

Herbicide Treatment Analysis

Targeting *Myriophyllum spicatum* **(Eurasian watermilfoil)**

North Twin Lake
Polk County, Wisconsin
August, 2019

Analysis conducted by Ecological Integrity Service, LLC
Amery, Wisconsin

Abstract

On June 26, 2019 the herbicide ProcellaCOR (Florpyrauxifen-benzyl) was utilized to reduce *Myriophyllum spicatum* (EWM) in one bed totaling 0.56 acres. The frequency of occurrence (FOO) had a significant reduction ($p < 0.0001$ from chi square analysis) with a FOO of 100% within the treatment bed before treatment to 0% after treatment. There was no significant reduction in native species following treatment with the herbicide. A meander and point intercept survey of the entire lake found individual plants or very small clumps of EWM in six locations, all in fairly close proximity of the treatment bed.

Introduction

On June 26, 2019 herbicide was applied to target the aquatic invasive species Eurasian water milfoil (EWM)- *Myriophyllum spicatum* on North Twin Lake, Polk County, Wisconsin. The treatment was conducted when the water temperature was 71°F with calm winds. The herbicide ProcellaCOR® (Florpyrauxifen-benzyl) was utilized. This treatment covered an area of 0.56 acres with a mean depth of 3.6 ft. This small area was targeted because it was the first year of discovery of an EWM bed in North Twin Lake. Figure 2 is a map showing the location of the treatment bed.

This analysis is to determine the effectiveness of the herbicide treatment targeting EWM on North Twin Lake, both with the herbicide. The analysis involves surveys conducted in Sept. 2018, May and August 2019 for the herbicide analysis.

Analysis Methods

In Sept., 2018 an AIS survey was conducted resulting in the discovery of an EWM bed in North Twin Lake (the adjoining Pike Lake has had EWM for several years and likely spread to North Twin Lake via boat traffic). This survey led to the delineation of the EWM bed for potential treatment. The delineated area was then checked in May 2019 to verify EWM coverage and potentially adjust the treatment bed. Treatment then occurred after this survey was completed.

Following treatment, a survey was conducted (post treatment) to evaluate the frequency and density of the EWM after treatment. The post treatment survey was conducted on August 16 , 2019 and involved using the same sampling points at predetermined sample locations within the treatment polygon in the pretreatment survey. A one-meter rake tow was used at each sample point with each species (including EWM) on the rake identified and given a density rating of 1, 2 or 3. The diagram below shows the density standards. The frequency of occurrence is determined within each treatment bed. The frequency of occurrence (FOO) is the % of the sample points that had any particular plant sampled.

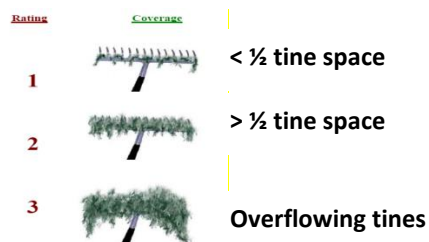


Figure 1: Density rating graphic.

After the surveys were completed, a chi-square analysis was conducted on the EWM frequency changes as well as the native plant species frequency changes. This allows for the determination of whether the herbicide treatment possibly reduced the frequency of EWM and whether the native plant species were adversely affected by the herbicide. Typically, the pretreatment survey reference is in late summer/fall the year prior to treatment. Table 1 summarizes the bed characteristics, treatment and conditions during treatment.

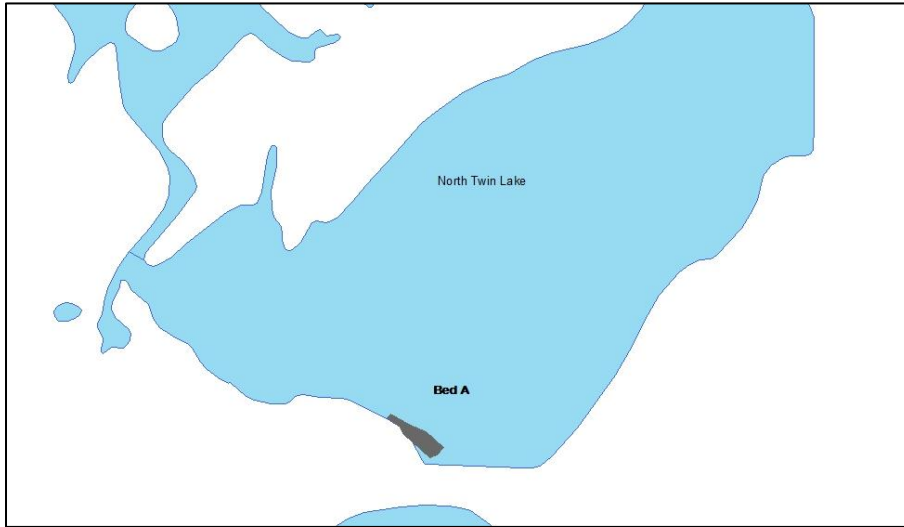


Figure 2: Map of treatment bed on North Twin Lake, 2019.

Bed	Area (Acres)	Mean depth	Water volume in bed	Ounces of herbicide applied (conc. In ppm)	Water Temp	Wind speed
A	9.5	3.6 ft	2.13 acre-ft	33.7(0.0096)	71	Calm

Table 1: EWM treatment bed information provided by herbicide applicator

Results

A post treatment survey conducted on August 16, 2019 showed a significant reduction in EWM frequency of occurrence (FOO). The EWM bed had a FOO reduction from 100.0% to 0.0%. There was no EWM sampled or viewed within the two treatment beds after treatment. The treatment was very effective with FOO reduction being significant based upon the chi-square analysis ($p < 0.0001$).

Bed	EWM FOO Before Treat	EWM FOO After Treat	Significant reduction?
Bed A	100%	0%	Yes ($p < 0.0001$)

Table 2: Frequency of occurrence change before and after treatment and statistical significance data.

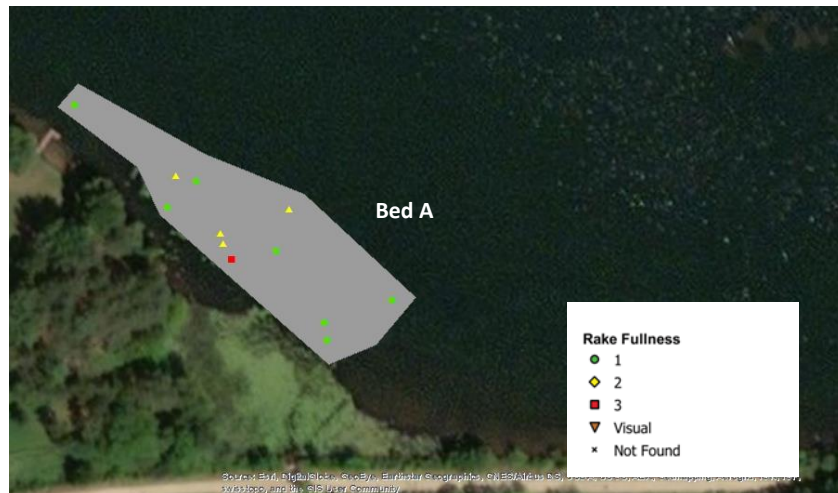


Figure 3: Map of EWM density before herbicide application.

Bed	Mean Density Prior to Treatment	Mean Density After Treatment
1	1.5	0.0

Table 3: Comparison of mean EWM density before and after treatment.

The density data shows an extensive reduction in mean density, decreasing from mean of 1.5 (scale of 0-3) before treatment to a mean of 0.0 after treatment. Figure 3 shows EWM density before treatment and figure 4 shows EMW density after treatment at sample points within the beds.

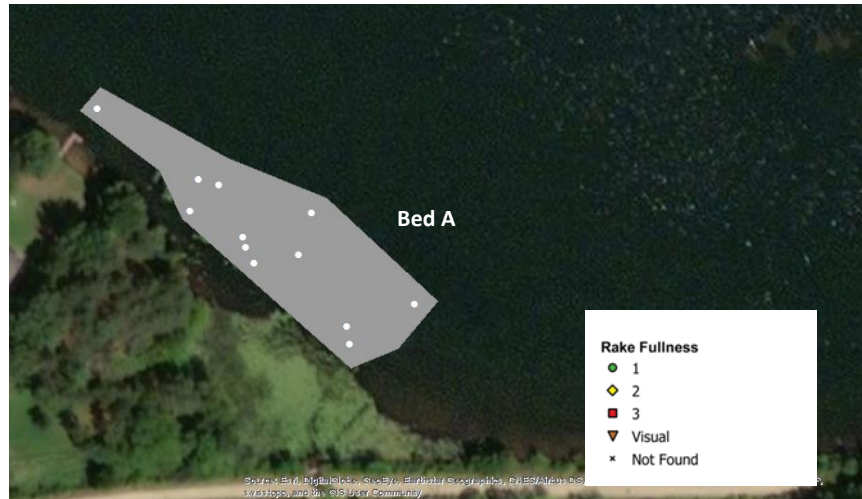


Figure 4: EWM density within treatment beds after treatment.

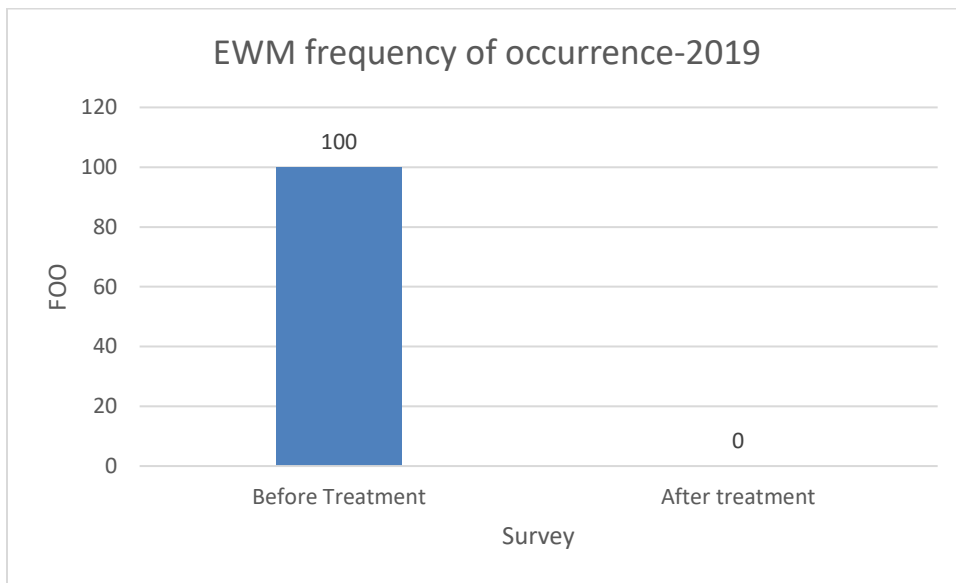


Figure 5: Graph showing frequency of occurrence (FOO) before and after treatment in each bed and both beds combined.

The effect of herbicide on native species was also evaluated using the FOO of each native species before and after treatment in a chi-square analysis. The desire is for no statistically significant reduction in FOO for any native species.

The native species evaluation shows no statistically significant reduction in any native species. This is the desired outcome; reduction in target AIS and no adverse effects on the native species.

Native Species	Pre-treatment FOO	Post treatment FOO	Change	Significant Increase/Reduction in species?
<i>Myriophyllum sibiricum</i>	41.7%	33.3%	-	No
<i>Potamogeton pusillus</i>	33.3%	33.3%	n/c	n/c
<i>Potamogeton richardsonii</i>	16.7%	16.7%	n/c	n/a
<i>Vallisneria americana</i>	41.7%	50.0%	+	No
<i>Potamogeton zosteriformis</i>	8.3%	16.7%	+	No
<i>Potamogeton amplifolius</i>	8.3%	8.3%	n/c	n/c
<i>Elodea canadensis</i>	58.3%	50.0%	-	No
<i>Potamogeton robbinsii</i>	100.0%	100.0%	n/c	n/c

Table 4: FOO of each native species sampled before and after treatment with statistical significance.

Discussion

The 2019 herbicide treatment was successful on the EWM bed in North Twin Lake. There was no EWM sampled or viewed within the treatment bed after treatment. The data shows no native species had a significant reduction. The short-term evaluation shows herbicide was effective, even on this small bed area. The bed will be re-evaluated in June/July 2020 to determine if the herbicide reduced the EWM long-term.

The rest of North Twin Lake was surveyed using a meander survey and a full-lake point intercept survey to determine if EWM existed anywhere else in the lake in August, 2019. The map below shows locations EWM was sampled or observed. These areas will be monitored in 2020 to determine if any areas result in bed formation. None of these areas were large enough or dense enough to be designated as a bed (a bed can be delineated due to EWM observed dense enough at the surface and large enough to navigate the border with a boat) in 2019.

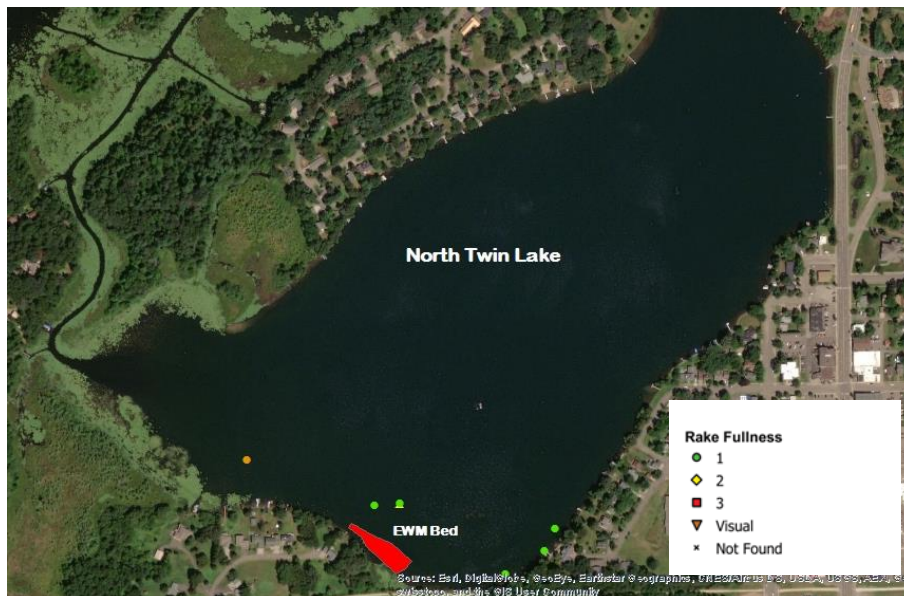


Figure 6: EWM locations from meander and point intercept surveys, August 2019.

References

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