LYCOTT ENVIRONMENTAL

January 15, 2015

Glen Echo Improvement Association, Inc.
c/o Ms. Jackie Nowak
P.O. Box 578
Charlton City, MA 01508
nowak151@verizon.net

Via Email and First-Class Mail

RE: Glen Echo Lake, Charlton, Massachusetts
2014 Herbicide Management Summary Report

Dear Association members:

Please find enclosed the 2014 Herbicide Management Summary Report for Glen Echo Lake. This document includes a detailed summary of Lycott's management activities during 2014 (e.g., permitting, notifications, herbicide treatments, and surveys), as well as broad management recommendations for 2015.

Should you have any questions regarding this report, please feel free to contact us at the office by telephone (508-885-0101) or by email (info@aquaticcontroltech.com), former email (info@lycott.com).

Sincerely,

Marc D. Bellaud
President

MDB/rlg

Enclosures

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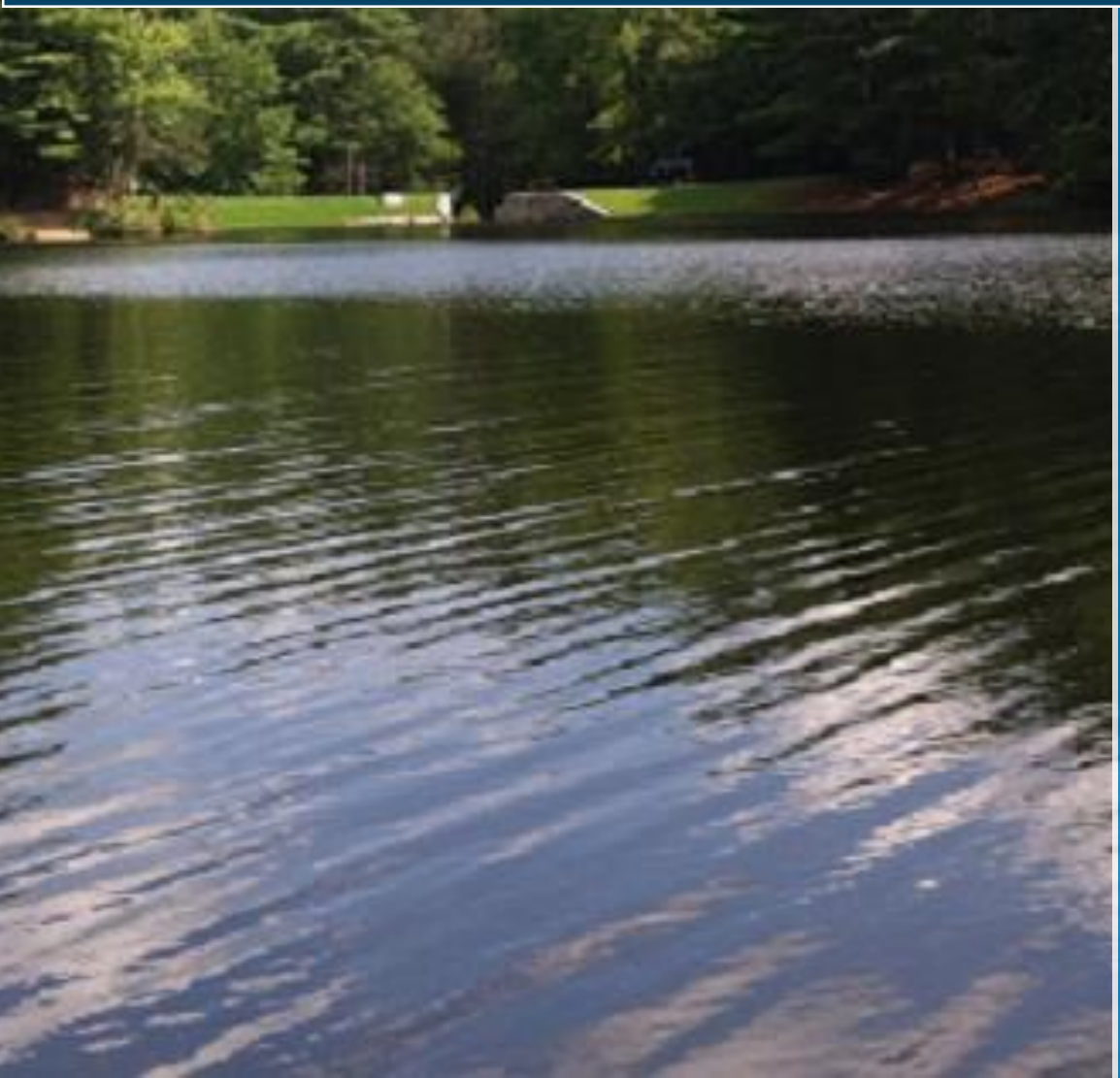
LYCOTT

Final Report for 2014 Aquatic Plant Management

Glen Echo Lake

Charlton, Massachusetts



Submitted: January 15, 2015

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Table of Contents

Appendix

1.0 Background

Glen Echo Lake is a 116 acre, fresh water lake located in Charlton, Massachusetts. This lake is primarily used for recreational activities (i.e., fishing, swimming, boating, etc.) by the residents living on it; Glen Echo's shoreline is approximately 90% developed by seasonal and year round residents.

On June 13, 2014, the Glen Echo Improvement Association (GEIA) contracted (Contract#362-14) Lycott Environmental (Lycott) of Spencer, Massachusetts to manage aquatic vegetation (i.e., invasive and/or nuisance) in Glen Echo Lake in 2014. In accordance with Contract (#362-14) and the Order of Conditions (OOC), the following document serves to provide the Glen Echo Improvement Association with a detailed summary of the 2014 herbicide management program.

2.0 Permit Information

Orders of Conditions	
DEP File #	**Expiration Date**
128-1073	3/4/2015

MassDEP License to Apply Chemicals for Control of Nuisance Aquatic Vegetation	
Application Submitted	**Permit Received**
6/16/2014	6/25/2014

3.0 Pre-Management Survey

A pre-management survey was conducted on July 1, 2014 by Lycott biologists, to determine the distribution and relative abundance of the target species throughout Glen Echo Lake. Results of this survey indicated that moderate to dense invasive, non-indigenous *Myriophyllum heterophyllum* (Variable Milfoil, V. Milfoil) typified several large areas (totaling approximately 50 acres) at Glen Echo Lake. As historically seen, much of the V. Milfoil infestation was observed in the northern basin; however, growth of V. Milfoil can now be seen along the eastern and western shorelines along Glen Echo Shore Road, Sunset Drive, Lakeview Drive, and in the south basin along Steven Parks Road (**Appendix: Figure 1-A**). Representative images of the V. Milfoil observed during the pre-management survey are shown below:

Image 1: Moderate to dense V. Milfoil

Image 2: Subsurface look at V. Milfoil

In 2013, the highly invasive Cabomba caroliniana (Fanwort), was identified in the southern section of Glen Echo Lake, along Steven Parks Road, during the post-management survey. This invasive, non-indigenous species was again observed during the 2014 pre-management survey in the same locations as in 2013.

The aquatic plant community observed was comprised primarily of the invasive, non-native species, Variable Milfoil; this species spanned approximately fifty (50) acres. Nine (9) native species were also noted during this survey and are listed in the table below. These species were limited to the littoral zone area and observed intermittently at trace to dense abundances. A map depicting the extent and relative abundance of aquatic vegetation observed during the 2014 pre-management survey is attached to this report (**Appendix: Figure 1-B**), these species are listed in the table below:

Common Name	**Scientific Name**
Quillwort	*Isoëtes* sp.
Big-Leaf Pondweed	*Potamogeton amplifolius*
Yellow Water Lily	*Nuphar variegata*
Ribbon-Leaf Pondweed	*Potamogeton epihydrus*
Stonewort sp.	*Nitella* sp.
Small Pondweed	*Potamogeton pusillus*
Snail-seed Pondweed	*Potamogeton bicupulatus*
Bladderwort sp.	*Utricularia* sp.
Coontail	*Ceratophyllum demersum*
Southern Naiad	*Najas guadalupensis*

4.0 Treatment Notifications

Notifications, including information on target species, herbicide(s)/algaecide(s) used, manufacturer's product labels, and the MassDEP issued permit were provided to the Charlton Conservation Commission by Lycott via fax and email seventy-two (72) hours prior to each herbicide application (dates listed below). Also prior to undertaking treatments, notifications were sent to the Charlton Board of Health, Charlton Board of Selectmen, and Glen Echo Improvement Association, and a public notice was placed in the Telegram & Gazette detailing the timing and water-use restriction of the treatment.

5.0 Chemical Applications

A total of three chemical applications were conducted during the 2014 management season. Each was scheduled to achieve the maximum effect on its respective target species. The table below summarizes the results of cursory assessments conducted at Glen Echo Lake prior to each application, as well as the chemical usage.

Notification Date	Treatment Date	Product	Amount	pH	Temp (°F)	Target Species Observations
6/25/14	7/2/14	Reward®	50 gal	7.0	68.0	Moderate to dense V. Milfoil throughout treatment areas
		Sonar® One	180 lbs			Dense Fanwort throughout treatment areas
7/21/14	7/30/14	Sonar® One	60 lbs	7.0	78.0	*Dense patches of Fanwort, chlorotic from first treatment
8/07/14	8/19/14	Sonar® One	100 lbs	7.0	75.0	Dense patches of Fanwort, chlorotic from first two treatments

* - On 7/16/14, Lycott applicators arrived at Glen Echo for the first 'booster' treatment. Upon conducting a cursory survey before treatment, multiple new growth patches of Fanwort were observed along the eastern and western shorelines of the Lake. The 'booster' treatment was held off until the proper paper work was submitted and received allowing treatment of additional acres of Fanwort.

The following pictures were taken on July 30, 2014 by a Lycott applicator, notice the chlorosis; **Image 3** shows pink chlorosis on Fanwort out of the water, while **Image 4** shows some pink chlorosis on submersed Fanwort. Treatment tracks for each herbicide application can be found in the **Appendix: Figure 2**.

Image 3: Chlorotic Fanwort retrieved via rake toss

Image 4: Chlorotic submersed Fanwort

6.0 Post-Management Survey

A post-management survey was conducted on October 6, 2014 by Lycott biologists. Results of this survey indicated that Fanwort expanded beyond its pre-treatment survey, mid-season survey and herbicide treatment extent (approximately 5 acres total), by approximately seven (7) acres (**Appendix: Figure 3-A**) (**Images 5 & 6**); this may have been due to the start of application beginning mid-summer. The extensive growth of nearly 50 acres of V. Milfoil may have suppressed the Fanwort plants as they had not been observed during the July survey (other than the two locations in the southern basin). Once the treatment of the V. Milfoil was conducted and took effect, the previously suppressed Fanwort was able to proliferate throughout the water

body. Fanwort has a very fragile stem structure, this benefits the species as it aids in reproduction. Fanwort will grow seeds but its primary means of reproduction is via fragmentation, and given that Glen Echo Lake is a highly recreational water body, it is likely that the Fanwort spread to other parts of the water body by fragmentation from recreational activity as well as fragmentation by the plant itself.

Image 5: Dense Fanwort located in the northern basin

Image 6: Subsurface look at Fanwort in the northern basin

Several additional indigenous aquatic vegetation species were noted throughout the littoral zone at varying densities at the time of the October survey (**Appendix: Figure 3-B**). The following table lists these species:

Common Name	Scientific Name
Fern-Leaf Pondweed	*Potamogeton robbinsii*
Quillwort	*Isoëtes* sp.
Big-Leaf Pondweed	*Potamogeton amplifolius*
Yellow Water Lily	*Nuphar variegata*
Ribbon-Leaf Pondweed	*Potamogeton epihydrus*
Stonewort sp.	*Nitella* sp.
Yellow Water Lily	*Nuphar variegata*

7.0 Conclusion and Recommendations

The management activities conducted at Glen Echo Lake in 2014 served to reduce the distributions of V. Milfoil throughout the water body. Although treated areas of Fanwort showed chlorosis, Lycott biologists will be able to better tell the effect of the herbicide treatments in the upcoming spring season.

Fanwort is a highly invasive, competitive plant species that has the capability to proliferate rapidly. Fanwort is considered invasive due to the fact that it will displace native species, decrease water quality, become a nuisance for recreational uses, decrease valuable food sources, and deplete oxygen resulting in anoxic conditions which can lead to fish fatality and be harmful to other wildlife. Due most likely to fragmentation and early season suppression by V. Milfoil,

Fanwort has spread intermittently along the shoreline of Glen Echo Lake and any remaining areas of this species should be targeted early before it continues to spread and move throughout the water body.

Based on pre- and post-management surveys, Lycott recommends the use of systemic herbicides for long term control of both V. Milfoil and Fanwort in Glen Echo Lake. The products recommended are Sonar® One for Fanwort, and Renovate® OTF for V. Milfoil. Systemic herbicides offer longer lasting control of target species; they reduce/eliminate both recruitment (i.e., new plants added to the population in subsequent years) as well as the standing crop by attack the root system of the plant killing it from the root rather than burning it back at the leaves. Large areas of growth, when treated with systemic herbicides, are often eradicated or reduced to small areas of growth which are cheaper and easier to maintain in future years. If the GEIA chooses to continue contact herbicide treatments utilizing Reward® for V. Milfoil, Lycott suggests two herbicide treatments be conducted, one in late spring/early summer and one later in the summer for any regrowth that may occur.

Appendix

Figure 1-A: July 2014 Distribution of Invasive Aquatic Vegetation Species
Figure 1-B: July 2014 Distribution of Remaining Aquatic Vegetation Species
Figure 2: 2014 Treatment Tracks
Figure 3-A: October 2014 Distribution of Invasive Aquatic Vegetation Species
Figure 3-B: October 2014 Distribution of Remaining Aquatic Vegetation Species

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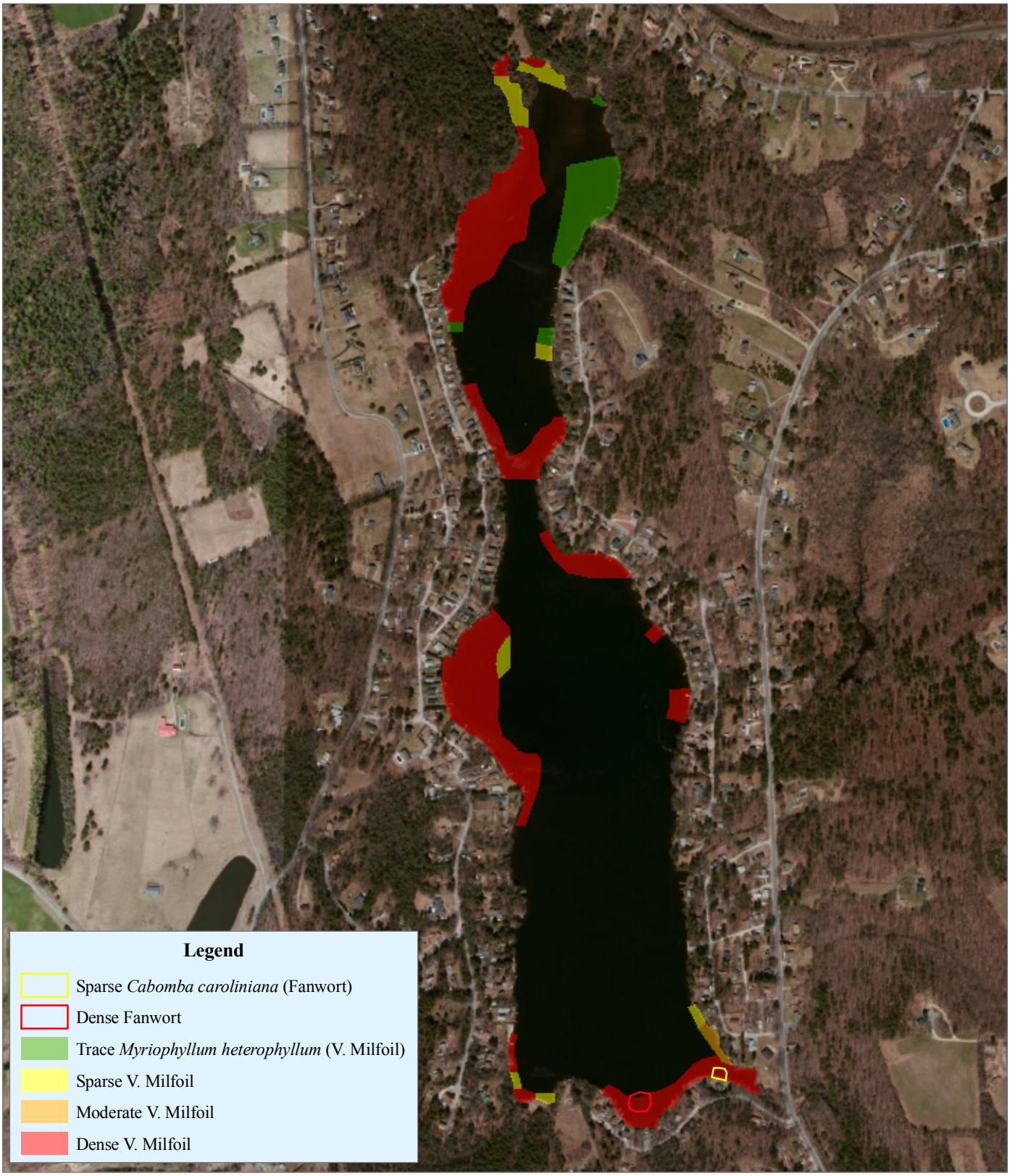
Figure 1-A: July 2014 Distribution of Invasive Aquatic Vegetation Species



Glen Echo Lake
Charlton,
Massachusetts

Data Collected: 07/01/2014
Map Prepared:11/07/2014
For Glen Echo Improvement Association, Contract (#362-14)
Basemap © 2013 Esri

0 250 500 1,000
1:10,000 Feet

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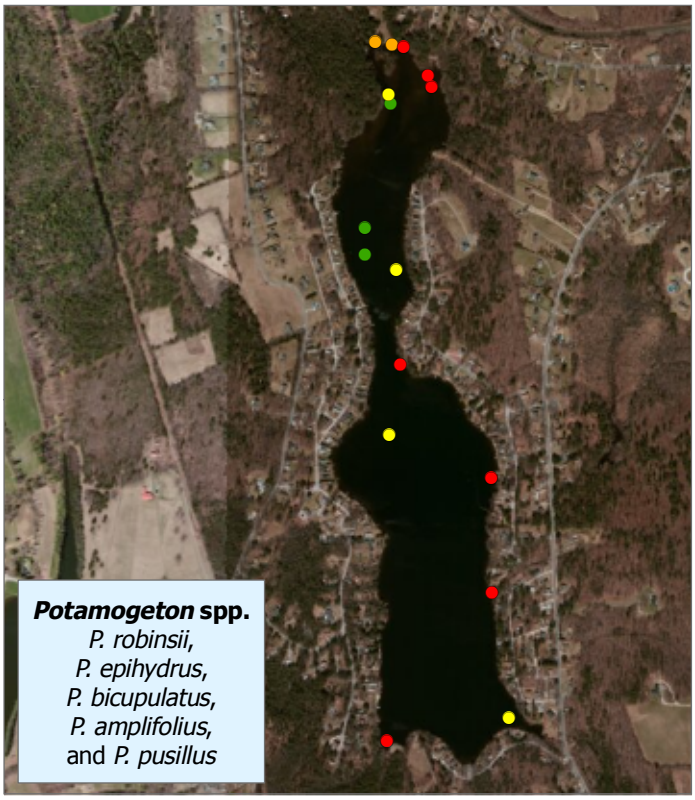
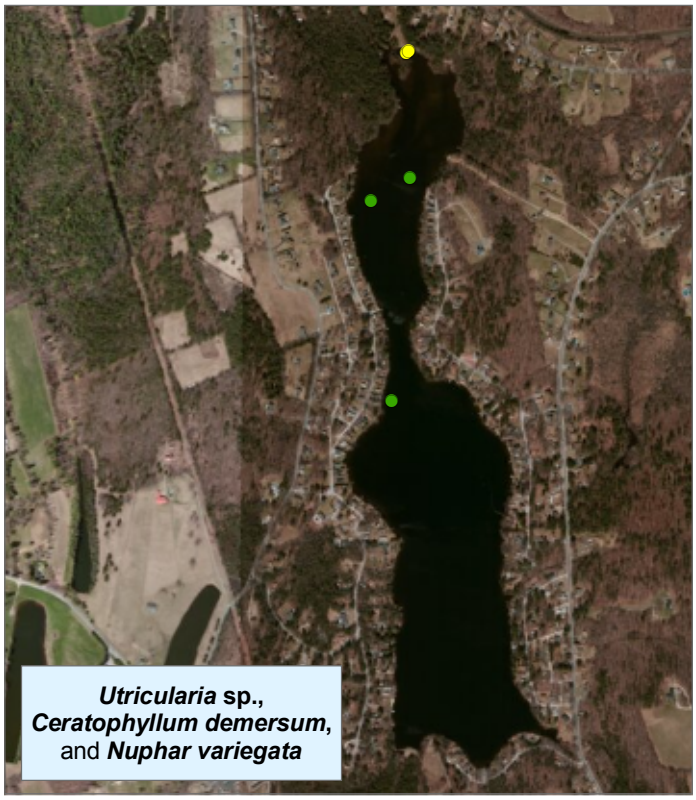
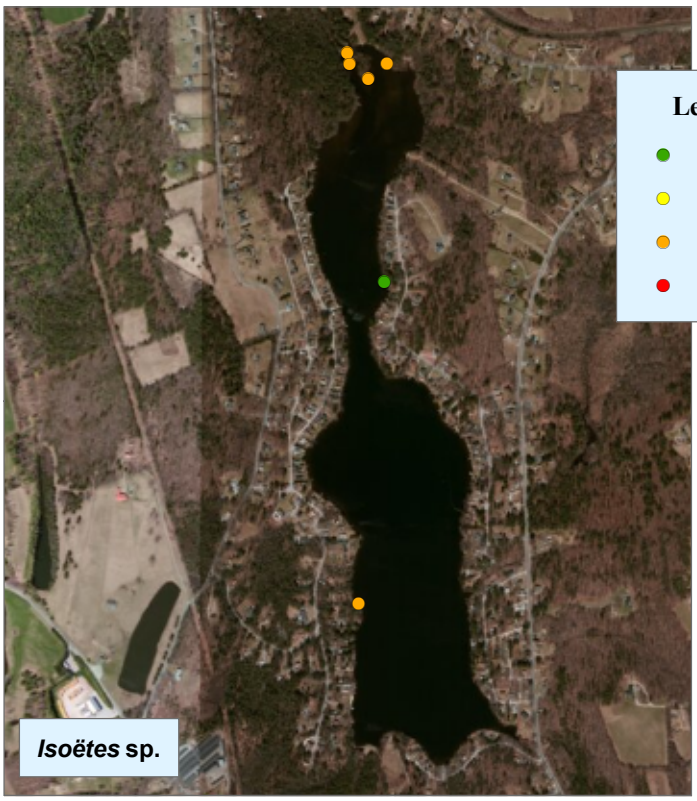
Figure 1-B: July 2014 Distribution of Remaining Aquatic Vegetation Species







Legend
- Trace
- Sparse
- Moderate
- Dense

Glen Echo Lake
Charlton,
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Data Collected: 07/01/2014
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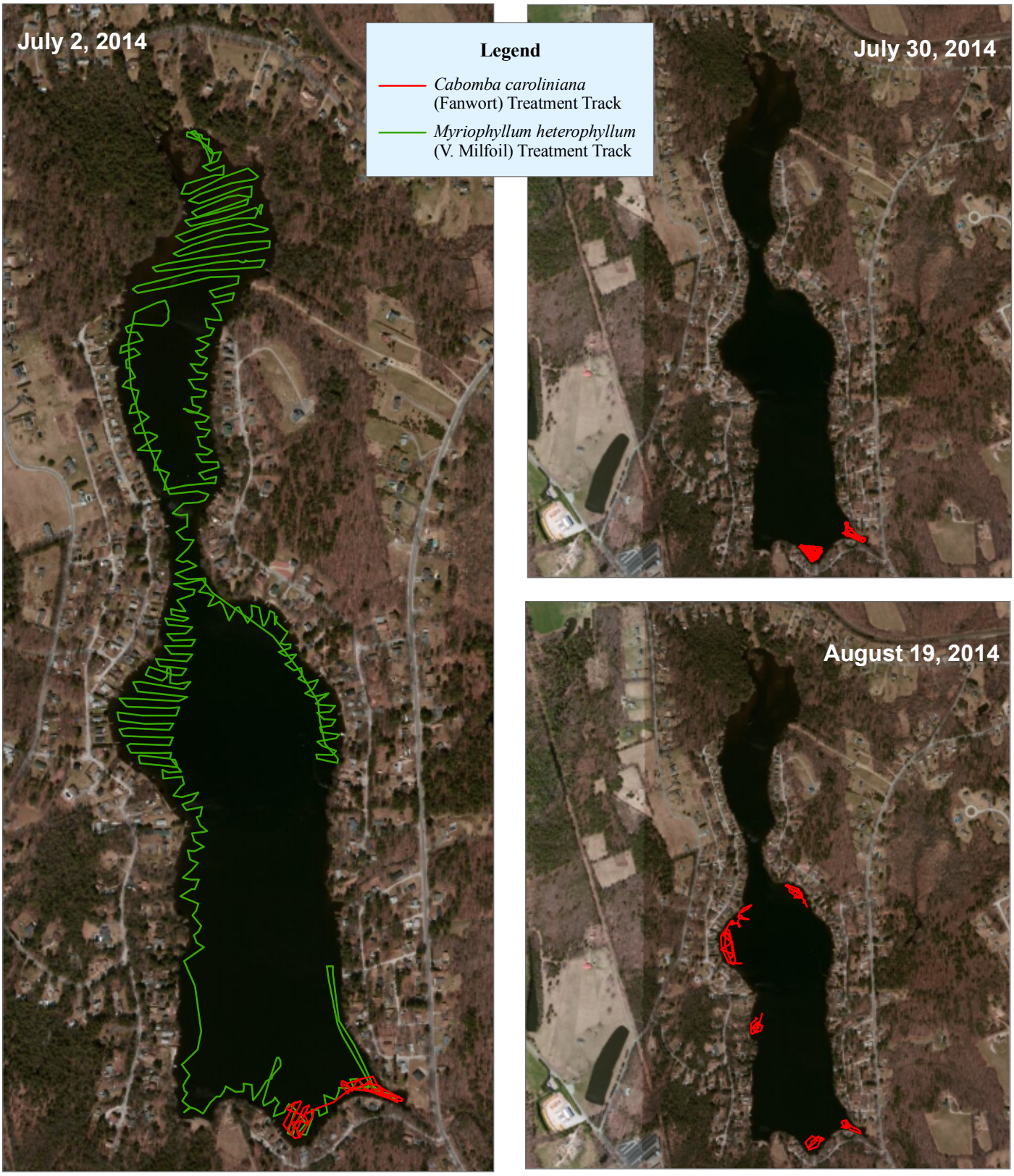
Figure 2: 2014 Treatment Tracks



Glen Echo Lake
Charlton, Massachusetts

Data Collected: July/August '14
Map Prepared:11/07/2014
For Glen Echo Improvement Association, Contract (#362-14)
Basemap © 2013 Esri

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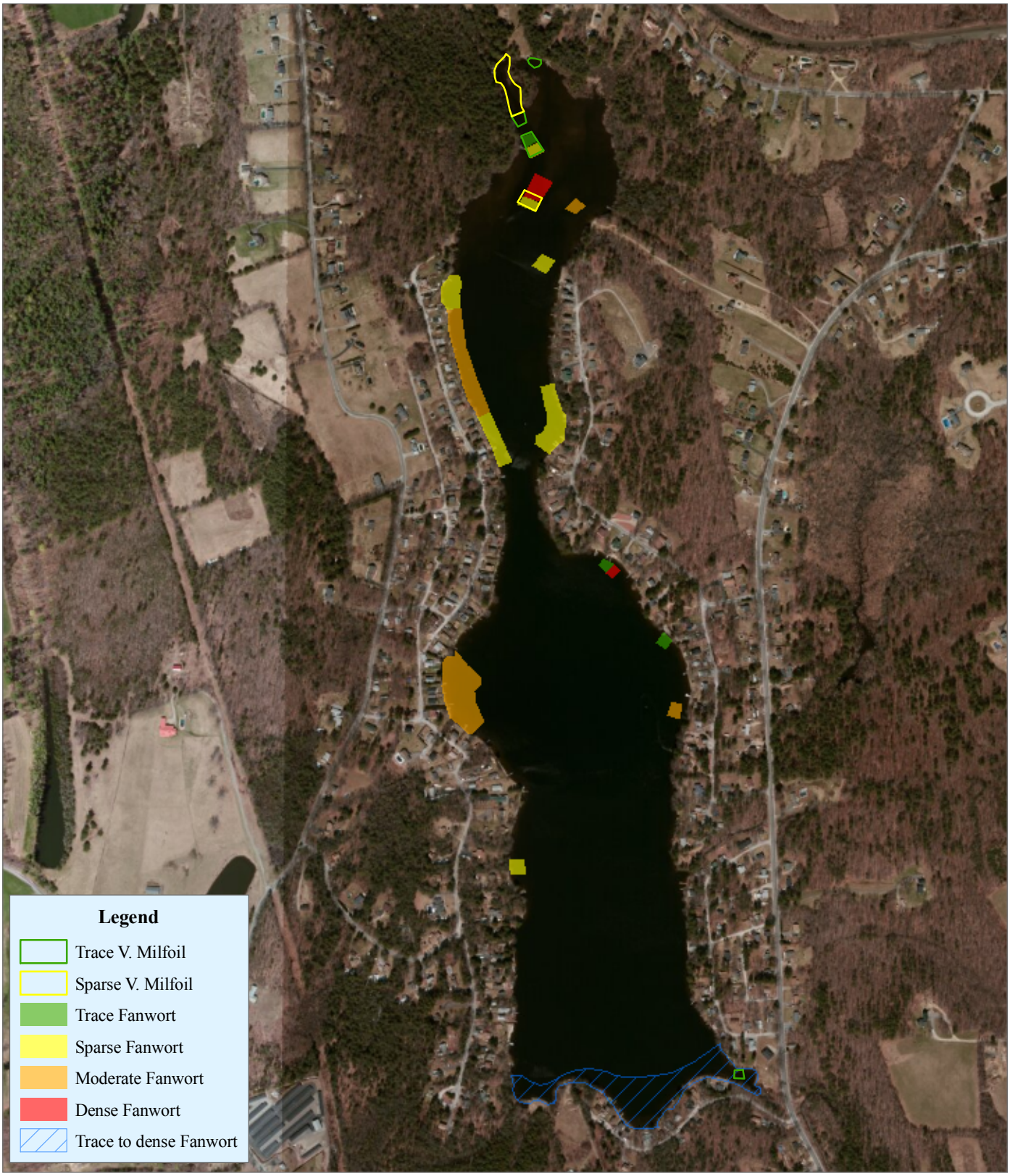
Figure 3-A: October 2014 Distribution of Invasive Aquatic Vegetation Species



Glen Echo Lake
Charlton,
Massachusetts

Data Collected: 10/06/2014
Map Prepared:11/07/2014
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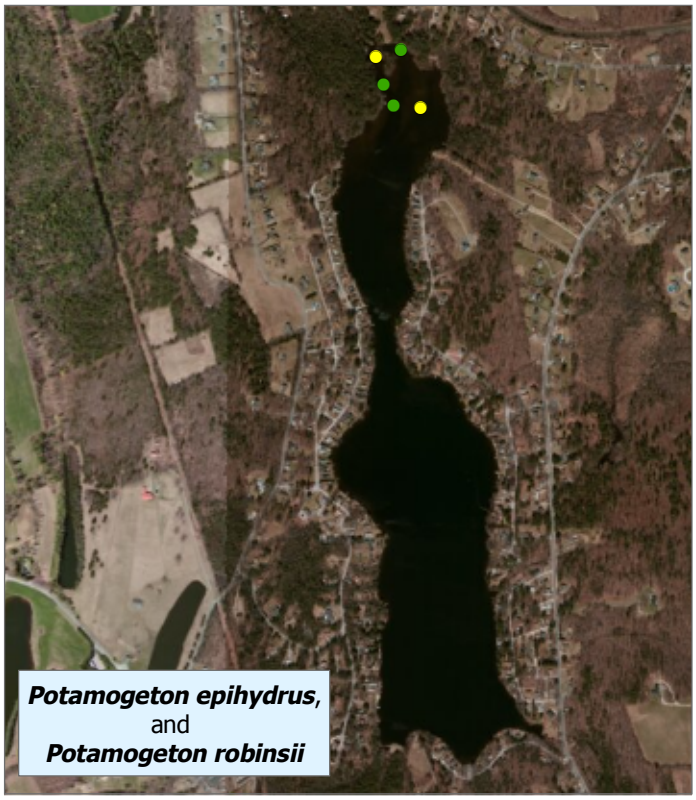
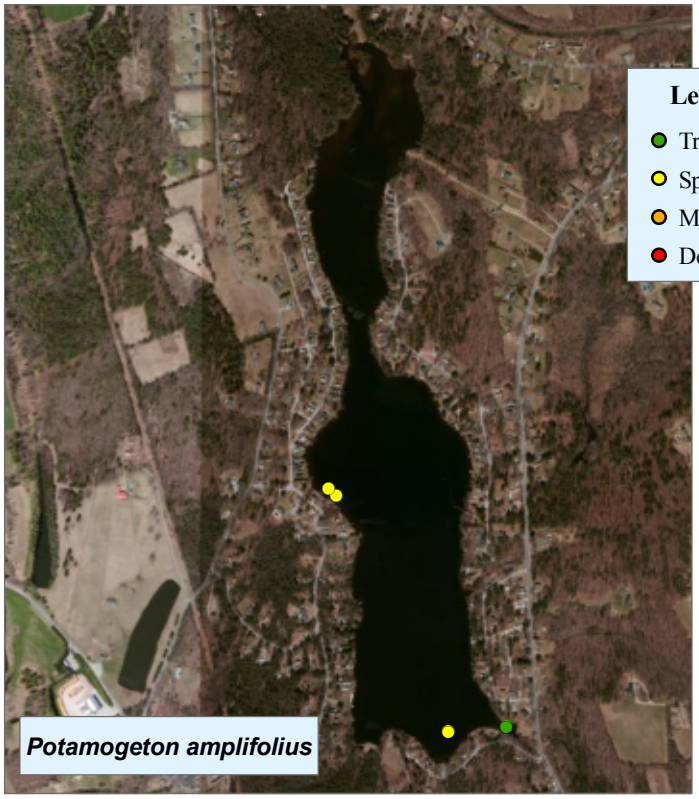
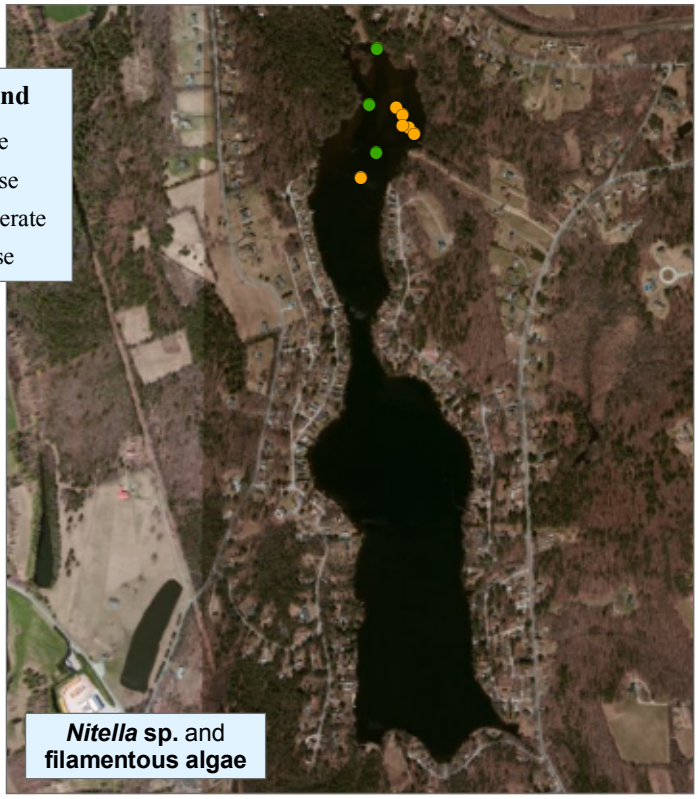
Figure 3-B: October 2014 Distribution of Remaining Aquatic Vegetation Species







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