

AQUATIC PLANT MANAGEMENT
LAKE BOON
STOW/HUDSON, MASSACHUSETTS
BIOLOGICAL SURVEY REPORT
JUNE 2006

Introduction

As part of Lycott's continued aquatic plant management services to the LBC, we have initiated an experimental plant management study in Lake Boon. The study consists of five (5) tasks. Briefly, the tasks include: 1) Biological Survey of the Lake Boon study area, 2) Removal of the non-native plants Fanwort and Variable-leaf Milfoil from selected study sites, 3) Planting of native plants from within Lake Boon to the newly cleared sites, 4) Monitoring the re-vegetated areas for native plant establishment and replanting where necessary, and 5) Aid LBC in the permitting process.

The following is a report on the latest vegetation maps (task 1) and proposed sites for the plant-removal study are submitted for approval. If selected sites are approved we will then undertake tasks 2 and 3.

Methods

A visual survey was conducted of the middle and eastern basins of Lake Boon on 5 June 2006. Field notes were compiled and three 50' x 50' sites were chosen based upon current plant distributions (Figures 1-4). On 13 June the three proposed sites (2500 sq. ft. quadrats) were demarcated with 4'-6' wooden stakes. Where possible, site boundaries were marked with either orange-painted or unpainted stakes. The outer margin of site 3 was in relatively deep water. Stakes would not have been visible from the surface and therefore were not used at this site. Sites 1 and 2 each have four stakes, one at each corner.

Detailed plant distribution maps were made of the coves and bay in the eastern basin, and spot surveys (i.e., throw rake samples) were conducted in the larger, deeper middle basin. No survey was conducted of the northern basin in June 2006.

Vegetation distribution maps were plotted using ArcView GIS 3.3 and orthophotos obtained from MassGIS as a background.

Results

Plant distributions

Eastern basin plant-distribution maps are presented in figures 1-4. Variable-leaf Milfoil and fanwort are ubiquitous throughout the eastern basin particularly concentrated in the shallower areas (~8' or less) where together they compose the dominant plant species in the 'understory' of the plant community. Fanwort was found in 4 of the 6 throw-rake samples taken in the middle basin and it is therefore assumed to be present throughout this basin. Milfoil was also present in the middle basin and particularly abundant in a shallow cove with a tributary ca. midway along the southern shore.

P. robbinsii was found in relatively deeper waters in the eastern and middle basins. Niads were not seen in the current survey, but may become more abundant as the summer warms and the algal species begin to flourish. Either of these species can serve as replacement plants, though niads may be suitable only for the deeper sections of the study sites.

Bladderwort was found occasionally in the shallower areas of the eastern basin.

Floating and emergent plant species (i.e., 'canopy' species) identified include watershield (*Brasenia schreberi*), Yellow pond-lily (*Nuphar spp.*), White pond-lily (*Nymphaea spp.*), and the native Large-leaf pondweed (*Potamogeton amplifolius*). *Nuphar*, *Nymphaea* and *Brasenia* vastly outnumber *P.amplifolius* in abundance. Where present in high numbers, these 'canopy' plants tend to be associated with reduced densities of the non-native milfoil and fanwort species.

Species list:

Scientific Name	Common Name
<i>Brasenia schreberi</i>	Watershield
<i>Cabomba caroliniana</i>	Fanwort
<i>Myriophyllum heterophyllum</i>	Variable-leaf Milfoil
<i>Nuphar spp.</i>	Yellow Pond-lily
<i>Nymphaea spp.</i>	White Pond-lily
<i>Potamogeton amplifolius</i>	Large-leaf Pondweed
<i>Potamogeton robbinsii</i>	Robbin's Pondweed/ Fern-leaf Pondweed
<i>Utricularia spp.</i>	Bladderwort

Experimental Site Selection

Three sites were marked for inclusion in the plant removal/replacement study. Each site is 2500 sq. ft. in area (50' x 50'). Care was taken to keep sites as similar as possible in terms of habitat (e.g., depth, sediment type, slope, proximity to shore, shoreline vegetation, and proximity to available native replacement plants) for comparison purposes. However, it was also important to select sites in different coves in the area of interest so that results might be generally applicable.

Proposed site locations are shown in figure 4 and plant distributions within each site are shown in figures 5-8.

Because site 3 is slightly deeper on the northern margin than the other sites it contains *P. robbinsii*. For this reason we suggest using this as the control site. If left untouched, we can monitor if fanwort is invading into the deeper *P. robbinsii* habitat as well as in the shallower areas (e.g. Figure 2).

Discussion

We found more fanwort than expected in the eastern basin. As a result, it is likely not feasible to hand harvest the experimental sites. A more efficient technique would be to install benthic screens which will block sunlight as well as limit the built-up of gasses which tend to lift other benthic barrier materials. Benthic barriers can quickly eliminate all plants covered if properly installed and maintained.

Once plants are gone from the study areas (roughly 3-4 weeks) the panels can be removed. Native plants will then be planted in their place (task 3). Follow-up surveys will map plant establishment (task 4).

In order to aid mapping of the control and treatment sites, a 4 x 4 grid will be installed in each of the three sites (Figure 8). The grid will be constructed of a thin, yellow, nylon rope which will be secured to the substrate with small metal staples and/or cement blocks. The grids will divide the 50' x 50' area into 16, 12.5' x 12.5' areas. Greater mapping detail can be obtained using this approach, particularly so in the dark water of Lake Boon where diver visibility is limited.

A grid will be installed in the control site the same time the benthic barrier panels are installed in the treatment sites (should this approach be acceptable). Once the barrier panels are removed from the treatment sites, grids will be installed prior to plant replacement. Thus, accurate maps can be made of the newly planted areas as well.

Figure 1. Distribution of floating plants in the eastern basin of Lake Boon. June 2006






<p>Lake Boon Eastern Basin Distribution of Floating Plants (white & yellow pond lilies, watershield, large-leaf pondweed) June 2006</p>		<p>MassGIS Orthophoto 1-meter resolution</p>	<p>Lycott Environmental Inc 600 Charlton Road Southbridge, MA 01551 Ph. 508-765-0101 Fax. 508-765-1352 www.lycott.com lycott@aol.com</p> 
<p>Scale 1:4005 50 0 50 100 Meters</p> 			

Figure 2. Distribution of Fanwort and Variable-leaf Milfoil in the eastern basin of Lake Boon. June 2006.






<p>Lake Boon Eastern Basin Variable-leaf Milfoil & Fanwort Distribution</p> <p>June 2006</p>		<p>MassGIS Orthophoto 1-meter resolution</p>	<p>Lycott Environmental Inc 600 Charlton Road Southbridge, MA 01551 Ph. 508-765-0101 Fax. 508-765-1352 www.lycott.com lycott@aol.com</p> 
<p>Scale 1:4005 50 0 50 100 Meters</p> 			

Figure 3. Distribution of *P. robbinsii* in the eastern basin of Lake Boon. June 2006






<p>Lake Boon Eastern Basin <i>P. robbinsii</i> distribution Possible 'take' area for plant replacements June 2006</p>		<p>MassGIS Orthophoto 1-meter resolution</p>	<p>Lycott Environmental Inc 600 Charlton Road Southbridge, MA 01551 Ph. 508-765-0101 Fax. 508-765-1352 www.lycott.com lycott@aol.com</p> 
<p>Scale 1:4005 50 0 50 100 Meters</p> 			

Figure 4. Proposed plant replacement sites.






<p>Lake Boon Eastern Basin Proposed control and plant removal sites June 2006</p>		<p>MassGIS Orthophoto 1-meter resolution</p>	<p>Lycott Environmental Inc 600 Charlton Road Southbridge, MA 01551 Ph. 508-765-0101 Fax. 508-765-1352 www.lycott.com lycott@aol.com</p> 
<p>Scale 1:4005 50 0 50 100 Meters</p> 			

Figure 5. Map of plant distribution in proposed treatment site (site 1) in Lake Boon. June 2006.

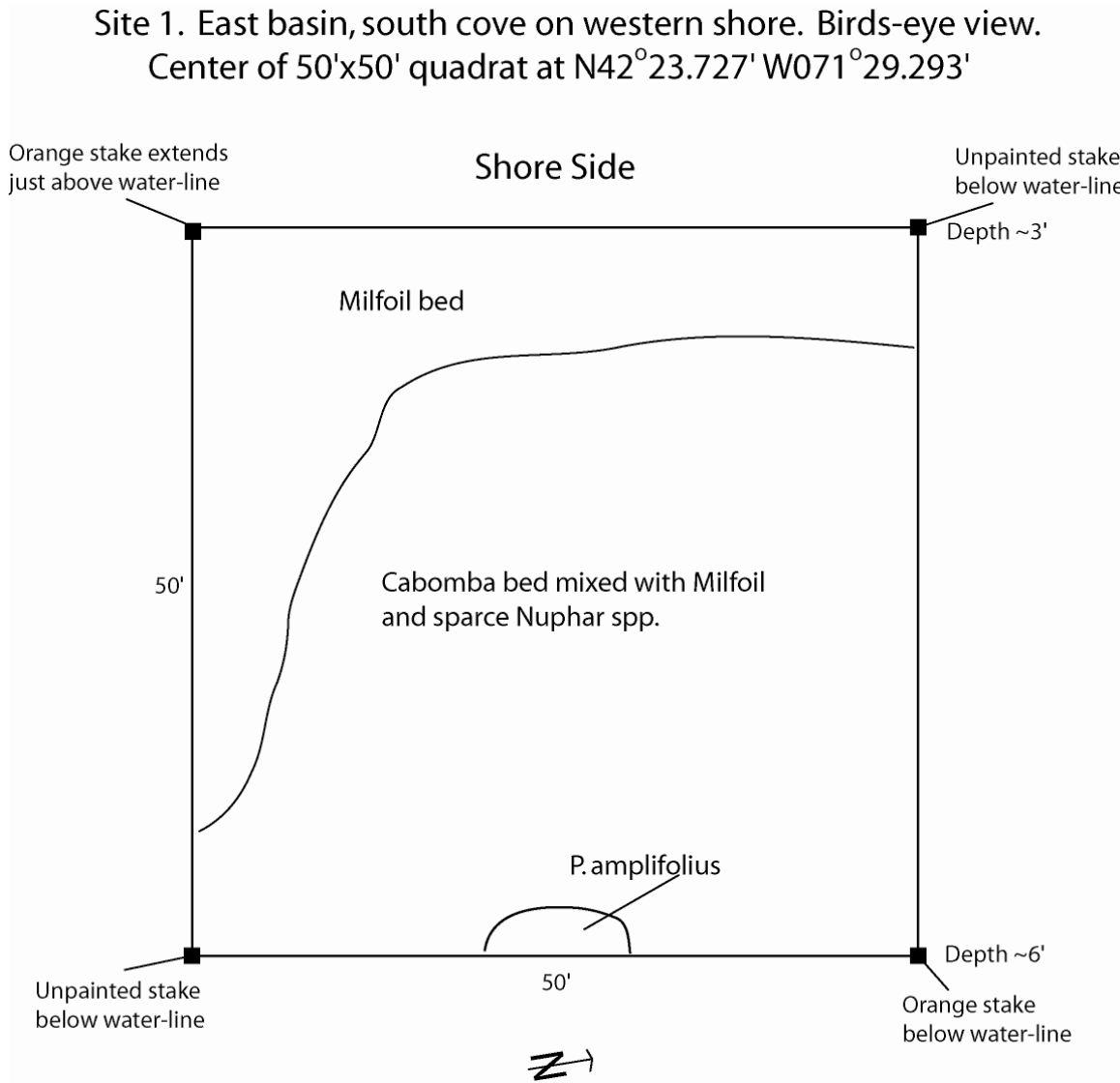


Figure 6. Map of plant distribution in proposed treatment site (site 2) in Lake Boon. June 2006.

Site 2. East basin, northeast cove on southern shore. Birds-eye view.
Center of 50'x50' quadrat at $N42^{\circ}23.869'$ $W071^{\circ}29.328'$

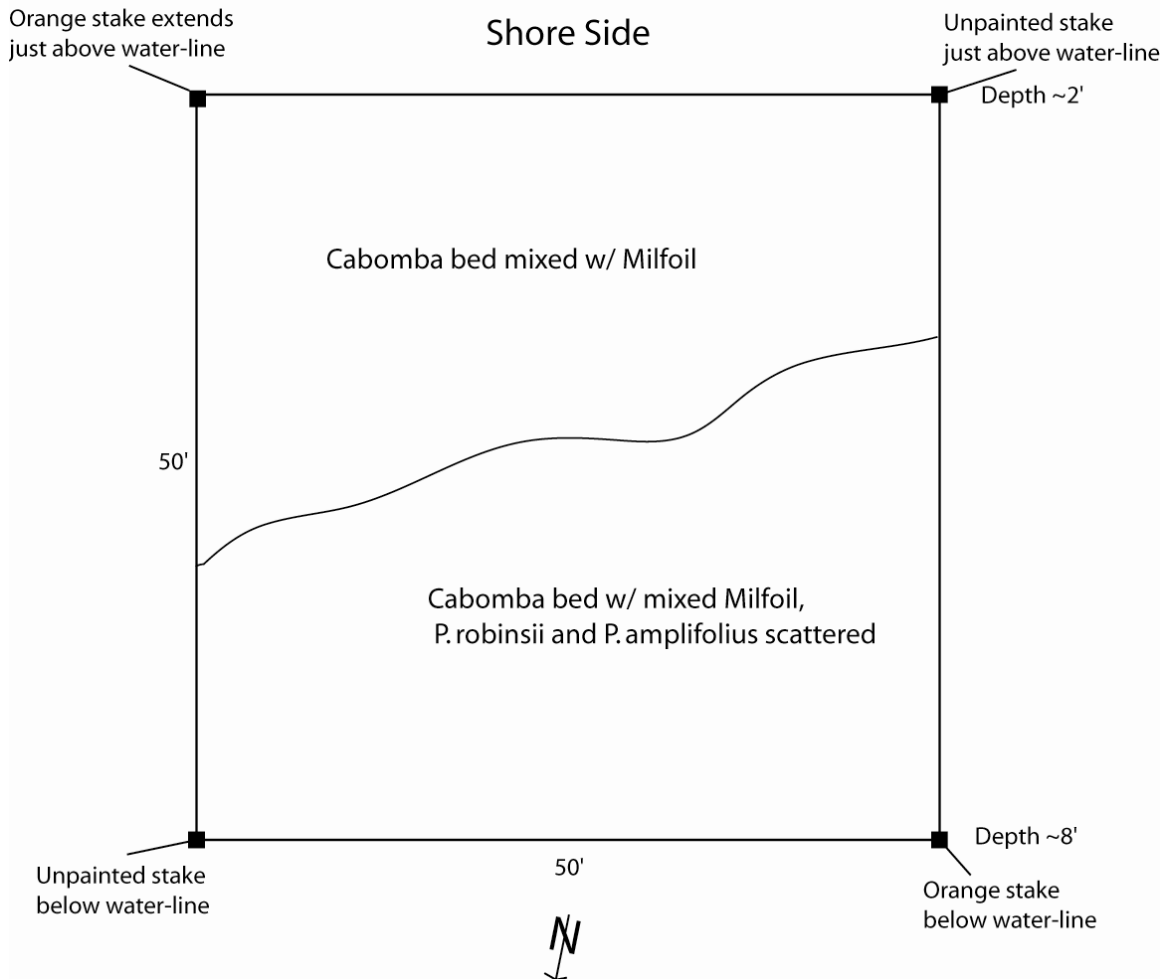


Figure 7. Map of plant distribution in proposed control site (site 3) in Lake Boon. June 2006.

Site 3. East basin, deep bay on southern shore. Birds-eye view.
Center of 50'x50' quadrat at N42°23.752' W071°29.370'

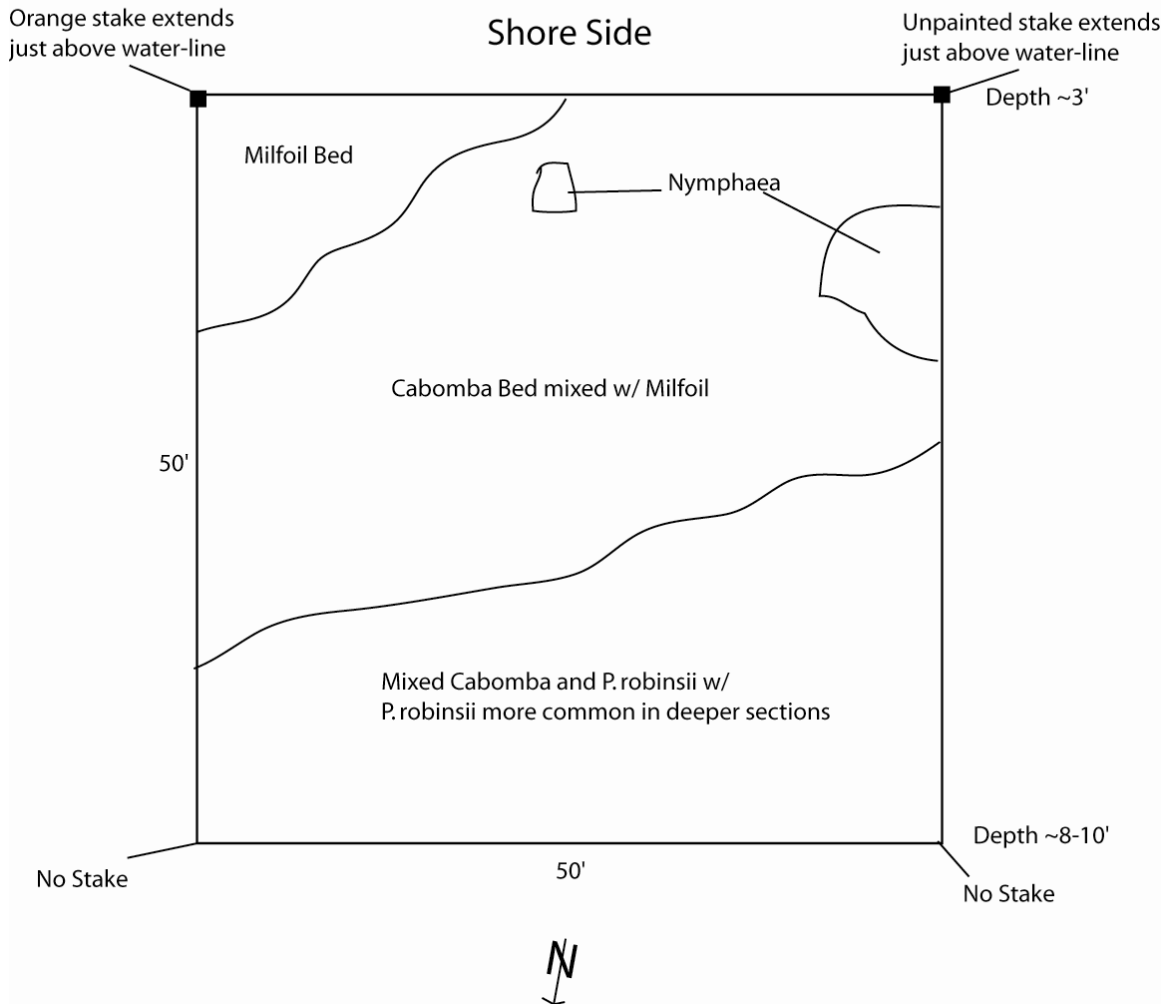


Figure 8. Sample grid overlay on site 3 vegetation map.

Sample grid overlay on quadrats. Birds-eye view.

