatic plant surveys will document whether these plants continue to spread throughout the lake in the coming years.

The table below shows the proportion of planted specimens that survived through the summer; values <1.0 indicate that not all of the planted specimens of that species survived, and values >1.0 indicate species that spread within the plot via runners or fragments (more specimens of that species found than originally planted). Overall, wild celery, fern-leaf pondweed, and clasping-leaf pondweed fared the best in the plots. Furthermore, plots 3, 4, and 6 appeared to provide the best conditions for plant survival.

| | PLOT 1 | PLOT 2 | PLOT 3 | PLOT 4 | PLOT 5 | PLOT 6 | MEAN |
|------------------------|------------|------------|------------|------------|------------|------------|------|
| Wild Celery | 0.2 | 0.4 | 1.2 | 0.8 | 0.6 | 0.8 | 0.7 |
| Fern-leaf Pondweed | 0.8 | 0.6 | 0.6 | 1.6 | 0.6 | 1.2 | 0.9 |
| Clasping-leaf Pondweed | 0.6 | 0 | 1.2 | 0.4 | 0.6 | 1.2 | 0.7 |
| Flat-stem Pondweed | na | 0 | 0.2 | na | 0 | 1.0 | 0.3 |
| Water Stargrass | 0.4 | 0 | 1.2 | 0.4 | 0 | 0 | 0.3 |
| Plot Mean | 0.5 | 0.2 | 0.9 | 0.8 | 0.4 | 0.8 | |

Successful transplantings in Plots 3 (left) and 4; photo taken at end of summer



Acknowledgments

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