

**2009 Progress Report of the
MiddFoil® Program in**

**Long Lake
Plainfield Township, MI**

Prepared for:

Plainfield Township

Prepared by:



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Introduction

This report summarized the MiddFoil[®] program, which the residents of Long Lake began in the summer 2009. The program was implemented starting with an initial survey of the lake, followed by stocking with the milfoil weevil, *Euhrychiopsis lecontei*, and a follow up survey eight weeks later. The surveys included qualitative and quantitative measurements of the Eurasian watermilfoil (EWM), native plants, along with weevil presence and damage. The table below outlines the program's schedule, site establishment, and number of weevils stocked thus far.

Year	Survey Dates	Sites Established	Number of weevils
2009	Initial: 6/11 Follow-up: 8/10	S1	11,000
2009	Initial: 6/18 Follow-up: 8/10	S2	11,000
2009	Initial: 6/11 Follow-up: 8/10	Mon A	0

2009 Results

Initial Surveys

On June 11, 2009, an EnviroScience field team conducted initial surveys of S1, S2 and M1, a monitoring site. S1 was established in the western portion of Long Lake, approximately 100 feet out from the southwest shoreline, in a bed of EWM 8 to 20 feet deep (Figure 1). S2 was located slightly southeast of S1 and just north of the narrows between the two fingers of the lake about 25 to 50 feet offshore, with a depth of 4 to 20 feet. Mon A was established in the eastern area of the lake just southwest of where two narrow peninsulas jut toward one another from opposite sides of the lake. The EWM bed was about 100 feet from shore

and 8 to 12 feet deep. All nearby shorelines were residential with many properties containing seawalls.

Qualitative and quantitative measurements were taken at each site. Qualitative information included visual analysis of the milfoil plants, examination of plants for the presence of weevils and weevil-induced damage, and native plant species in the areas. Quantitative measurements at each site included the density of EWM (stems/m²) and removal of plants along transect lines across the EWM beds. The stems were transported to the EnviroScience lab in Stow, Ohio to be examined under a microscope. The number of weevils and weevil-induced damage were recorded.

Stocking Site – S1 – Qualitative Assessment Results

The overall density of EWM at S1 was dense. Milfoil weevil eggs and adults were observed on the plants in the lake. Weevil-induced damage was seen on about 7% of the plants. In addition to the presence of damaged plants, the milfoil was covered in algae. The EWM was approximately 2 to 12” below the surface. EWM was the dominant aquatic plant and comprised about 75% of the plant community. The other 25% included the native plant species Northern watermilfoil (*Myriophyllum sibiricum*), Flat-stem pondweed (*Potamogeton zosteriformis*), Illinois pondweed (*Potamogeton illinoensis*), Large-leaf pondweed (*Potamogeton amplifolius*), Common waterweed (*Elodea canadensis*), Eel grass (*Vallisneria americana*), and the algae Chara (*Chara spp.*) and stonewort (*Nitella spp.*).

Following the initial survey on June 11, 11,000 milfoil weevils were stocked in S1.

Stocking Site – S2 – Qualitative Assessment Results

The overall density of EWM at S2 was dense. Weevil-induced damage was seen on about 1% of the plants. The EWM was generally healthy except for the small amount of damage. The EWM formed a continuous bed along the south shore with some open areas. EWM was the dominant aquatic plant and comprised about 85% of the plant community. The other 15% included the native plant species Northern watermilfoil (*Myriophyllum sibiricum*), Flat-stem pondweed (*Potamogeton zosteriformis*), Illinois pondweed (*Potamogeton illinoensis*), Large-leaf pondweed (*Potamogeton amplifolius*), Variable pondweed (*Potamogeton gramineus*), Crowfoot (*Ranunculus longirostris*), Common waterweed (*Elodea canadensis*), Eel grass (*Vallisneria americana*), Water marigold (*Bidens beckii*), and the algae Chara (*Chara spp.*) and stonewort (*Nitella spp.*).

The remaining 11,000 milfoil weevils were stocked in S2 the following week on June 18th.

Monitoring Site – Mon A – Qualitative Assessment Results

The overall density of the EWM at Mon A was moderate to dense and the EWM was healthy. Minimal weevil damage was observed in the lake. EWM was the dominant aquatic plant and comprised about 90% of the plant community. The other 10% included the native plant species Northern watermilfoil (*Myriophyllum sibiricum*), Flat-stem pondweed (*Potamogeton zosteriformis*), Variable pondweed (*Potamogeton gramineus*), Common waterweed (*Elodea canadensis*), and the alga Chara (*Chara spp.*).

S1, S2, and Mon A - Quantitative Measurement Results

For quantitative assessment of the weevil population, three transects of 10 EWM stems (30 stems) were removed from S1 and Mon A. Due to its large size six transects of 10 EWM stems (60 stems) were taken from S2. Weevil life stages present in the sites included eggs and larvae (Table 1).

Quantitative measurement for plant density was determined by collecting all plants within a 0.09 m² PVC quadrat at three random locations within each site. The samples were counted and converted to number of plants per square meter (Table 2). EWM density was lowest at S1, slightly higher at S2, and highest at Mon A. These data serve as a baseline for comparing changes in EWM density in future survey years.

Follow-up Survey

On August 10, 2009, EnviroScience field personnel returned to Long Lake to gather post-treatment qualitative and quantitative information utilizing the same methods as in the initial survey.

Stocking Site – S1 – Qualitative Assessment Results

The overall density of EWM in S1 was ranked as moderate. Milfoil weevil adults were observed on the plants in the lake. Weevil-induced damage was seen on 30% of the plants and the general condition of the EWM was healthy with some plants dying back. EWM was the dominant aquatic plant and comprised about 55% of the plant community. The other 45% included the same native plant species as found in the initial survey.

Stocking Site – S2 – Qualitative Assessment Results

The overall density of EWM at S2 was ranked as dense. Milfoil weevil adults were observed on the plants in the lake. Damage from weevil larvae was seen on about 15% of the plants and the general condition of the EWM was healthy with some plants dying back. EWM was the dominant aquatic plant and comprised about 70% of the plant community. The other 30% included the same native plant species as found in the S2 initial survey with the addition of Coontail (*Ceratophyllum demersum*).

Monitoring Site – Mon A – Qualitative Assessment Results

The overall density of the milfoil at Mon A was moderate. Milfoil weevil adults were observed on the plants in the lake and weevil-induced damage was seen on 10% of the plants. Overall the EWM was healthy and was the dominant aquatic plant, comprising about 80% of the plant community. The other 20% included the same native plant species as found in the initial survey with the addition of Coontail (*Ceratophyllum demersum*).

S1 and M1 - Quantitative Measurement Results

The same methods for quantitative analysis used in the initial survey were applied for the follow-up survey. Weevil life stages found in the transect plants were egg, larvae, and adult, along with larval damage. The EWM density followed the same trend as the initial survey with slight increases from S1 to S2 to Mon A (Table 2).

Discussion

The focus of the MiddFoil[®] treatment program is to control the growth of EWM using the milfoil weevil. When working with a biocontrol such as the milfoil weevil,

it is important to remember that the rate at which “control” is achieved can vary greatly among water bodies. Many factors play an important role including, the size of the water body, shoreline habitat, amount and health of the EWM, amount of weevils stocked, and how much recreation occurs on the lake. As the EWM begins to decrease over time, so will the population of weevils until the two reach a state of equilibrium and sustain each other within the lake at low levels.

Density oscillations observed between weevils and EWM are expected and are not surprising due to the fact that the milfoil has the potential to grow faster than the weevils can reproduce. It may take the population of weevils a season to “catch up” with the density of EWM before they can bring the milfoil levels back down. We have been witnessing this very event happening in many lakes in Michigan and other states and provinces that utilize the MiddFoil® program and expect to see a continued reduction of EWM in Long Lake in 2010.

Positive results from the 2009 initial surveys revealed an indigenous milfoil weevil population in Long Lake. There was an increase in weevil damage observed in S1 from 0 to 30%; in S2 from 1 to 15%; and in Mon A from 1 to 10% between pre- and post-stocking of weevils. The presence of weevils in both surveys indicated they continued to reproduce throughout the summer. Evidence of this indigenous population of weevils proves that Long Lake maintains the necessary requirements to sustain a population of weevils throughout the summer and winter, as well as having the critical required shoreline habitat for over wintering survival.

Surveys also revealed a diverse native plant community. Between June and August, the percentages of EWM to native plants decreased. A change in this ratio over time is expected as the EWM is reduced. EWM did not top out at the surface in either S1 or S2. Only in the monitoring site, where no weevil augmentation occurred, did any EWM reach the surface.

Future Recommendations

On September 29, 2009, Cortney Marquette of EnviroScience re-visited Long Lake to reassess the EWM problem in Long Lake. During the 2009 season, the EWM has infested multiple new areas. These new areas were nonexistent in early June. Because of the massive increase, a more aggressive management plan is being recommended. This new plan will include an integrated approach of using a contact herbicide in limited areas while continuing the implementation of the MiddFoil® program. These two management techniques can be used together with careful monitoring. The idea is that less and less herbicide will be needed as the growing population of weevils start spread across the lake and take control. This plan was discussed with the township supervisor on October 22, 2009 and will be ready for review by November 4, 2009.

Should you have any questions or comments, please do not hesitate to contact me at (800)940-4025.

Sincerely,



Nancy L. Cushing
Aquatic Biologist

Table 1. Summary Data from Site Transect Analysis of EWM During 2009 Initial and Follow-up Surveys of Long Lake

Site	Parameter Measured	Initial June 11, 2009	Follow-up Aug. 8, 2009
S1	Total weevils	9.00	7.00
	Total stems	30.00	30.00
	Ave. weevils/stem	0.30	0.23
	Ave. meristems/stem	3.03	2.37
S2	Total weevils	4.00	6.00
	Total stems	59.00	60.00
	Ave. weevils/stem	0.07	0.10
	Ave. meristems/stem	3.02	2.53
Mon A	Total weevils	0.00	0.00
	Total stems	30.00	30.00
	Ave. weevils/stem	0.00	0.00
	Ave. meristems/stem	2.53	1.70

Table 2. Density of Eurasian Watermilfoil Collected During 2009 Initial and Follow-up Surveys of Long Lake

Site	June 11, 2009 Initial (stem /m ²)	August 8, 2009 Follow-up (stem /m ²)
S1	85.22	114.77
S2	103.66	225.88
Mon A	196.22	285.22