AQUATIC CONTROL TECHNOLOGY, INC.
POND AND LAKE MANAGEMENT SPECIALISTS

December 23, 2011

Barnstable Conservation Commission
c/o Mr. Rob Gatewood, Administrator
200 Main Street
Barnstable, MA 02601

Re: 2011 Year-End Report for the Hydrophyte Control Project at Red Lily Pond and Lake Elizabeth – Barnstable, MA

Dear Mr. Gatewood:

Please accept this as our Year-End Report for the mechanical hydro-raking project performed at Red Lily Pond and Lake Elizabeth to control nuisance aquatic plant growth. In the following sections we have provided a brief description and chronology of the hydro-raking efforts and a discussion of future management recommendation.

2011 Program Chronology

- Stakeholders meeting (Town & Association) 5/13/11
- Wildlife habitat evaluation 5/13/11
- File NOI with Barnstable Conservation Commission..... 8/9/11
- Approved Order of Conditions issued by Con. Com. 9/7/11
- Mobilization of project equipment 9/29/11
- Begin mechanical hydro-raking in Red Lily Pond..... 10/3/11
- Complete Red Lily Pond hydro-raking..... 10/30/11
- Begin Lake Elizabeth hydro-raking 10/31/11
- Complete Lake Elizabeth hydro-raking..... 11/8/11
- Final site meeting..... 11/2/11
- Manual debris clean up at Red Lily Pond 11/4/11
- Post hydro-raking inspection..... 11/8/11
- Shoreline access clean-up and restoration..... 11/15/11

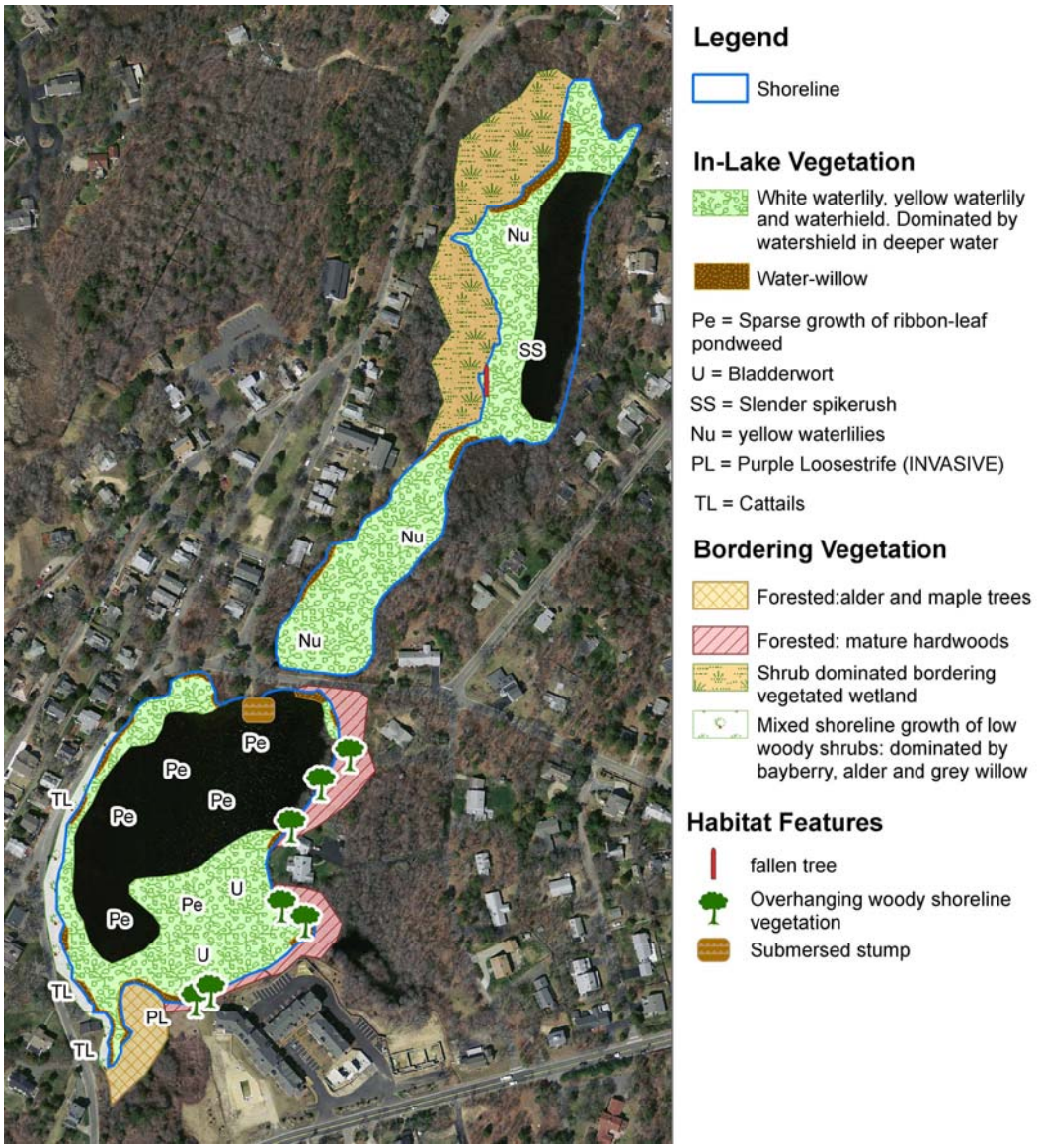
Wildlife Habitat Evaluation & Permitting

On 5/13/11 an Aquatic Control Biologist conducted a wildlife habitat evaluation of both Red Lily Pond and Lake Elizabeth. The primary focus of this inspection was to document biotic and abiotic wildlife habitat features (i.e. over-hanging trees, emergent & submersed vegetation, submersed boulders/logs, stumps, snags, etc.) in order to evaluate the pond systems overall habitat value. Both waterbodies supported a variety of habitat features for use by resident and transient wildlife species.

At the time of the survey both ponds had general warm-water fisheries and waterfowl habitat requirements, although, heavy waterlily growth was impairing important "edge" effect (the relationship between vegetated areas and open water). The ponds the following general characteristics important to fish and waterfowl habitat:

- Soft organic bottom sediments, which are the preferred spawning substrate of many warm-water fish species.
- Submersed biotic and abiotic structure capable of providing both escape cover, juvenile fish nursery, and predatory ambush sites.
- Gently sloping banks for waterfowl nesting and foraging activities.
- Aquatic vegetation capable of providing waterfowl forage.

Figure 1 – Vegetation and Wildlife Habitat Map



Using this information a mechanical hydro-raking plan was developed to selectively reduce the growth of floating-leaf waterlilies and encroaching waterwillow. The management plan was presented to the Barnstable Conservation Commission for regulatory approval by the filing of a Notice of Intent (NOI) under the MA Wetlands Protection Act. An approved Order of Conditions (OOC) was issued for the hydro-raking project by the Conservation Commission on 9/7/11.

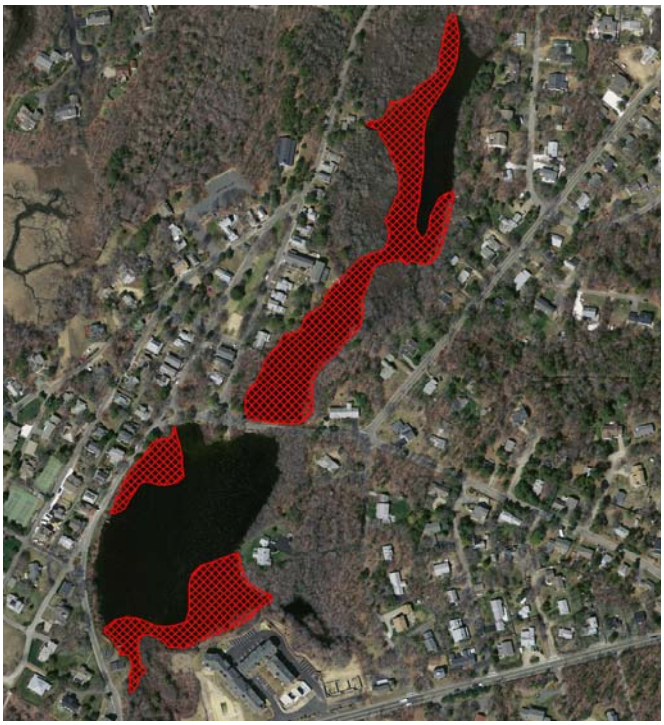
Mechanical Hydro-Raking

The mechanical hydro-raking component of the management program was focused on the removal of the dense floating-leaf waterlily growth, as well as any areas of encroaching emergent vegetation. Because the management program was intended to selectively remove areas of undesirable plant growth, priority hydro-raking areas were selected using the data collected during the early season vegetation and wildlife habitat evaluation.

Red Lily Pond

The hydro-raking was begun in Red Lily Pond on October 3, 2011. The raking work for the first week of the project (~35 hrs. of hydro-rake operation) focused on the removal of the waterlily and emergent plant

Figure 2 – Designated Hydro-Raking Areas



growth within southern basin of the pond. During this period, a total of 30 truck loads (~150 yds^3) of material were removed. At this point in the project it was determined, that in order to complete the raking within the remaining designated areas, additional operation hours would be required. As a result the Town and Association authorized an additional 27 hrs. of removal work. The next week and one half (~65 hydro-rake hours) was split between the narrow central portion of the pond and the western shore of the north basin. A total of approximately 4.0 acres were raked in Red Lily Pond.

Lake Elizabeth

Hydro-Raking operation began in Lake Elizabeth on 10/30/11. Machine launching and materials off-loading proved to be more difficult in Lake Elizabeth due to the shallow water depths in the vicinity of the designated off-loading site. With minimal modifications to the placement of the steel containment tub, however, allowed for the hydro-raking work to continue. As outlined in figure 2 the bulk of the hydro-raking work in Lake Elizabeth was focused in the southeast and northwest corners of the pond. The target vegetation in Lake Elizabeth was dominated by watershield and emergent waterwillow. A total of approximately 77 hours of raking were performed in Lake Elizabeth. These efforts were divided among the designated areas commensurate with the level of plant growth and the level of raking difficultly.

The following table breaks down the operations of the hydro-raking task by week.

TABLE 1 – RED LILY POND & LAKE ELIZABETH HYDRO-RAKING

Project Variables	***Red Lily Pond***	***Lake Elizabeth***	***Project Totals***
Raking Time Frame	10/3 – 10/29	10/30-11/8	10/3-11/8
Number of Hours Raked	100 hrs	77 hrs.	177 hrs.
Total Number of Truck Loads	120 loads	92 loads	212 loads
Estimated Cubic Yardage Removed	600 yds^3	460 yds^3	1060 yds^3

The post hydro-raking inspection, performed on 11/8/11, indicated good control of both the targeted emergent vegetation community as well as the floating-leaf waterlily canopy. The full extent of waterlily control within the areas hydro-raked will not be known until next summer. At the time of the survey there was intermittent low density cover of a variety of native plant species, including bladderwort, slender spikerush, ribbon-leaf pondweed, and waterlilies (white, yellow and watershield). Although the waterlily and aquatic vegetation growth as a whole were significantly reduced as a result of the hydro-raking effort, areas of diverse native plant growth were preserved to serve as important fish and wildlife habitat.

Management Recommendations

The 2011 hydro-raking performed at the two ponds was successful at reducing the waterlily and emergent plant cover and should provide multiple years of acceptable control. In fact, the last hydro-raking project at Red Lily Pond and Lake Elizabeth performed in the late 1990's provided more than 10 years of effective target plant control. Although there is potential for the 2011 hydro-raking effort to achieve similar results, we feel that it would be more cost effective and less disruptive to the pond system to conduct smaller scale maintenance level hydro-raking work on a more frequent basis. This approach will not only reduce the amount of disturbance at any one time, but will also act to provide desirable herring

spawn conditions on a more consistent basis, which is important for the re-establishment of the run. It is therefore our recommendation that the Town and Association consider maintenance hydro-raking within the next 3-4 years to sustain a desirable level of plant growth. At this raking interval it difficult to anticipate the extent of raking that will be required; however, based on the current conditions we would anticipate a raking effort in the range of 80 hours. In order to determine the proper timing of future hydro-raking work we recommend that biennial vegetation monitoring be performed. This data will also be important for identifying specific management areas and the required budget.

We have enjoyed working with you this past year to achieve your pond management goals and hope to continue our relationship in the future. If you have any questions or require additional information please feel free to contact our office.

Sincerely,

AQUATIC CONTROL TECHNOLOGY, INC.

Keith Gazaille
Senior Biologist