2013 Eurasian watermilfoil Survey and Weevil Population Survey at Clear Lake, Mecosta County, Michigan

Prepared for:

The Clear Lake Association

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1.0 Introduction

Eurasian watermilfoil (*Myriophyllum spicatum*, hereafter referred to as milfoil) is an exotic aquatic species that tolerates a wide range of growing conditions and out-competes native vegetation. Monocultures of milfoil limit recreational use, reduce biodiversity, and can cause detrimental changes to water temperature and dissolved oxygen in severe infestations.

The North American beetle, the milfoil weevil (*Euhrychiopsis lecontei)*, was augmented in Clear Lake in 2006 to suppress the growth of milfoil. This weevil is a specialist herbivore of milfoil and damages the plant in multiple ways. The most significant impact is caused by weevil larvae as they damage the meristem, or growing tip, and burrow through the stem. Nutrient flow in the plant is disrupted and the stem loses buoyancy and collapses in the water column. A cascading effect pulls neighboring plants lower into the water column and the rate of photosynthesis is significantly reduced in these stems.

A total of 15,000 weevils were stocked throughout four milfoil beds in July of 2006. No survey was contracted during this time. A follow-up survey was conducted by EnviroScience biologists in 2007 and again on July 23, 2013 to measure weevil population density and milfoil density within the previous stocking and monitoring sites. A milfoil survey was also conducted in 2013 to map acreage and relative density in Clear Lake.

2.0 Methods

EnviroScience biologists boated throughout the lake and recorded GPS points around the perimeter of each milfoil bed. A rake sampler (weighted rake head attached to rope) was used in areas of poor visibility and to confirm the presence of milfoil in deep areas. This process was repeated for multiple points around each bed and for all beds in the lake. Each site was assigned a relative density and map color of Sparse (yellow), Moderate (orange), and Dense (red). GPS data was digitized to create a map and calculate acreage.

Weevil population survey methods include qualitative and quantitative information to monitor changes occurring in both the weevil population and milfoil density. Qualitative observations in these surveys include the overall density and health of milfoil, identification of native plant species present, and the presence of weevils and weevil-induced damage. Quantitative measurements include milfoil density and weevil population density. Milfoil density is determined by using a 0.09 meter PVC quadrat, randomly tossing it throughout the milfoil bed, and counting the stems within the quadrat. This count is converted to the number of milfoil stems per square meter (stems/m^2). The presence of a weevil population is determined through lab analysis of 30 random stems collected at each site. Damage specific to a weevil population is recorded such as stem damage caused by larval movement, holes caused by pupae, and leaf and stem feeding by adults.

3.0 Results

The milfoil survey resulted in a total of 37 acres mapped: 2 acres Sparse, 3.4 acres Moderate, and 31.6 acres Dense (Figure 1). Although not always visible from the surface, plant growth in depths over 10 feet was confirmed through rake sampling.

Minimal weevil larval and adult damage was observed at all sites ranging from 5 to 25%. M1 and S3 exhibited the least damage while S2 exhibited the highest degree of damage. Stem density was recorded at all sites and was highest at S3 and M1 (Table 3.0).

Table 3.0 Eurasian watermilfoil stem density (stems/m^2) in Clear Lake.

Site	2006	8/22/07	7/23/13
S1	*No survey contracted*	77.73	48.15
S2		311.11	55.56
S3		100.00	112.96
S4		200.00	38.89
M1		222.22	168.52

Milfoil made up 75-90% of the plant community at S2, S3, and M1. S1 and S4 contained 50% milfoil relative to native species. Native aquatic vegetation species identified throughout the lake included Chara (*Chara spp*.), Clasping-leaf pondweed (*Potamogeton richardsonii*), Elodea (*Elodea canadensis*), Flat-stem pondweed (*P. zosteriformis*), Thin-leaf pondweed (*P. pusillus*), and White waterlily (*Nymphaea odorata*).

4.0 Discussion

Milfoil is currenlty the dominant plant species at Clear Lake, although it is growing throughout a community of six native vegetation species. It covers approximately 30% of the lake and is most dense in the eastern basin due to prevailing winds and shallower depths in this area.

It appears that the weevil population still remains at low numbers following the 2006 stocking and 2007 survey. Multiple years of augmentation are reccomended as they are most effective to reinforce the population. It is the reccomendation of EnviroScience that localized herbicide treatment is used in areas of heavy boat traffic if dense milfoil conditions persist. Because vegetation growth depends on seasonal conditions, regular monitoring is also reccomended to further guide management decisions.

Please contact EnviroScience at slomske@EnviroScienceInc.com or at (800) 940-4025 with questions regarding this report.

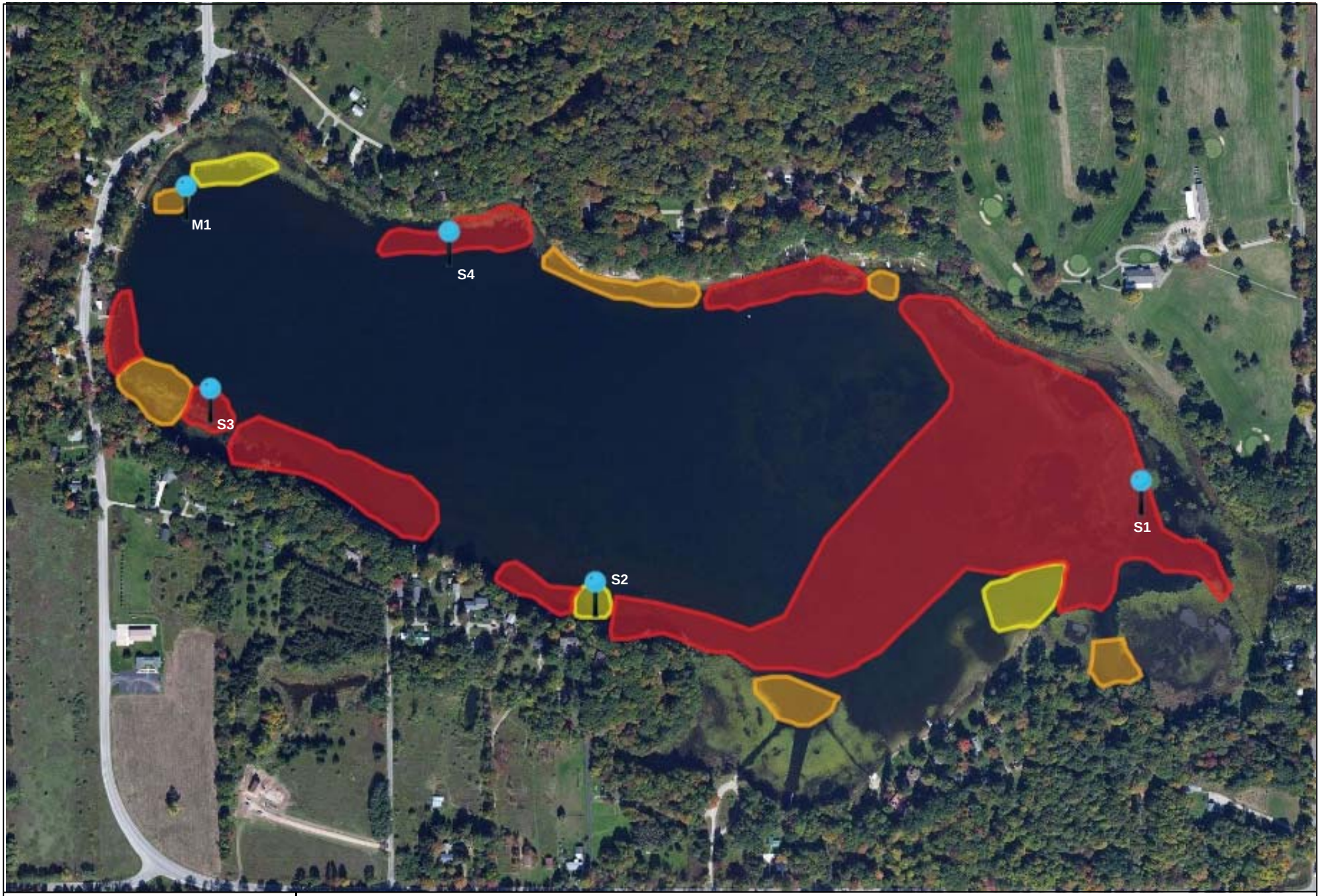

Figure 1. Clear Lake
Mecosta County, Michigan

Sparse milfoil
Moderate milfoil
Dense milfoil

Weevil population survey sites

1000 ft

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