APPENDIX A
Survey Methods

Lake Fairlee 2009-2010

Collection of quantitative data is an important element of environmental management. Quantitative data provides an objective analysis of management requirements and outcomes, while allowing comparability of data between multiple observers. Data collection for management of aquatic vegetation may use point intercept methods, line intercept methods, or a combination thereof. Due to the large size of Lake Fairlee, the point intercept method was chosen as the primary data collection technique. This method allows for analysis of many points, providing an accurate representation of species presence/absence, as well as species diversity. Several areas were chosen for further analysis by a SCUBA diver. These locations focused on areas of moderate to dense growth of the target species (in this case E. Milfoil), while including several areas with little to no growth of the target species. The data collected for these dive locations included species presence and absence.

Point Intercept Method

Prior to the survey, an 80 m (~260 ft) grid was generated and applied to the outline of Lake Fairlee. A total of 120 points were randomly selected within a 100 m buffer around the entire shoreline. This buffer area includes the extent of the lake's littoral zone, to approximately 6 m (20 ft) deep. The 120 points were uploaded to a high-sensitivity GPS unit, and printed on data sheets for use in the field.

During the survey, a small boat was used to navigate to each predetermined point. The following data was collected at each point:

Species Identification

The rake toss method, based on protocols developed by Cornell University, was used to retrieve submersed aquatic vegetation from either side of the survey vessel. Two rake tosses were done at each point, one on either side of the survey vessel. Each species found on the rake was identified and recorded. Plant species observed in the immediate area, but not found on either rake toss were also recorded. Any species not readily identified *in situ* was placed into a plastic bag labeled with the data point number and returned to the lab for further analysis. Once all species were recorded, the most prevalent species was recorded as dominant for later use in presence/absence maps.

Relative Abundance

The abundance scale, developed by the US Army Corps of Engineers and modified by Cornell, was used to categorize total growth.

Notation	Description
Z	*Zero*: no plants on rake
T	*Trace*: fingerful on rake
S	*Sparse*: handful on rake
M	*Moderate*: rakeful of plants
D	*Dense*: difficult to bring into boat

Percent Cover

Percent cover is defined as the percent of bottom sediments obscured by vegetation. In general, an area in which no sediments are visible is classified at 100% cover; at times however bottom sediments are not visible due to water clarity, regardless of vegetative growth. These points were given a null (∅) designation, for data recording purposes.

Biomass Index

The biomass for each data point was recorded on a scale from zero to four:

0	No biomass	No plants
1	Low biomass	Very low growth
2	Moderate biomass	Growth extending up, into water column
3	High biomass	Growth in water column and possibly to surface, may be considered a recreational or habitat nuisance
4	Very high biomass	Growth filling the water column and covering the surface

Eurasian Milfoil Percentage

The immediate area around the boat was observed for growth of E. Milfoil and each point was assigned a percentage.

Presence/Absence Confirmation – SCUBA Observation

Fifteen locations were identified in the field to confirm vegetative cover and species distribution with a scuba diver. Locations were selected based on dense cover of E. Milfoil or other canopy species which obscured smaller plant growth from surface observation. A few areas with little to no growth of the target species were also included to provide a comparison of diversity and abundance.

A diver swam approximately ten to fifteen minutes at each location within the littoral zone and any dense E. Milfoil beds collecting a sample of each plant observed along the swim route. Routes were selected based on environmental factors such as depth, vegetative cover, and bathymetry of the individual locations.

Diver locations were marked with GPS and the description of the route and depth were recorded on a separate data sheet for each location. Samples collected were placed in bags and cataloged within twelve hours.

Milfoil Bed Identification

In order to identify target species bed perimeters, a boat was used to navigate around the lake while surveyors recorded the visual density of each bed. 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.