

FINAL REPORT FOR YEAR ONE OF
EURASIAN MILFOIL MANAGEMENT
LAKE FAIRLEE
FAIRLEE, WEST FAIRLEE & THETFORD
VERMONT
2010

PROPOSAL/CONTRACT # 248-10



SUBMITTED: October 25, 2010

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Maps Included with this Report

- June 2, 2010
 - Lake Fairlee Treatment Areas
- August 17, 2010
 - Biomass Index of Individual Survey Points
 - Total Density at Individual Survey Points
 - Presence / Absence of Observed Species (4 pages)

1.0 Introduction

Lycott Environmental, Inc. (Lycott) was contracted by the Lake Fairlee Association (LFA or the Association), to conduct in-lake management for control of the invasive species Eurasian Milfoil (*Myriophyllum spicatum*, E. Milfoil). E. Milfoil was first documented in Lake Fairlee – located in the Vermont towns of Fairlee, Thetford, and West Fairlee – in 1995. Despite significant efforts by LFA and others, by 2009 growth of E. Milfoil had proliferated to approximately 130 acres of the 457-acre lake.

A permit application which requested use of the aquatic herbicide Renovate OTF[®] (Renovate, active ingredient triclopyr) was submitted to the Vermont Department of Environmental Conservation (VT DEC) on behalf of the Association by Lycott in February 2010. After a long review process, the proposed management plan was approved. This five-year plan includes the use of Renovate OTF, hand-harvesting, benthic barrier, and Diver Assisted Suction Harvesting (DASH). During the first year of management, a Renovate OTF treatment was permitted for June, and the removal of existing benthic barrier (covered under a previously issued permit) was required at the end of the growing season.

In anticipation of receipt of the final permit, public notices were published in local newspapers and notifications were sent to abutters via certified mailings. Just prior to the scheduled treatment, a final survey of E. Milfoil beds was conducted and the proposed treatment areas were submitted to the State for final approval. Treatment was scheduled and carried out on June 2, 2010 by two teams of licensed applicators using two air-boats and a pontoon boat.

A water sampling program was initiated at the start of treatment and was carried out at the required locations and increments for 90 days following the treatment. A final vegetation survey was conducted on August 18, 2010 by Lycott biologists and SCUBA divers. No growth of E. Milfoil was found at the time of this survey.

Following the survey, and as a condition of the Permit, previously installed benthic barriers were removed by Lycott SCUBA divers and staff and stored onshore for potential future management activities.

The following sections of this report detail the efforts undertaken by Lycott to manage the E. Milfoil infestation in Lake Fairlee during 2010.

2.0 Permitting

On December 1, 2009 a final permit application was submitted to VT DEC, for the management of aquatic vegetation in Lake Fairlee (additional information was requested and submitted on February 25, 2010). The final permit, ANC #2009-C08 was received on May 27, 2010. Prior to receipt of the final permit all public postings, certified mailing notifications and newspaper notices were scheduled and delivered with a tentative treatment date of June 2, 2010.

3.0 Pre-Treatment Survey

3.1 *September 2009*

The pre-treatment survey was conducted on September 28, 2009 to identify and map species of aquatic vegetation both inside and outside of the proposed treatment areas. The results of this survey were compiled and included in the February 2010 permit application. A brief summary is provided as follows:

A total of thirteen (13) species of submersed and floating aquatic vegetation were observed at the 120 data points within the lake's littoral zone. Species composition, relative abundance, percent cover, biomass index, and percent E. Milfoil were recorded at each survey point. Overall, vegetative coverage throughout the littoral zone was considered moderate with dense areas of E. Milfoil common.

To identify E. Milfoil beds, a boat was used to navigate around the lake while the visual density of each bed was recorded. A GPS unit was used to track the boat as it moved around plant beds. This GPS track was then uploaded to an ArcView mapping program and used to develop a pre-treatment map detailing the overall milfoil situation in Lake Fairlee including relative densities of beds.

3.2 *May 2010*

On May 26, 2010 an 'early season watermilfoil search' was conducted to verify the treatment areas proposed in the permit application, and to establish a baseline with which to judge the success of the treatment. As anticipated, E. Milfoil was observed within the proposed treatment areas. In a few cases, growth had extended slightly beyond the treatment areas. Several isolated plants were also found to the east of the Middle Brook inlet.

4.0 Herbicide Treatments

4.1 *Treatment Design*

Renovate OTF[®] was selected as the most appropriate herbicide for use in Lake Fairlee for several reasons including its ability to be used in distinct areas for spot-treatments. Application rates of 1.5 and 2 parts per million (ppm) were used in the north and south sections of the lake, respectively, based on hydrologic conditions and plant growth (Figure 1).



Figure 1: Treatment Areas

E. Milfoil Density	Pounds of Renovate per acre	Target Concentration
Trace to Sparse	162	1.5 ppm
Moderate to Dense or areas of higher dilution potential	216	2.0 ppm

4.2 Treatment Area Delineation

Prior to treatment, buoys were placed along the treatment areas to provide visual aide for treatment personnel and observers. These buoys marked the ‘no treatment areas’ as well as treatment areas requiring different concentrations and herbicide formulations (Figure 2). In addition to these on-the-water aides, each treatment team used a GPS unit with treatment areas uploaded as tracks (Figure 3). While working within these treatment areas, applicators also recorded their treatment paths as herbicide was dispersed.



Figure 2: Buoy Marking Treatment Area

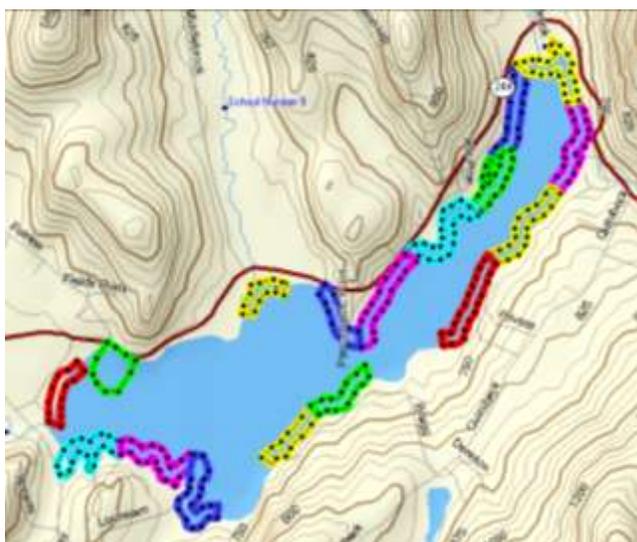


Figure 3: Treatment areas as shown on GPS during treatment



Figure 4: Base of Operations

4.3 Herbicide Application

Treatments were conducted by licensed Lycott staff utilizing two air boats and a pontoon boat, allowing for completion of the treatment in one day. A systematic loading of the boats from the base of operations allowed all material in a given load to be dispersed in a single treatment area (Figure 4).



Figure 5: Pontoon boat utilizing an educator to disperse Renovate

Renovate was dispersed throughout the treatment area with the use of two electrically operated Herd spreaders, each mounted on the bow of an airboat, while the pontoon boat used an educator system designed to disperse the herbicide with a stream of water drawn from the lake. A final treatment map including herbicide concentrations and amounts is included with this report.

Posters notifying residents and lake users of the treatment and water-use restrictions were posted along the shoreline prior to treatment. A sign was also posted at the lake’s Department of Fish and Wildlife boat ramp to notify the public that boating was not allowed on the lake for the

day of the treatment, as required in the Permit. Additional staff assisted on the shore with material handling and questions from the public. Representatives from VT DEC as well as the Association were on site to observe the treatment and interact with the public to address any questions. In addition Sarah Miller, an Aquatic Specialist from SePro Corporation (manufacturer of Renovate) was on site to field technical questions from community members.

5.0 Water Sampling

A sampling program was initiated on the treatment day, with one sample taken just prior to treatment at Site 1 (Figure 6). On June 3, 2010, four representatives of the Association were trained in the proper use of a VanDorn sample bottle and proper protocols for sample collections per the SePro “Sampling Collection Procedures for FasTEST” document. Subsequent samples were collected by the Association in accordance with the permit. Following initial test results, water use restrictions were extended downstream and an additional sample site, Site 10, was added to the testing protocol.

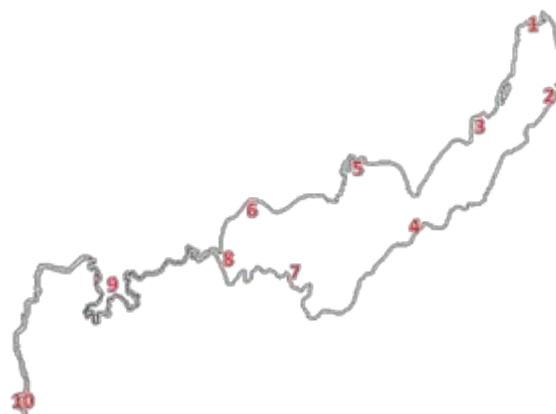


Figure 6: Sample Sites 1 – 10

Table 1: SePRO FasTEST Results for 2010 (results in ppb)

Date Collected	Site #1	Site #2	Site #3	Site #4	Site #5	Site #6	Site #7	Site #8	Site #9	Site #10
June 2	618	--	--	148	--	--	--	--	--	--
June 3	202	930	510	85	160	145	123	332	15	--
June 9	121	127	113	--	--	--	--	--	--	--
June 15	--	--	98	--	--	--	93	88	--	31
June 21	--	--	59	--	--	--	65	--	--	--
June 28	38	66	50	47	39	42	42	40	30	0
July 28	--	13	--	--	--	--	17	--	--	--
August 30	--	11	--	--	--	--	10	--	--	--

It should be noted that the main purpose of SePRO’s FasTEST analysis is to detect triclopyr concentrations to meet label restrictions for potable water and irrigation. Label requirements call for a reporting limit of less than one part per billion (<1.0 part per billion, or 0.001 ppm).

The following table details the water use restrictions implemented by the permit and the date each was lifted by VT DEC. Once all water-use restrictions were lifted, public signs were collected.

Table 2: Lake Fairlee Water Use Restrictions

Restriction	Date Imposed	Date Lifted
No use of water for any Purpose	6/2/10	6/4/10
No use of water for Drinking or for Food or drink preparation	6/2/10	7/1/10
No use of water for Domestic Purposes	6/2/10	6/4/10
No use of water for Irrigation	6/2/10	10/2/10
No use of water for Recreation	6/2/10	6/4/10

6.0 Post-Treatment Survey

The post-treatment survey was conducted on August 18th by two Lycott biologists who replicated the survey methods used in the September 2009 survey (Methods are included in Appendix A). Data for depth, density, percent cover, biomass, and percent E. Milfoil were recorded at each of the 120 pre-established littoral zone data points. Species presence and dominance was also recorded. The survey also included SCUBA diver confirmation of findings at several random data points. The purpose of this survey was to identify and map species of aquatic vegetation throughout Lake Fairlee and to determine the effects of the Renovate OTF treatment on non-native and native species.



Figure 7: Fern-Leaf Pondweed

A total of seventeen (17) species of rooted aquatic macrophytes were identified at the time of the evaluation. Tape Grass (*Vallisneria americana*) was the most prevalent species, occurring at 26% of the points surveyed, followed closely by Fern-Leaf Pondweed (*Potamogeton robbinsii*, Figure 7), and Stonewort (*Nitella*), occurring with greater than 20% frequency. No growth of E. Milfoil was found at any of the survey points.

The following table details the remaining species identified during the 2009 and 2010 surveys. Maps showing presence and absence of each observed species are included in Appendix A (Figures 3A-D).

Table 3: Aquatic Vegetation and Frequency of Occurrence for Lake Fairlee

Species	2009		2010	
	Number of Occurrences	Frequency of Occurrence (%)	Number of Occurrences	Frequency of Occurrence (%)
<i>Ceterophyllum demersum</i>	1	1	0	0
<i>Chara</i>	1	1	0	0
<i>Elodea</i>	27	23	3	3
<i>Isotes</i>	2	2	3	3
<i>Megalondonta beckii</i>	36	30	21	18
<i>Myriophyllum spicatum</i>	36	30	0	0
<i>Najas</i>	0	0	5	4
<i>Nitella</i>	23	19	27	23
<i>Nymphaea / Nuphar / Brasenia sp.</i>	8	8	2	2
<i>Potamogeton amplifolius</i>	25	21	23	19
<i>Potamogeton epihydrus</i>	0	0	4	3
<i>Potamogeton perfoliatus</i>	4	3	2	2
<i>Potamogeton pusillus</i>	2	2	1	1
<i>Potamogeton robbinsii</i>	40	33	30	25
<i>Potamogeton zosteriformis</i>	0	0	6	5
<i>Utricularia</i>	0	0	1	1
<i>Vallisneria americana</i>	27	23	31	26

Three (3) of these species; Bushy Pondweed, Ribbon-Leaf Pondweed, Flat-Stem Pondweed, and Bladderwort were not observed in the September 2009 survey. These species may have been obscured due to heavy E. Milfoil growth at the time of the survey; however, the isolated populations suggest that these plants may have been allowed to propagate due to the removal of competition from E. Milfoil.

In general, vegetative coverage throughout the littoral zone was considered moderate (25-50% coverage), with areas of dense growth common in shallow areas. The majority of plant growth was found in depths up to twelve (12) feet.

6.1 Distribution of E. Milfoil

E. Milfoil was not detected during the point survey. Diver surveys were conducted at four (4) locations where E. Milfoil beds were observed and treated in the spring of 2010. While the majority of E. Milfoil plants remaining were only brown stalks with dead and decaying rootballs, several plants which appeared dead (brown stalks), were starting to send out new sprouts (Figure 8). This growth was only observed at one location in the lake at an approximate depth of eighteen (18) feet. With the exception of this location, no E. Milfoil was observed at the twelve (12) dive locations.



Figure 8: E. Milfoil Post-Treatment

An additional post-treatment survey was conducted on September 22, 2010, by William Stevenson and Sarah Miller. The previous findings were confirmed.

7.0 Benthic Barrier Removal

As a condition of the Permit, all previously installed benthic barriers were removed by Lycott divers and staff. This was completed and the materials (barrier and ballast) were placed on shore for storage. In the event that future management methods include benthic barrier material, much of the previously installed material can be re-used (Figure 9).



Figure 9: Barrier Removal

During the barrier removal divers again surveyed the lake finding only about fifteen (15) plants which were hand-harvested. These plants showed significant deterioration based on the initial treatment; however, some nominal re-growth was present. In consultation with the SePro Aquatic Specialist, Sarah Miller, it was determined that these plants likely would have perished during the winter if left un-harvested.

8.0 Conclusion

As discussed above, no growth of E. Milfoil was found during the detailed final survey or by divers in the 'no treatment areas'. These observations support the conclusion that Renovate treatment conducted in June 2010 successfully managed this species in Lake Fairlee for the summer season. Typically, these results may be enjoyed for several years with limited areas of re-growth which, in most situations can easily be managed with hand-harvesting or benthic barriers.

9.0 Recommendations

Pursuant to the requirement of the Permit, Lycott recommends that an extensive survey of Lake Fairlee be completed in the early growing season of 2011. Findings from this survey should be used to establish hand-harvesting or benthic barrier areas for management in 2011. Additionally, surveys should be conducted post-management each year so that effects of the treatment and other management strategies on target and non-target species may be monitored.

