

Annual Report

2016 Aquatic Vegetation Management Program

Webster Lake Association

Webster, Massachusetts

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Introduction

In 2016, an herbicide treatment program using Reward (diquat), Clipper (flumioxazin) and Sonar (fluridone) herbicides was conducted at Webster Lake to provide area-selective control of non-native, invasive variable milfoil (*Myriophyllum heterophyllum*) and fanwort (*Cabomba caroliniana*). The Project Completion Report for the 2016 Aquatic Management Program follows. This report will serve to document the herbicide application process, the pre- and post-treatment monitoring of aquatic vegetation in the lake and the observed response of the targeted invasive weeds.

All work performed in 2016 was conducted in accordance pursuant to a License to Apply Chemicals from the MA DEP (#16222) and an Order of Conditions from the Webster Conservation Commission (#323-0720).

2016 Webster Lake Aquatic Plant Management Program

- *Received MA DEP License to Apply Chemicals..... 6/6/16*
- *Pre-treatment survey..... 5/16/16*
- *Herbicide Treatments*
 - *Initial Sonar herbicide treatment 6/7/16*
 - *Reward/Clipper herbicide treatment..... 6/22/16*
 - *Follow-Up Sonar herbicide treatments..... 7/14/16, 8/2/16, 9/26/16*
- *Post-treatment Inspections 7/14 & 8/2 & 9/27/16*
- *Late season survey 10/12/16*
- *Year-End Report 12/15/16*

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Early Season (Pre-treatment) Survey

SOLitude Lake Management (SLM) Biologists performed the pre-treatment survey on May 16th. As in the past, the survey consisted of navigating the shoreline of the entire lake, noting the types of aquatic plants present and their relative cover and density. Surveys were performed using a combination of techniques: visual observations, the use of “throw-rake” tosses, and an underwater camera system. Special attention was given to the presence of both the non-native invasives variable watermilfoil (VWM) and fanwort, of which few dense areas were identified.

Based on findings from the surveys, a map was compiled that depicted areas of variable milfoil and fanwort growth and provided recommendations for areas that warranted treatment with Reward (diquat) for variable milfoil control and other areas for treatment with the combination of Reward and Clipper (flumioxazin) or Sonar (fluridone) for variable milfoil and fanwort control (Figure 1). Recommended treatment areas focused on areas of dense growth of these two invasive species along high-use, developed shorelines, in marina and cove areas, and in narrow channels that experience high boat traffic. Management objectives were to control growth in high-use areas of the lake to improve access and to limit the chances of fragmentation and additional spread of these invasive species. A version of the map was shared with the Webster Lake Association before treatment areas were finalized.

Twenty-one separate areas ranging in size from 0.9 to 16.8 acres and totaling ~92 acres were targeted for treatment with Reward herbicide for variable milfoil control. An additional four areas ranging in size from 1.9 to 15.6 acres and totaling 23.2 acres were targeted for treatment with Reward and Clipper herbicides for control of variable milfoil and fanwort. Finally, 3 areas totaling ~25-acres were treated with Sonar herbicide, part of which (15-acres) was the Sucker Brook Cove, which was completed as part of a separate project.

Native aquatic plants found in the lake continued to be dominated by stonewort (*Nitella sp.*), Eastern purple bladderwort (*Utricularia purpurea*), tapegrass (*Vallisneria americana*), large-leaf pondweed (*Potamogeton amplifolius*) along with other species, such as thin-leaf pondweed (*Potamogeton pusillus*), other bladderwort species (*Utricularia spp.*), ribbon leaf pondweed (*Potamogeton epihydrus*), Robbins pondweed (*Potamogeton robbinsii*), slender spikerush (*Eleocharis sp.*), cattails (*Typha sp.*), bur-reed (*Sparganium sp.*), arrowhead (*Sagittaria sp.*), white and yellow lilies (*Nymphaea odorata* and *Nuphar variegata*), watershield (*Brasenia schreberi*), and filamentous algae. As with previous years, native vegetation was typically observed in low densities along much of the exposed rocky shoreline and in higher densities within the shallow mucky coves of the lake. Moderate cover of native aquatic plants is important to maintain a healthy and balanced lake ecosystem. Several areas were identified as no-treatment wildlife habitat preservation areas.

Chemical Treatment Summary

Given the protocol for Sonar herbicide use, the initial treatment of those areas was conducted on June 7th. This was followed up with booster treatments on July 14th, August 2nd and September 26th in order to maintain the target concentration over the desired exposure time of 60+ days. Pelletized herbicide was applied from a bow-mounted rotary spreader and on-board GPS was used to guide the applications.

Once the Reward/Clipper treatment areas were finalized with WLA, that herbicide treatment was scheduled, notified and performed on June 22nd. Prior to treatment, the lake shoreline was posted with printed signs that showed the treatment areas outlined on a map of the lake along with the temporary water use restrictions to be imposed. We also notified the Conservation Commission in advance of treatment, which is required in accordance with the permit for this work.

An airboat was utilized to perform the herbicide application. The concentrated herbicides were diluted in a mixing tank on board the airboat and a dilute herbicide solution was applied using a chemical injection system that meters the solution subsurface through weighted hoses. The treatment plots were pre-loaded into a GPS unit on board the board that provided real-time navigation and assured that the herbicide was applied in the proper locations at pre-determined doses.

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Post-Treatment Inspections

In the ensuing months, the lake was inspected multiple times to monitor the effectiveness of the treatment. Good control of the target species was observed in most locations. In some areas that harbored dense variable milfoil growth prior to treatment, some evidence of sparse milfoil plants was still evident. Most of the milfoil plants remaining exhibited stalks stripped of almost all of the leaflets and were in the process of decaying. Good control of fanwort was seen in areas that were treated with the combination of Reward and Clipper herbicides. Waterlilies appeared to be the most impacted native species, typically in treated coves. For the Sonar treatment areas specifically, the southernmost area (Area S2) did not respond well to the treatment, probably because of its location and small size, which allowed for more dilution. The treatments in Areas S1 & S2 worked well although there were some chlorotic (probably non-viable) biomass remaining and some less affected, viable growth along the outer fringes.

Late Season Survey

A final late-season survey was performed on October 12th. By that time there was some considerable recovery of both fanwort and VWM (Figure 2). Late season recovery of these plants is expected due to the fact that both Reward and Clipper are considered contact-herbicides that do not control the root structures. Most of the recovering milfoil and fanwort plants were less than three feet tall and were not interfering with access or boating activity on the lake, though many large fanwort patches were identified outside of the treatment areas. Milfoil remains more widespread than fanwort, but a few of the cove areas along the southeast shoreline supported considerable fanwort plants (mainly newly observed areas that were not treated).

Native plants were still evident throughout the lake during the 2016 late season survey. Dominant plants observed included stonewort, tapegrass, common bladderwort (*Utricularia vulgaris*), Eastern purple bladderwort, little floating bladderwort (*Utricularia radiata*), snailseed pondweed (*Potamogeton bicupulatus*), large-leaf pondweed, muskgrass (*Chara sp.*), ribbon-leaf pondweed, yellow and white water lilies. Submersed pondweeds, bladderwort and stonewort were present, although some impacts were noted directly in treated areas. Full recovery of any impacted waterlilies is expected in 2017.

Water Clarity:

Water clarity in Webster Lake was measured using a Secchi disk. Secchi disk readings were collected mid-basin in each lake during the late season survey. The results of these measurements are listed below (Table 1). As seen in past years, the clarity in South Lake remains somewhat below that of the other two lakes. Overall, the water clarity readings were noticeably better than in either 2014 or 2015.

Table 1: Secchi disk measurements collected in 2015 & 2014 season

Date Collected	North Lake Reading (feet)	Middle Lake Reading (Feet)	South Lake Reading (Feet)
10-12-16	13.5	13.5	10.0
09-24-15	12.5	11.1	9.4
06-06-14	13.0	12.5	10.6

Temperature and Dissolved Oxygen Profiles:

Temperature and dissolved oxygen profiles were collected mid-basin in each lake during the late-season survey. The water column was well oxygenated throughout, and no longer stratified from the summer (Table 2). All three profiles depict consistent temperatures and dissolved oxygen values from surface to bottom, which is common for the fall season.

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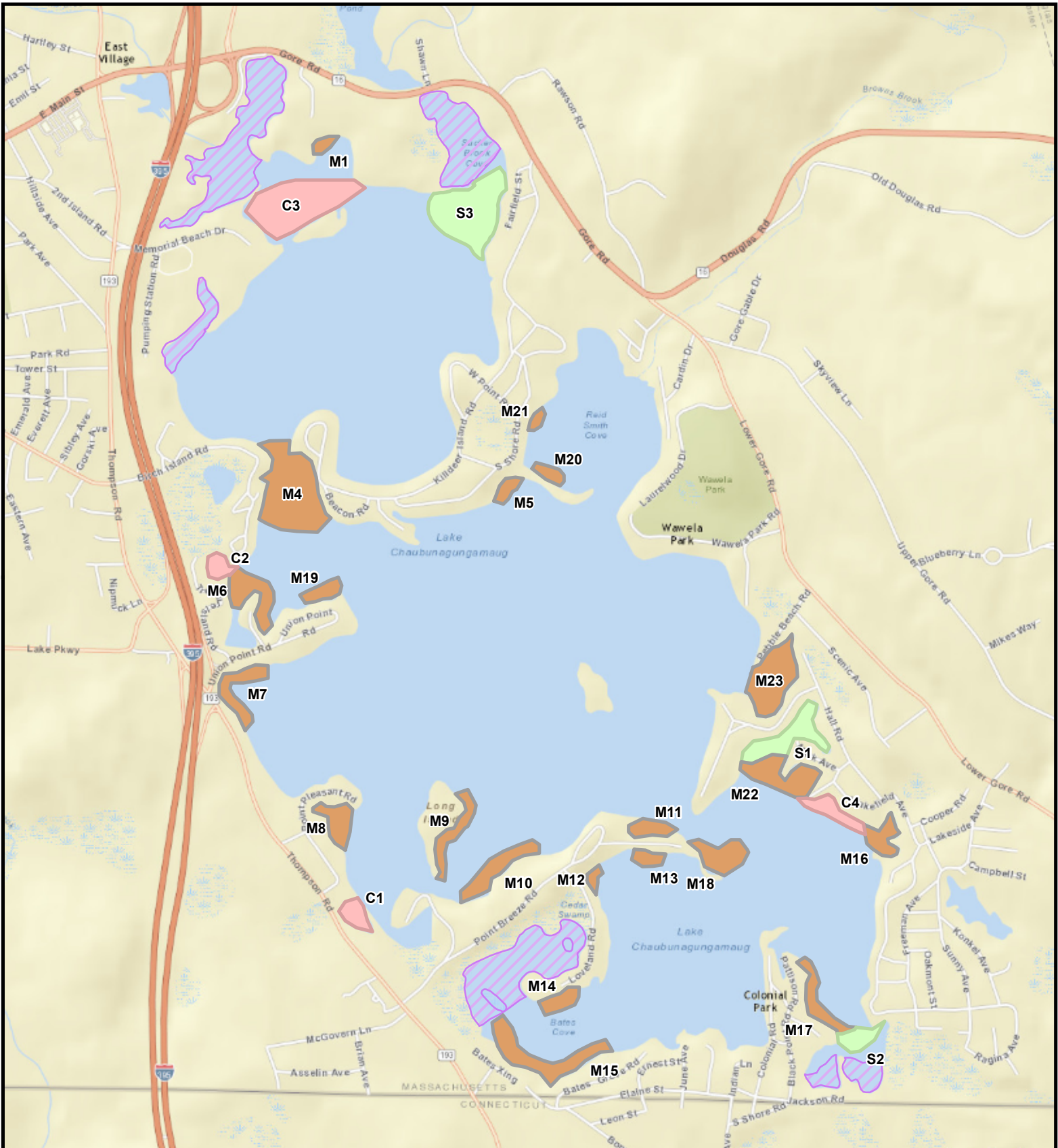
Depth (Meters)	North Lake		Middle Lake		South Lake	
	Temperature (°C)	Dissolved Oxygen (mg/L)	Temperature (°C)	Dissolved Oxygen (mg/L)	Temperature (°C)	Dissolved Oxygen (mg/L)
Surface	17.0	8.97	17.4	8.96	16.9	9.01
1	16.9	8.97	17.2	9.01	16.7	9.02
2	16.8	8.87	17.0	8.98	16.5	9.03
3	16.5	8.87	16.9	8.95	16.2	9.03
4	16.2	8.86	16.7	8.94	16.2	8.98
5	16.2	8.84	16.6	8.90	16.1	8.95
6	16.1	8.61	16.5	8.88	16.1	8.92
7	16.1	8.40	16.5	8.84	16.0	8.42
8	--	--	16.4	8.83	16.0	8.36
9	--	--	16.4	8.80	--	--

Summary and Ongoing Management Recommendations for 2016

Overall, good control of the targeted invasive fanwort and variable milfoil growth was achieved by the 2016 treatment program. The area selective treatment with Reward and Clipper herbicides provided good, season-long control of these invasive plants in high-use areas. Some late season regrowth was observed, but plants were still small and not at nuisance densities, or growing at lower depths unnoticed by boat traffic.

For 2017, we recommend that the Webster Lake Association budget for continued maintenance spot-treatments of invasive fanwort and VWM growth. Reward herbicide is recommended for VWM control and Clipper herbicide is recommended for continued spot-treatment of fanwort. There continue to be some state restrictions on the use of Clipper that only allow for a maximum of 25% of the waterbody to be treated during any year and rotating treatment areas, so that the same areas are not retreated within a three-year period. It should be manageable to rotate use of Clipper and Sonar herbicides for fanwort control under the current regulations. Work by the WLA and also within MassDEP may result in the lifting or modification of these regulations, hopefully in 2017.

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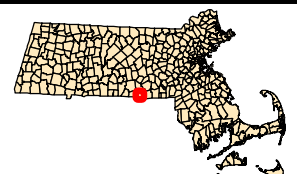
Webster Lake

Webster, MA
2016 Treatment Areas - Chemicals

- Clipper/Reward
- Reward
- Sonar
- Wildlife Preservation Zones

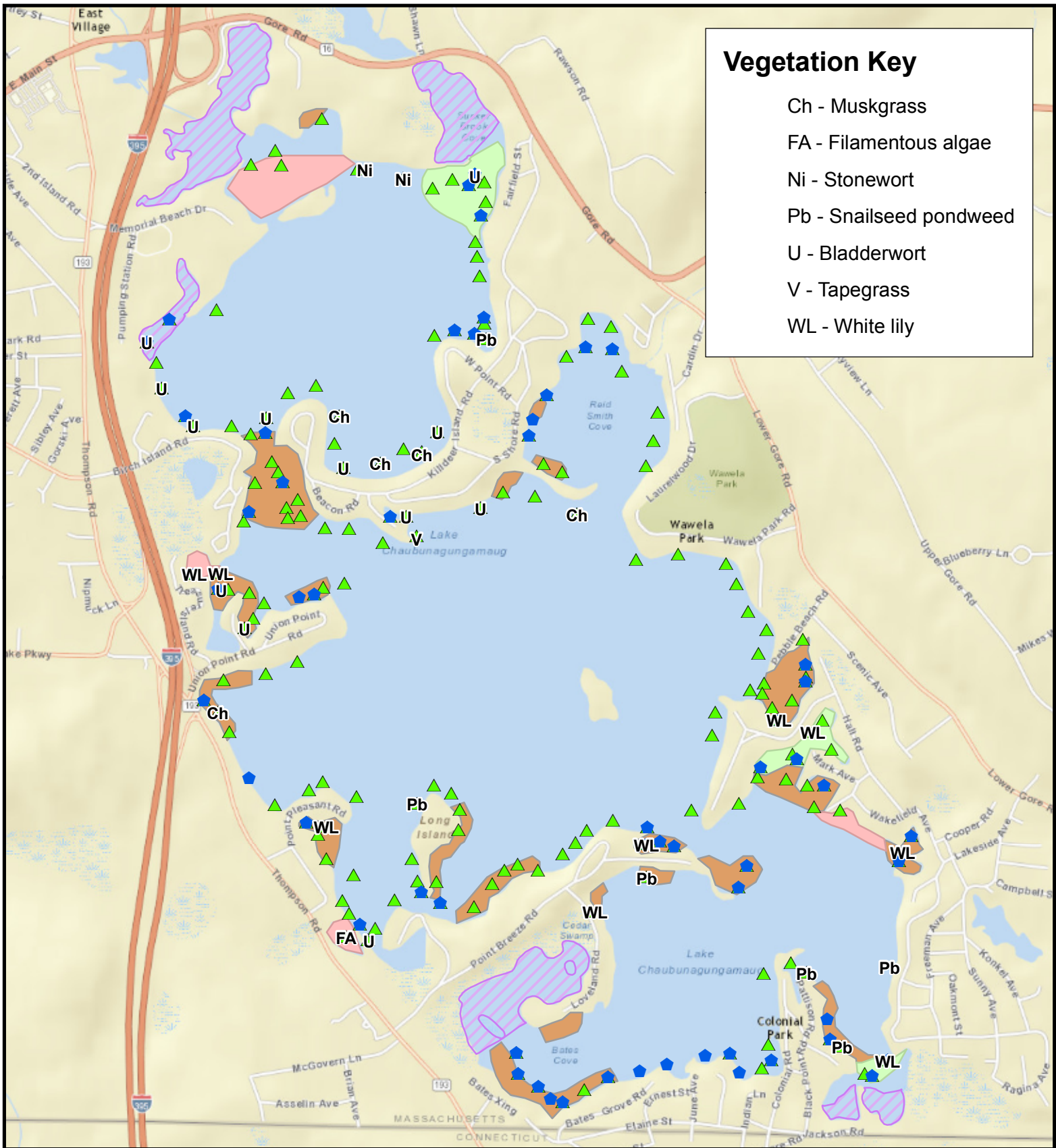


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0 550 1,100 2,200 3,300 4,400
Feet

FIGURE:	SURVEY DATE:	MAP DATE:
1	5/16/16	6/1/16



Vegetation Key

- Ch - Muskgrass
- FA - Filamentous algae
- Ni - Stonewort
- Pb - Snailseed pondweed
- U - Bladderwort
- V - Tapegrass
- WL - White lily

Webster Lake

Webster, MA

2016 Late-season Vegetation Survey with Treatment Areas

FIGURE:	SURVEY DATE:	MAP DATE:
2	10/12/16	12/5/16

Legend

- Fanwort
- VWM
- Clipper/Reward
- Reward
- Sonar
- Wildlife Preservation Zones

0 0.1 0.2 0.4 0.6 0.8 Miles

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