

Grant Request to the Lake George Watershed Coalition

Aquatic Plant Mapping of Selected Areas of Lake George with a Focus on the Distribution of Eurasian Watermilfoil

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Project Period: 1 Year

Amount Requested: \$24,000

Executive Summary

The DFWI conducted hydroacoustic mapping of selected areas of the littoral zone of Lake George in 2007 and 2008, representing 17% of the lake's entire littoral zone. During those surveys, we identified 19 areas supporting milfoil growth, 7 of which were not previously reported and have subsequently been managed. In 2009, we completed a hydroacoustic survey of the aquatic plant resources found in lower rim of the southern basin of Lake George, identifying extensive areas of Eurasian watermilfoil growth, quantifying the density of growth and providing GIS based maps of native and invasive plant distribution in this region.. In 2010 we propose to complete a similar survey in the Town of Hague, extending from Friends Point to Jenkins point. Aquatic plant mapping utilizing hydroacoustic technology has been demonstrated to be capable of efficiently ascertaining the extent of plant growth, accurately delineating percent plant cover and identifying the presence, location and size of invasive Eurasian watermilfoil beds.

Background:

The Darrin Fresh Water Institute (DFWI) has conducted aquatic plant (macrophyte) assessments of Lake George since the early 1970s. With the discovery of Eurasian watermilfoil (*Myriophyllum spicatum* L.) in 1985, aquatic plant assessments took on an added role of plant management. Eurasian watermilfoil (EWM) management activities based on physical control techniques (hand and suction harvesting and benthic barrier) were initiated in 1989. Management activities have been supported by state, federal and local sources. Federal financial support for EWM management in Lake George ended in 1993. In 1995, a multi-year program incorporating hand harvesting, suction harvesting and benthic barrier was initiated and continued through 2001 (Boylen et al. 1997; Eichler et al. 1993, 1995). In 2002, the aquatic plant management program was awarded to Lycott Environmental Services as a consultant to the Lake George Park Commission (LGPC) (King and Lyman 2006). The DFWI continued to provide a limited EWM

monitoring effort with support from the LGPC and the FUND for Lake George through 2007. EWM clearly remains one of the most visible threats to the Lake George ecosystem. A serious and systematic effort to monitor this invasive species is of utmost importance for its management and control.

In order to effectively manage this invasive species it is imperative to know all locations where it grows. Traditionally, hydroacoustic technology has been employed for fisheries and bathymetry (depth mapping) surveys. However, recent developments in equipment and software have expanded its capability to include delineation of aquatic plant communities. Since 2005, the Darrin Fresh Water Institute has invested more than \$200,000 in hydroacoustic instrumentation and personnel training in order to refine this technology to maximize its effectiveness. In 2006 and 2007, we successfully applied this technology for aquatic plant mapping with a focus on Eurasian watermilfoil (milfoil) in Lake George (Harrison and Farrell 2007).

The hydroacoustic system used by DFWI includes both a 70 kHz and a 420 kHz split beam transducer attached to a DT-X surface unit. The transducer is deployed via fixed mount to a research vessel. This system is augmented with several software analyses packages capable of discerning bathymetry, plant height, plant percent cover, and potential plant typing. The system produces a continuous real time data stream, which enables their simultaneous integration and depiction within a geo-referenced three-dimensional space.

There are currently 179 known locations around the lake where milfoil has been reported (King and Lyman 2010). The perimeter of Hague Brook delta, the shallows in the vicinity of the Waltonian Islands and the area near Jenkins Brook provide an extensive area suitable for discovery of new locations. This area has not been extensively managed and includes a number of known locations sustaining moderate populations of Eurasian watermilfoil. The proposed survey includes the area from Friends Point to Jenkins Point in the Town of Hague, and encompasses approximately 500 acres.

This proposal and request for funding is appropriate within the goals of the Lake George Watershed Conference. The detection and management of invasive species in Lake George is of utmost importance to maintaining water quality and ecosystem balance. Management of Eurasian watermilfoil is a labor-intensive pursuit. Previous management programs on Lake George have been slowed by an inadequate determination of known locations. It is impossible to effectively manage something for which you lack adequate distribution information. Hydroacoustic technology offers an opportunity for a more rapid, thorough and cost-effective milfoil surveillance program. This Project addresses the Lake George Watershed Coalition Priority Objective 6: Intervention and Control of the Introduction of Nuisance Species in the Waters of Lake George.

References:

- Boylen, C.W., L.W. Eichler, and J.W. Sutherland. 1997. Physical control of Eurasian watermilfoil in an oligotrophic lake, p. 213-218. In J.M. Caffrey, P.R.F. Barrett, K.J. Murphy and P.M. Wade (ed.) Management and Ecology of Freshwater Plants. Kluwer Academic Publishers, Dordrecht.
- Eichler, L.W., R.T. Bombard, J.W. Sutherland, and C.W. Boylen. 1993. Suction harvesting of Eurasian water milfoil and its effect on native plant communities. International Symposium on the Biology and Control of Aquatic Plants. *Journal of Aquatic Plant Management* 31:144-148.
- Eichler, L.W., R.T. Bombard, J.W. Sutherland, and C.W. Boylen. 1995. Recolonization of benthic barrier sites following the removal of barrier material. *Journal of Aquatic Plant Management*, 33:51-54.
- Harrison, J.P. and J. Farrell. 2007. Hydroacoustic Aquatic Resource Mapping Program. DFWI Technical Report 2007-8. Darrin Fresh Water Institute, Bolton Landing, NY.
- King, R. W. and L. Lyman. 2006. Eurasian watermilfoil management in Lake George, New York, 2007. Lycott Technical Report LG2007. Prepared for the Lake George Park Commission. Lycott Environmental Inc. Southbridge, MA. USA.

Deliverables:

Upon conclusion of the 2010 plant growing season, this project will provide the following:

1. A hydroacoustic database for the Hague delta area of Lake George extending from Jenkins Brook to Friends Point, which integrates several key components of the ecosystem in a context universally applicable to both mapping and global information system (GIS) exchange.
2. Detailed 3 dimensional maps of the bay incorporating the following:
 - a. Accurate accounting of plant spatial area coverage, plant percent cover, plant height, plant types, presence of invasive species (milfoil), and plant growth.
 - b. Further refinement, if necessary, of current algorithms for detection of Eurasian watermilfoil.
 - c. Creation and testing of new algorithms for the detection and delineation of other macrophytes species where possible.
 - d. Accurate bathymetry for use as baseline criteria for future examination of possible sedimentation changes.

Budget for Hydroacoustics - 2010

Item	Cost
Salaries & Fringe	\$15,500
Equipment (boat & gas)	\$1,500
Supplies	\$1,100
Travel	\$248
Clerical, Report preparation	\$700
	Subtotal
	\$19,048
Indirect costs (26% of budget)	\$4,952
	Total
	\$24,000

Figure 1. Proposed 2010 Hydroacoustic Survey area and sites previously surveyed. The proposed survey area encompasses approximately 500 surface acres of Lake George.

