AQUATIC CONTROL TECHNOLOGY, INC.
POND AND LAKE MANAGEMENT SPECIALISTS

February 22, 2010

Mr. Stephen E. Cotton, President
Foster's Pond Corporation
19 Pomeroy Road
Andover, MA 01810

Re: Recommended Treatment Protocol for Diquat Herbicide Spot-Treatment of Invasive Aquatic Plants in Foster's Pond

Dear Mr. Cotton:

We reviewed the 2009 Foster's Pond Aquatic Vegetation Survey and Water Quality Monitoring Report prepared by Geosyntec Consultants. A new invasive species was discovered in 2009. The following document summarizes past management activities and details the spot-treatment program recommended by Geosyntec.

INTRODUCTION AND MANAGEMENT HISTORY

Three non-native and invasive submersed aquatic plants were documented in Foster's Pond. Fanwort (*Cabomba caroliniana*) was the target of the fluridone (trade name Sonar) herbicide treatment programs performed in 2005 and 2007. Brazilian elodea (*Egeria densa*) in the Glenwood Road Basin was spot-treated with fluridone herbicide in 2006. Both plants have returned in limited densities. A third invasive plant, curlyleaf pondweed (*Potamogeton crispus*) was identified by the Foster's Pond Corporation (FPC) in prior years, but was not observed during the 2009 survey.

The fourth submersed invasive species in Foster's Pond, European or spiny naiad (*Najas minor),* was found by Geosyntec in 2009. This plant has been rapidly spreading through Massachusetts lakes and ponds in recent years. Due to the limited distribution of spiny naiad currently found in Foster's Pond, Geosyntec suggested spot-treatment with Diquat (trade name Reward) herbicide in 2010. Spiny naiad is a prolific seed producer, so immediate management will help limit further spread and prevent further contributions to the "seed bank" in the bottom sediment. Three of the invasive plants in currently found Foster's Pond - spiny naiad, Brazilian elodea and curlyleaf pondweed - are susceptible to diquat herbicide. Fluridone remains the only aquatic herbicide registered for use in Massachusetts that effectively controls fanwort.

DIQUAT HERBICIDE TREATMENT PROGRAM

Diquat is a contact-acting herbicide that controls actively growing stem and leaf tissue of susceptible plants. Treatments are typically performed in the late spring or early summer; when target plants are in their most active phase of growth, but before the reach their peak biomass. A tentative treatment protocol for spot-treatment with diquat follows:

Herbicide Description and Mode of Action:
Diquat is a widely used contact herbicide that is applied to lakes and ponds throughout North America to control nuisance submersed aquatic plants. It is probably the most widely used aquatic herbicide in Massachusetts and other

Northeastern states. Diquat has been used to control nuisance submersed weed growth at three other Andover water bodies over the past decade; Pomps Pond, Field Pond and at a private pond located off of Pond View Place.

Diquat is translocated to some extent within the plant. Its rapid action tends to disrupt the leaf cuticle of plants and acts by interfering with photosynthesis. Upon contact with the soil, it is absorbed immediately and thereby biologically inactivated.

To control nuisance spiny naiad, Brazilian elodea or curlyleaf pondweed growth found in Foster's Pond, diquat would be applied at the application rate of 1.0 - 1.5 gal/acre, which is less than the USEPA label's recommended maximum application rate of 2.0 gals. Temporary water use restrictions for Reward are 1) no drinking or cooking for 3 days, 2) no irrigation of turf/food crops for 5 days, and 3) no watering livestock for 1 day. There are no restrictions on swimming, boating or fishing listed on the EPA product label, but prudent pesticide management practices suggest that the pond be closed to all uses on the day of treatment.

Herbicide Toxicology and Environmental Fate:

Diquat is registered for use in Zone II, groundwater protection areas in Massachusetts. There are no well-water use restrictions or no-treatment setbacks required for aquatic Diquat applications in Massachusetts. Diquat has a high adsorption coefficient and propensity to bind with sediment, which makes it relatively immobile in soil. We have been involved in dozens projects in NH, CT and MA where post-treatment well testing was a permit condition and we are not aware of a single positive detection of Diquat in a well following an aquatic application.

Diquat is usually applied at 1 gallon per surface acre in waters averaging 4 feet in Massachusetts, which results in a water concentration of 0.1 ppm (MA Practical Guide, p. 123). Diquat residues in water rapidly decline to typically between 0.064 and 0.144 ppm ion eight hours after application and to below 0.01 ppm ion during the next five days. The Maximum Contaminant Level (MCL) for Diquat established by the EPA is 0.02 ppm (mg/l). The primary route of dissipation of Diquat in water is *adsorption*. Diquat rapidly disappears from water in natural systems by adsorption to sediment, aquatic vegetation, and dissolved and particulate organic matter (e.g. EPA, 2002; WHO, 1984). Upon introduction into water, Diquat quickly binds to these matrices and is thereby removed from the water column, becoming essentially immobile and inactivated in the environment (EPA, 2002). The aquatic half-life of Diquat in natural waters is approximately 1 – 2 days (EPA, 2002). Reward not adsorbed by the plants is tightly bound to soil, and rendered biologically unavailable. Because of its rapid dissipation, aquatic animal exposure to Diquat would be limited to very short-term, acute durations (Washington State Department of Ecology, 2002). Because dissipation of Diquat is so rapid, acute effects to organisms in the field are unlikely at rates used for vegetation control (GEIR, p. A-53).

Detailed information on diquat can be found at the Massachusetts Department of Conservation and Recreation, Lakes and Ponds Program website. There are links under the Publications tab to the "Generic Environmental Impact Report for Eutrophication and Lake Management in Massachusetts" and the "Practical Guide to Lake Management in Massachusetts."
<http://www.mass.gov/dcr/waterSupply/lakepond/publications.htm>

Additional information can be found at the Massachusetts Department of Agricultural Resources website:
<http://www.mass.gov/agr/pesticides/water/Aquatic/Herbicides.htm>

Application Methodology:

Treatments will be performed by MA Commercially Certified aquatic applicators. Treatments will be performed from either an Airboat or conventional spray boat powered by an outboard motor. The concentrated liquid formulation of diquat will first be diluted with pond water in a 50-gallon spray tank on board the spray boat. The herbicide solution will then be evenly injected subsurface through weighted hoses using a calibrated pumping system.

Treatment Timing:

Timing of the initial application will be determined following a pre-treatment inspection in June. Spiny naiad is an annual plant that develops from seed each year. In some instances, active plant growth is not evident until late June or July. Treatment would be scheduled to occur within approximately two weeks after active growth is confirmed and the treatment areas are finalized.

Treatment Areas:
Based on observations documented on the 2009 Geosyntec survey, it is anticipated that treatment will be undertaken in a total of approximately 5 acres centering on the two areas delineated in the attached map where spiny naiad was found. However, additional areas may be treated if spiny naiad is observed in other parts of the pond in the course of the pre-treatment inspection. Our final report that will be filed with the Conservation Commission pursuant to Special Condition 12.27 will document all areas treated in 2010.

Notification and Water Use Restrictions:
Although no restrictions on swimming, fishing or other recreational activities are required by the product label following treatment with Reward, we recommend the following temporary water use restrictions: no boating, fishing, or swimming in the treated water on the day of treatment; no use of treated water for drinking, watering livestock or irrigation for a period of 5 days following treatment. Accordingly, prior to all treatments, the shorelines of areas to be treated will be posted with signs that warn of the temporary water use restrictions.

Additional Permits:
This treatment program is subject to the existing Order of Conditions (DEP File # 090-0535). Aquatic Control will prepare and file for a site-specific License to Apply Chemicals (BRP WM 04), which is issued by DEP annually on a project-specific basis. Pursuant to Special Condition 12.19, a copy of this License will be provided to the Conservation Commission prior to treatment.

We trust that this information will address most of the questions raised about the proposed spot-treatment with diquat (Reward) herbicide.

Please do not hesitate to contact our office if you have questions or require additional information.

Sincerely,

AQUATIC CONTROL TECHNOLOGY, INC.

Marc D Bellaud

Marc Bellaud
Senior Biologist

Enclosures

SPINY NAIAD (*Najas minor*) LOCATIONS

Map based on data provided by Geosyntec Consultants in 2009