AQUATIC CONTROL TECHNOLOGY

Year-End Report for the 2015 Aquatic Plant Management of the

Lake Cochituate System

Natick, Framingham, & Wayland, Massachusetts

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Marc D. Bellaud
President/Aquatic Biologist

info@aquaticcontroltech.com
508-885-0101
21 West Main St (Route 9)
Spencer, MA 01562

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1.0 **Background**

Cochituate State Park, located in the Towns of Natick, Framingham, and Wayland encompasses the approximately 683-acre water system of Fiske Pond and Lake Cochituate (herein referred to as the 'Lake Cochituate system'). Water flows in a northerly direction from Fiske Pond into Lake Cochituate which is comprised of three distinct basins, commonly referred to as South, Middle, and North Ponds (**Image 1**). Due to its location and accessibility, these water bodies receive heavy recreational use, including fishing, swimming, canoeing, kayaking, rowing, water skiing, and sight-seeing.

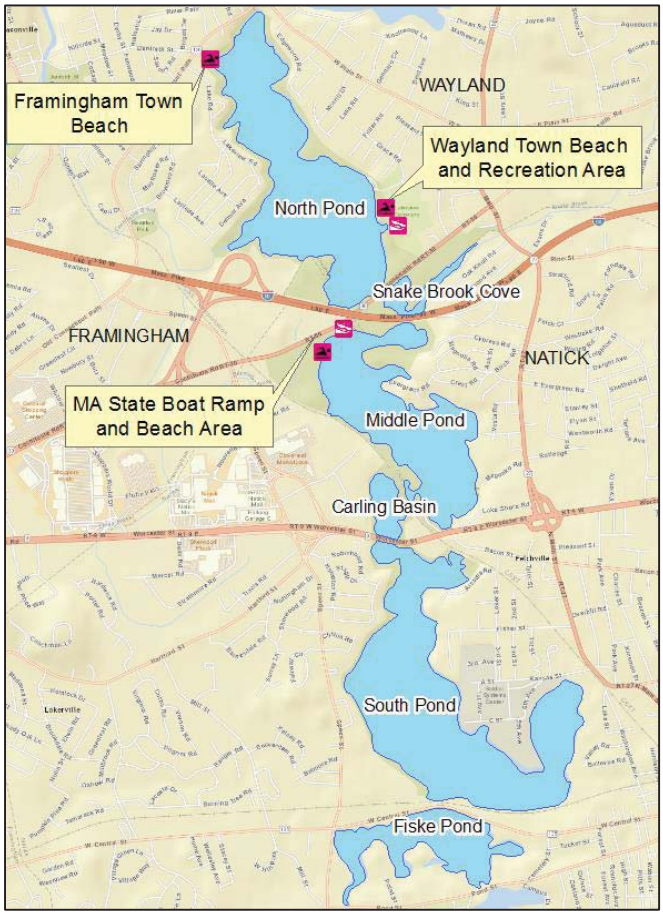


Image 1. Lake Cochituate system site reference map.

Several invasive aquatic vegetation species; *Myriophyllum spicatum* (Eurasian Milfoil, E. Milfoil), *Myriophyllum heterophyllum* (Variable Milfoil, V. Milfoil), and *Trapa natans* (Water Chestnut) were first observed in the Lake Cochituate system in the early 2000s. Since this time, a variety of management efforts, including hand-pulling, suction harvesting, mechanical harvesting/hydro-raking, benthic matting, fragment barriers, water circulators and herbicides (both systemic and contact) have been implemented in the Lake Cochituate system via a coordinated effort between DCR, several municipal departments, and other "Friends" groups. Due to funding and coordination of multiple stakeholders, implementation of these control efforts followed a segmented approach (i.e., control efforts were implemented per water body and varied in frequency and scale) and as such, have rendered long-term results difficult to achieve. Given each water body impacts the next, both from upstream to downstream and downstream to upstream, based on natural flow and recreational uses, implementation of a system-wide approach was needed to achieve an overall reduction in invasive aquatic vegetation in the Lake Cochituate system.

On August 8, 2014, Aquatic Control Technology (ACT) received a Notice to Proceed (NTP) from the Department of Conservation and Recreation (DCR) to conduct an invasive and nuisance aquatic vegetation program throughout the entire Lake Cochituate system from 2014 to 2016 (contract #115-14). As detailed in the NTP, the target invasive aquatic plant species, include *Myriophyllum* species, and *T. natans*, and nuisance aquatic plant species, include *Potamogeton* (Pondweed) spp. and *Ceratophyllum demersum* (Coontail). The following sections of this report serve to provide DCR and the Wayland, Framingham, and Natick Conservation Commissions with a summary of the management activities, including the permitting (i.e., Notice of Intent and License to Apply Chemicals), surveys, notifications, management activities, and diquat sampling, that occurred in the Lake Cochituate system during 2015.

2.0 Permit Information

ACT is currently up to date with all permits, acquired in 2014, until the current contract ends after the management year of 2016. A License to Apply Chemicals for the Control of Nuisance Aquatic Vegetation was accepted by the Massachusetts DEP on June 19th, 2015.

3.0 Pre-Management Surveys

Due to the large size of the Lake Cochituate system, several pre-management surveys were conducted by ACT during the 2015 summer season. These surveys included observations of the aquatic plant community at designated locations (i.e., point-intercept survey) and target bed identifications. This vegetation data were used to develop management recommendations for controlling the invasive and nuisance aquatic plant species (as detailed above) during the 2015 season. A detailed description of these survey methods is provided in **Appendix A**. A summary of the pre-management survey results and management recommendations are provided in the following table. In order to maintain continuity with previous reports and map submissions pre-management survey results are separated by basin (i.e., North, Middle, South, and Fiske Ponds) in the following table.

Survey Location/ Date(s)	Survey Observations
North Pond June 23, 2015	*M. spicatum* was observed in trace amounts (2.4%) during the June target bed identification survey. Invasive species *M. heterophyllum* and *T. natans* are not typically observed in this section of the Lake Cochituate system and were not observed at the time of this survey. During the June 2015 point-intercept survey, a few isolated *M. spicatum* plants were noted in the southern section of North Pond. At this time, nine native species were observed; *P. robbinsii* (Fern-Leaf Pondweed) (40.5%) and *Najas flexilis* (27.4%) dominated the aquatic plant community. Overall, vegetative coverage (of all species) was minimal (average coverage: 9%) and limited to coves and shallow (i.e., growth typically not observed past 13'), silty/sandy areas throughout North Pond (refer **Appendix B** maps and associated raw data) **Management recommendation(s): Conduct follow-up survey to identify potential late-season emergence of *M. spicatum* in North Pond. If *M. spicatum* densities remain below a threshold of 5% coverage (1,000 stems per acre), hand-harvesting should be employed to control the *M. spicatum* population in North Pond.**
Middle Pond (including Snake Brook & Carling Basin) June 23, 2015	Trace to dense (primarily trace) *M. spicatum* noted throughout the littoral zone (19.4%). *P. crispus* was also observed in a single isolated location. Unlike the 2014 spring season, *M. spicatum* was no longer the dominant plant during the pre-management survey. Of the thirteen native species noted the most prevalent were *P. robbinsii* (40%), *P. perfoliatus* (19%), and *Najas flexilis* (Bushy Naiad) (19%). A medium amount of vegetative coverage (of all species) (average vegetative coverage: 35%) was noted throughout the littoral zone (i.e., littoral zone defined as 14'; no growth observed >14') (refer to **Appendix C** for maps and associated raw data). **Management recommendation(s): Invasive aquatic plant species; *M. spicatum* exceeded a threshold of 5% coverage (1,000 stems per acre); therefore, diquat management is recommended. Although not a primary management concern, additional invasive species, *P. crispus*, coincides with invasive *Myriophyllum* species and is susceptible to diquat;**

Survey Location/ Date(s)	Survey Observations
	Therefore, this species will likely be affected by the proposed diquat treatment. No evidence of *T. natans* was observed at this time.
South Pond June 25, 2015	Trace to dense (primarily sparse) *M. spicatum* noted throughout the littoral zone (20%), with *Potamogeton crispus* found at 1% frequency. Although *Egeria densa* was discovered in the 2014 pre-management survey, it was not found in the 2015 season. *M. spicatum* did not dominate the plant community and was found at only 20% of the survey points. Eight native species were also observed at this time; the most prevalent species included *P. robbinsii* (50%), Najas flexilis (39%), *and Potamogeton perfoliatus* (36%). Frequency of occurrence (of all species) was 8% less than the 2014 average of 55% with no growth observed past 12 feet. (Refer to **Appendix D** for maps and associated data). **Management recommendation(s): Similar extents and abundances of invasive species in South Pond as in Middle Pond. Therefore, management recommendations for Middle Pond hold true for South Pond.**
Fiske Pond June 29, 2015	May and June target bed identification survey indicated that isolated patches of moderate to dense *M. heterophyllum* was observed in three locations *T. natans* was widely scattered along the shoreline. Several other native species including Fern Pondweed(*Potamogeton robbinsii)* Coontail (*Ceratophyllum demersum)* and water lily sp. were sporadically observed throughout the pond (refer to **Appendix E** for maps and associated raw data). **Management recommendation(s): *M. heterophyllum* exceeds a threshold of 5% coverage (1000 stems per acre); therefore herbicide management is recommended. Limited extent and abundance of *T. natans* should be managed with hand-harvesting.**

4.0 Notifications

Two Reward herbicide treatments were performed at the Lake Cochituate system during the 2015 season. The first was conducted on June 29 (Fiske Pond) and August 31 (Middle and South Ponds). The following notification activities were conducted prior to these herbicide applications:

Timing	Tasks
6/19/15	• Mailed 'opt-out' treatment letters to abutters of Fiske Pond [1] • Notified Natick Conservation Commission (NCC) via FAX of 6/29/15 treatment activities and provided a copy of the 'Opt-out letter.'
6/23/15	• Public notice regarding 6/29/15 anticipated treatment activities published in Boston Globe (6-25), Metro West Daily News (6-26), and Natick Bulletin (6-26).
6/24/2015 & 6/26/2015	• Spoke to Bob Bois, Conservation Agent • Universal Treatment Signage posted
7/29/2015	• Opt-Out letters sent to identified abutters with no "opt-out" letters returned.
8/19/15	• Public notice detailing 8/31/15 treatment activities published in Natick Bulletin & Tab, The Boston Globe, and Metrowest Daily.
8/24/14	• Notified the Natick, Framingham, and Wayland Conservation Commissions (via FAX) of 8/31/15 treatment activities and provided a copy of the 8/31/15 treatment area map and water-use restrictions poster.
8/27/15	• Public notice detailing 8/31/15 treatment activities in Lake Cochituate published in Metro West Daily News and Boston Globe.
8/28/15	• Universal Treatment Signage Posted.

[1] In accordance with the OOC, DEP File #233-717, issued by the NCC, the 'opt-out' letters provided the abutters to the Lake Cochituate in Natick to 'opt-out' of treatments (i.e., no direct herbicide application in waters 75 feet from shoreline of abutter's property). Respondents were excluded from the 2014 herbicide management activities.

5.0 Management Activities

Several management activities such as, herbicide treatment and hand-harvesting were implemented to control invasive and nuisance aquatic plant species in the Lake Cochituate system in 2015. These activities are listed in sequential order in the following table:

Timing	Tasks
6/29/15	• Utilized 10 gallons of diquat to control invasive species within 7 acres of Fiske Pond.
6/29 –6/30/15	• Deployed a two-person team to hand-harvest Water Chestnut in Fiske Pond.
8/31/15	• Utilized 80 gallons of diquat on approximately 55 acres of Pagan Cove (South Pond), Snake Brook, and Carling Basin.

5.1 **Diquat Sampling**

The following diquat sampling was performed for each of the treatments conducted (Fiske Pond-6/29/15 & Lake Chochituate-8/31/15):

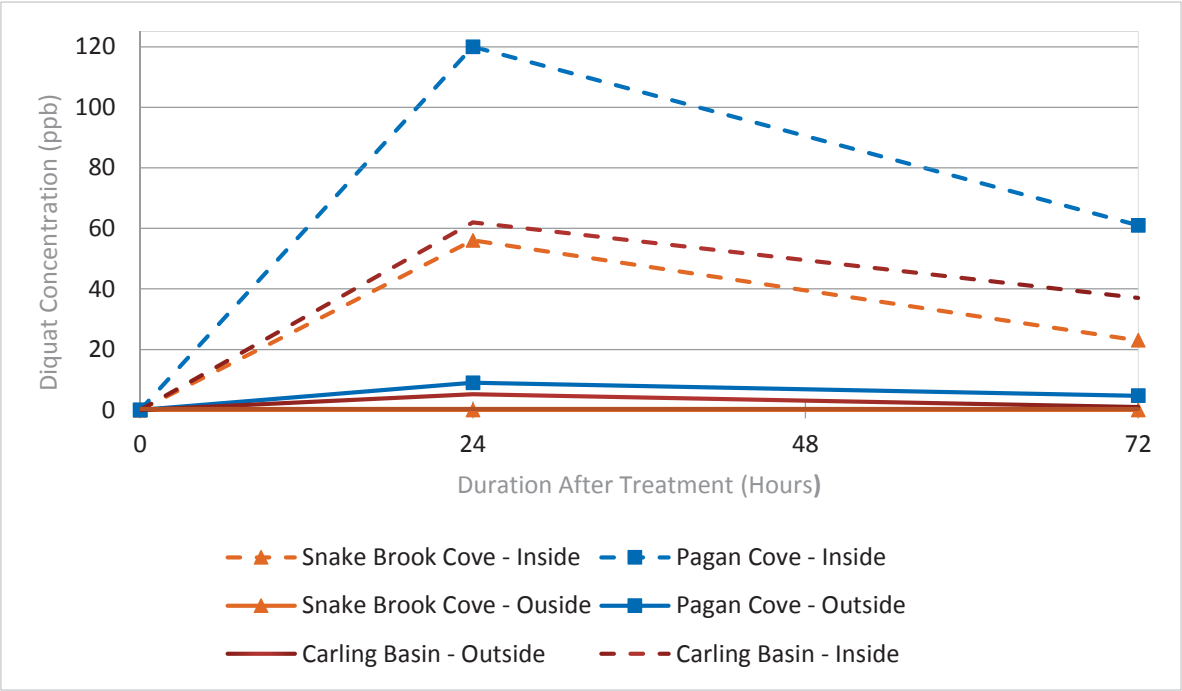
<u>In-lake Water Sampling:</u> In accordance with Special Condition #21, ACT will conduct an herbicide residue sampling program. At least two rounds of samples will be collected; before treatment, 24 hours after treatment (HAT), and 72 HAT, at two locations; inside a treatment area and outside a treatment area, in each treated lake (i.e., Fiske, South, Middle, and North Ponds). Additional samples will be collected until results are at 'non-detect' (≤ 0.001 mg/L). Samples will be collected by ACT and analyzed at a State-certified laboratory. This sampling program will allow for quantitative assessment of herbicide migration and dissipation within and outside of the treatment area. Results will be submitted to the DCR and NCC.

<u>Well Water Sampling</u>: In accordance with Special Condition #23, arrangements will be made with the Natick Water Department to sample the Evergreen and Springvale Wells for diquat. In treatment years, samples will be collected before treatment, 30 days following each application of diquat.

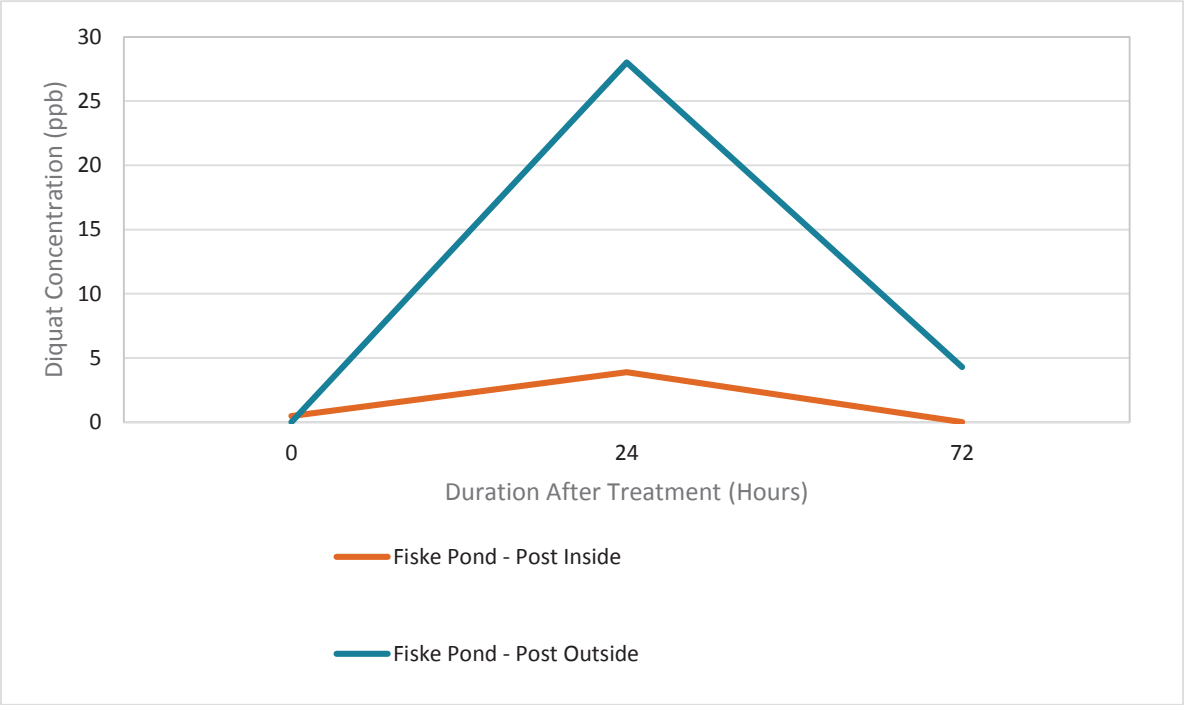
The 2015 diquat sampling program proceeded in accordance with the above plan. Results of the in-lake pre-treatment diquat water testing indicated that diquat concentrations were non-detectable at all sampling locations. The diquat concentrations at 24 hours post-treatment averaged approximately 79 ppb within the treated areas (maximum value = 120ppm Pagan Cove), which is less than a third (28%) of the theoretical diquat concentration associated with the applied dose (1.5 gals/acre or 277 ppb). The diquat concentration fell by roughly 50% at the 72 hr. post-treatment sampling round, with an average concentration 40 ppb within the treatment areas. Due to the characteristic rapid decay rate of diquat, no additional testing was pursued beyond the 72-hr sampling round for the Lake Cochituate treatment and Fiske Pond treatment, as they would undoubtedly have resulted in 'non-detect' values (**Graph 1** and **Graph 2**). Throughout the post-treatment diquat sampling, the results from outside the designated treatment areas in Lake Cochituate (Snake Brook, Carlings Basin, and Pagan Cove) were significantly lower than concentrations within the treatment areas. In fact, average diquat concentrations outside the treatment areas were below the EPA Maximum Contaminant Level for diquat of 20 ppb (both sampling rounds indicated concentrations below 5 ppb outside of the areas treated).

Although no diquat treatment was performed in areas immediately adjacent to the Evergreen and Springvale Wells in 2015, well samples were analyzed prior to treatment and at 30 days post-treatment. All well sampling results were below non-detectable limits.

Graph 1A. Results of the in-lake diquat water sampling pertaining to the 08/31/2015 diquat treatment



Graph 1B. Results of the in-lake diquat water sampling pertaining to the 6/29/2015 diquat treatment



5.2 Hand-Harvesting

Between the dates of August 4th and August 24th, ACT hired Aquatic Vision LLC (AV) to conduct diver hand-harvesting within areas with trace levels of milfoil growth as well as selected high-use area with nuisance level plant growth (i.e. North, Middle, & South Ponds). In the end, AV spent 234 hours hand-picking approximately 30,300 Eurasian milfoil plants and 550 gallons of Clasping Leaf Pondweed from North, Middle, and South Pond. A summary of the hand-pulling efforts broken down by basin is provided in the table below.

Basin	Location, Time Spent & Number of Plants Collected
North Pond	Northernmost Bay: 26 Eurasian Milfoil plants; 2 Hours
	Wayland Town Beach: 50 gallons of Clasping Leaf Pondweed; 12 Hours
	Southern Shore: 485 Milfoil plants; 10 Hours
Total:	**511 Milfoil Plants; 24 Hours**
Middle Pond	Evergreen Point (East): 2,374 milfoil plants; 18.5 Hours
	Eastern shore, south of Evergreen Point: 3,208 Milfoil Plants; 16 Hours
	South Shore: 3959 milfoil plants; 26 Hours
	State Beach Area: 500 Gallons of Clasping-Leaf; 36 Milfoil plants
	Boat Rental Area: 4,458 Milfoil plants; 32 Hours
	Keyhole Tunnel & Bay: 118 Milfoil Plants; 6 hours
	AMVETS Beach/ Peninsula: 1,767/12,192 Milfoil Plants; 40 Hours
Total:	**28,112 Milfoil Plants; 177 Hours**
South Pond	North Shore: 354 Milfoil Plants; 13 Hours
	Pagan Cove: 830 Milfoil Plants; 14 Hours
	Western Shore: 102 Milfoil Plants; 6 Hours
Total:	**1286 Milfoil Plants; 33 Hours**

6.0 Post-Management Survey

As previously stated, due to the large size of the Lake Cochituate water system, post-management surveys were conducted over several dates during the late-summer/fall season. Post-management survey methodology replicated the methods implemented during the 2015 pre-management surveys. A factor differentiating plant species frequency between pre and post-management is likely due to the high biomass of late summer growth. The species not observed during the post survey were low-growing species and would likely be covered by the taller, denser plants. A summary of the pre-management survey results separated by basin is provided in the tables and charts that follow.

Survey Location/ Dates	Observations
North Pond October 5, 2015	No invasive vegetation species were observed during the October 5th point intercept survey. The point-intercept survey noted nine (ten in June) native species, with *P. robbinsii* (39%), *N. flexilis* (32%), and *P. gramineus* (17%) dominating the aquatic plant community. Vegetative coverage (of all species) increased slightly since June (average coverage: 34% in Oct. and 9% in June) and continued to persist in coves and shallow, silty areas in the pond (**Appendix B**)
Middle Pond October 5, 2015	Once again, no invasive vegetative species were observed. At the time of the October point-intercept survey, a total of ten (13 in June) native species were noted; *P. robbinsii* (36%), *V. americana* (23%), *P. perfoliatus* (13%), and *N. flexilis* (11%) exhibited the most widespread distributions at this time. Vegetative coverage (of all species) was increased between Pre and post management (average vegetative coverage: 59% in Sept. and 35% in June) throughout the littoral zone (**Appendix C**)
South Pond October 8, 2015	No evidence of *M. spicatum* was seen during the point intercept survey. Results of the October point-intercept survey reflect this sentiment -- *M. spicatum* occurred at 20% of the pre-determined points in June and 0% of the pre-determined points in October. No additional invasive species were noted. Seven native aquatic plant species also observed during the point-intercept survey with *P. robbinsii* (54%), *P. perfoliatus* (27%), and *Najas flexilis* (27%). Vegetative coverage (of all species) rose slightly from 48% In June to 52% in October and was observed throughout the littoral zone (**Appendix D**).
Fiske Pond July 7, 2015	No invasive species were noted during the target bed identification and point-intercept surveys. Target nuisance aquatic plant species, *C. demersum* remained relatively static throughout the pond. Four native species continued to persist following treatment with; *P. robbinsii* (Fern-Leaf Pondweed) (66%), *Nymphaea odorata (*White Water Lil) (58%) dominating the aquatic plant community. Vegetative coverage (of all species) has increased, likely due to the continuous treatments of Variable Milfoil and Water Chestnut (average coverage: 60%). (**Appendix E**)

The following graphs (2A-D) provide a comparison of the pre- and post-management percent frequency of occurrence for each species in each water body of the Lake Cochituate system – North, Middle, South, and Fiske Ponds. Visual depictions of the frequency of occurrence and relative abundance during the pre- and post-management surveys for the Lake Cochituate system are also provided in **Appendix B – D.**

Figure 2A: North Pond 2015 Pre- and Post Management
(%) Frequency of Occurrence

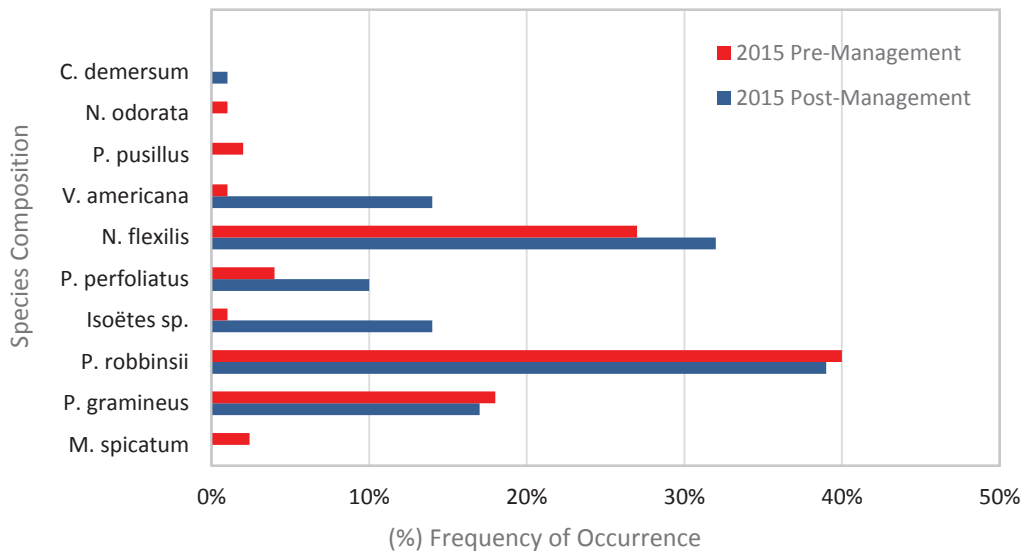
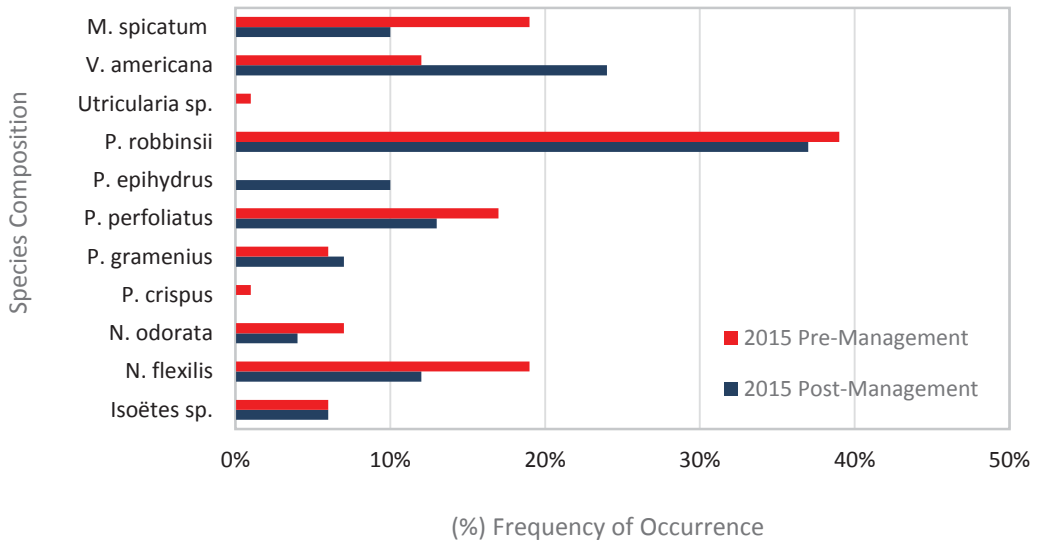


Figure 2B: Middle Pond/Channel & Snake Brook
2015 Pre- and Post Management
(%) Frequency of Occurrence



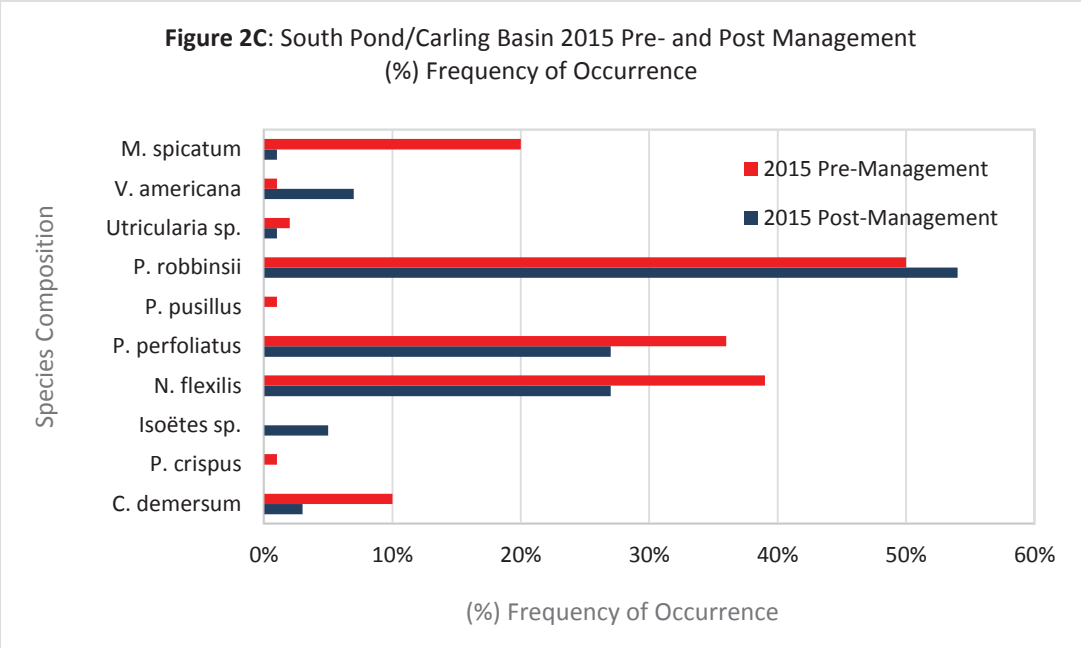
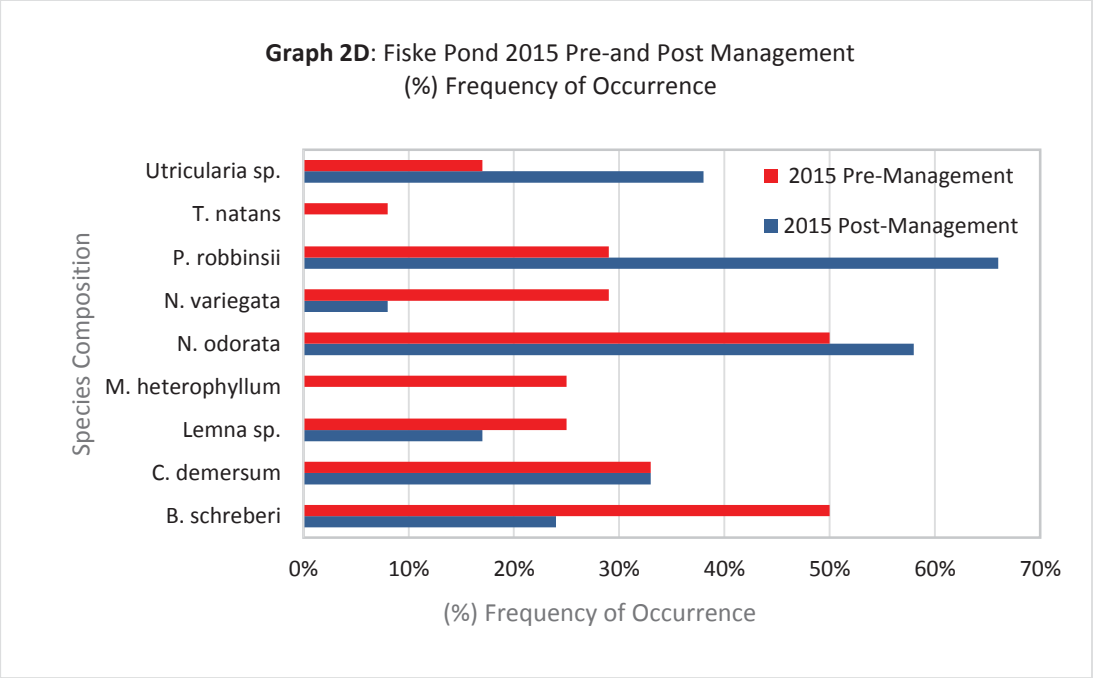


Figure 2C: South Pond/Carling Basin 2015 Pre- and Post Management
(%) Frequency of Occurrence
Species Composition
M. spicatum
V. americana
Utricularia sp.
P. robbinsii
P. pusillus
P. perfoliatus
N. flexilis
Isoëtes sp.
P. crispus
C. demersum
2015 Pre-Management
2015 Post-Management
0%
10%
20%
30%
40%
50%
60%
(%) Frequency of Occurrence


Graph 2D: Fiske Pond 2015 Pre-and Post Management
(%) Frequency of Occurrence
Species Composition
Utricularia sp.
T. natans
P. robbinsii
N. variegata
N. odorata
M. heterophyllum
Lemna sp.
C. demersum
B. schreberi
2015 Pre-Management
2015 Post-Management
0%
10%
20%
30%
40%
50%
60%
70%
(%) Frequency of Occurrence

7.0 **Conclusion**

The management activities implemented in the Lake Cochituate system effectively controlled the target invasive and nuisance aquatic plant species: *M. spicatum*, *M. heterophyllum*, *T. natans*, and *C. demersum* during the 2015 season. Overall, native aquatic plant species continued to persist throughout the Lake Cochituate system following treatments and in general, their frequency of occurrence increased or remained nearly unchanged after treatments. As we have discussed, contact herbicides, such as diquat, only affect the vegetative portion of the plant and are not widely translocated into the target plant root system. As a result, we expect that regrowth from viable target plant root stock will necessitate continued area selective management in 2016 and beyond.

Although diquat is a contact herbicide it does often provide complete control of a percentage of plants within the target population. Therefore, as evidenced by the significant reduction in target milfoil growth from 2014-2015 in Lake Cochituate and our experience at other lakes, annual treatment of regrowth can result in an incremental reduction of the target growth over time. As a result, ACT recommends a similar management approach in 2016. In short, the anticipated management program will include pre-management surveys to identify target species' distributions and appropriate management techniques early in the growing season (i.e., May/June). Management activities will be implemented throughout the growing season (June – August), with timing and frequency determined by interim survey results. Lastly, a post-management survey will be conducted at the end of the growing season (i.e., September/early October) to evaluate the overall efficacy of the annual management program.

Appendix A:

2015 Pre- and Post-Management Survey Protocol

info@aquaticcontroltech.com
(508) 885-0101
21 West Main St (Route 9)
Spencer, MA 01562

2015 Pre- and Post-Management Survey Protocol

Lake Cochituate System

Natick, Wayland, Framingham, Massachusetts

The point-intercept method was utilized during the pre- and post-management surveys. Point-intercept surveys of North Pond continued at a set of 84 pre-existing points from Lycott's 2010 management program. Point-intercept surveys of the upper portions of Middle Pond continued at a subset of the pre-existing points from Lycott's 2014 management program. Point-intercept surveys throughout the remainder of the Lake Cochituate system (i.e., remainder of Middle Pond, Carling Basin, South Pond, and Fiske Pond) were based on a 100-m grid within the littoral zone. This resulted in the establishment of 91, 85, and 23 pre-determined points in Middle (including Snake Brook and Carling Basin), South, and Fiske Ponds, respectively.

These point-intercept surveys were supplemented with an inspection of the entire littoral zone to identify beds of the target species. This 'bed identification' method, detailed below was employed each time Lycott visited a pond so that any new growth of the target species may be identified and targeted for management as soon as possible.

Point Intercept Method

Lycott biologists surveyed each water body using the aforementioned survey points uploaded to a GPS unit. The following data will be collected at each of the survey points:

Water depth
Species present
Relative abundance of each species
Total percentage of cover
Biomass index
Percent of target species

Species Identification

The rake toss method, based on protocols developed by Cornell University, was used to retrieve submersed aquatic vegetation from either side of the survey vessel. Two rake tosses will be carried out at each point; one on either side of the survey vessel. Each species found on the rake will be identified and recorded. Plant species observed in the immediate area, but not found on either rake toss was also recorded. Any species not readily identified *in situ* was placed into a plastic bag labeled with the data point number and preserved for further analysis. Once all species were recorded, the most prevalent species was noted as dominant for later use in presence/absence maps.

Relative Abundance

The abundance scale, developed by the US Army Corps of Engineers and modified by Cornell, was used to categorize total growth.

Notation	Description
Z	*Zero*: no plants on rake
T	*Trace*: fingerful on rake
S	*Sparse*: handful on rake

M	*Moderate*: rakeful of plants
D	*Dense*: difficult to bring into boat

Percent Cover

Percent cover was defined as the percent of bottom sediments obscured by vegetation. In general, an area in which no sediments are visible was classified at 100% cover; at times however bottom sediments are not visible due to water clarity, regardless of vegetative growth. These points will be given a null (∅) designation, for data recording purposes.

Biomass Index

The biomass for each data point was recorded on a scale from zero to four:

0	No biomass	No plants
1	Low biomass	Very low growth
2	Moderate biomass	Growth extending up, into water column
3	High biomass	Growth in water column and possibly to surface, may be considered a recreational or habitat nuisance
4	Very high biomass	Growth filling the water column and covering the surface

Percentage of Target Species

The immediate area around the boat was observed for growth of *M. spicatum, M. heterophyllum, Trapa natans,* and any other target species. Each point will be assigned the appropriate percentage.

Target Species Bed Identification

In order to identify target species bed perimeters, a boat was used to navigate around the pond while surveyors recorded the visual density of each bed. A GPS unit was used to track the boat as it moved around plant beds. This GPS track was uploaded to a GIS-based mapping program (ArcMap 9.3.x) and used to develop a pre-management map detailing the overall invasive/nuisance species situation, including relative densities and acreage of beds.

AQUATIC CONTROL TECHNOLOGY

Appendix B

North Pond 2015 Pre, Interim, and Post Management Survey Maps and Raw Data

info@aquaticcontroltech.com
(p) 508-885-0101
(f) 774-745-0277

590 Lake Street
Shrewsbury, MA 01545

2015 Invasive Macrophyte Species Distribution and Relative Abundance

Lake Cochituate
Natick, Framingham, &
Wayland, Massachusetts

Data Collected: 6/23 - 6/25/15
Map Created: 6/30/15; rev.7/29/15
For MA DCR
Basemap © 2013 Esri

0 375 750
Feet

N

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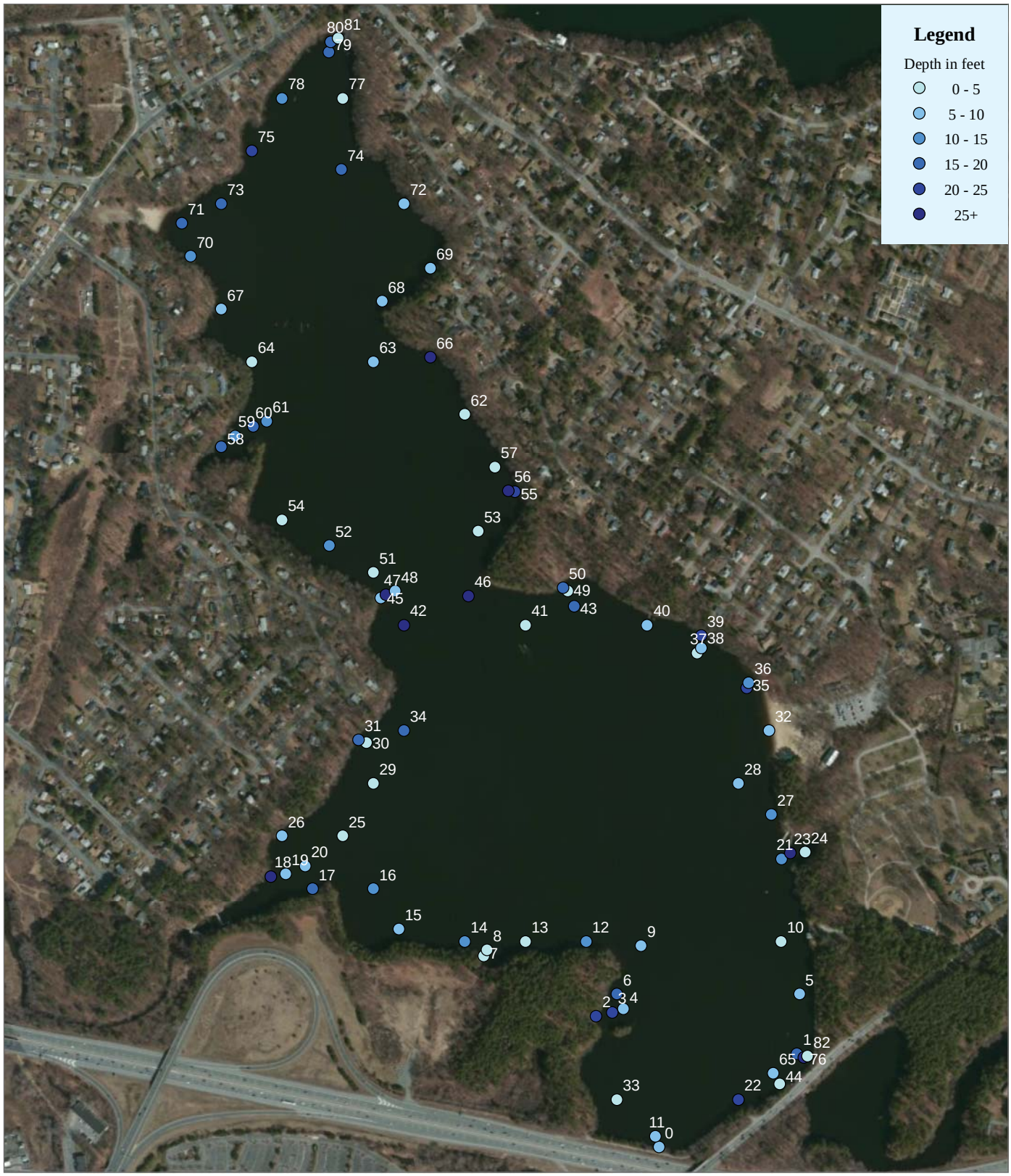
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

2015 Depth of Survey Points, Pre- and Post-Management



Cochituate Lake
Natick, Framingham,
& Wayland, Massachusetts

Map Prepared: 11/25/15
Basemap © 2013 Esri

0 490 980
1:9,000 Feet

N

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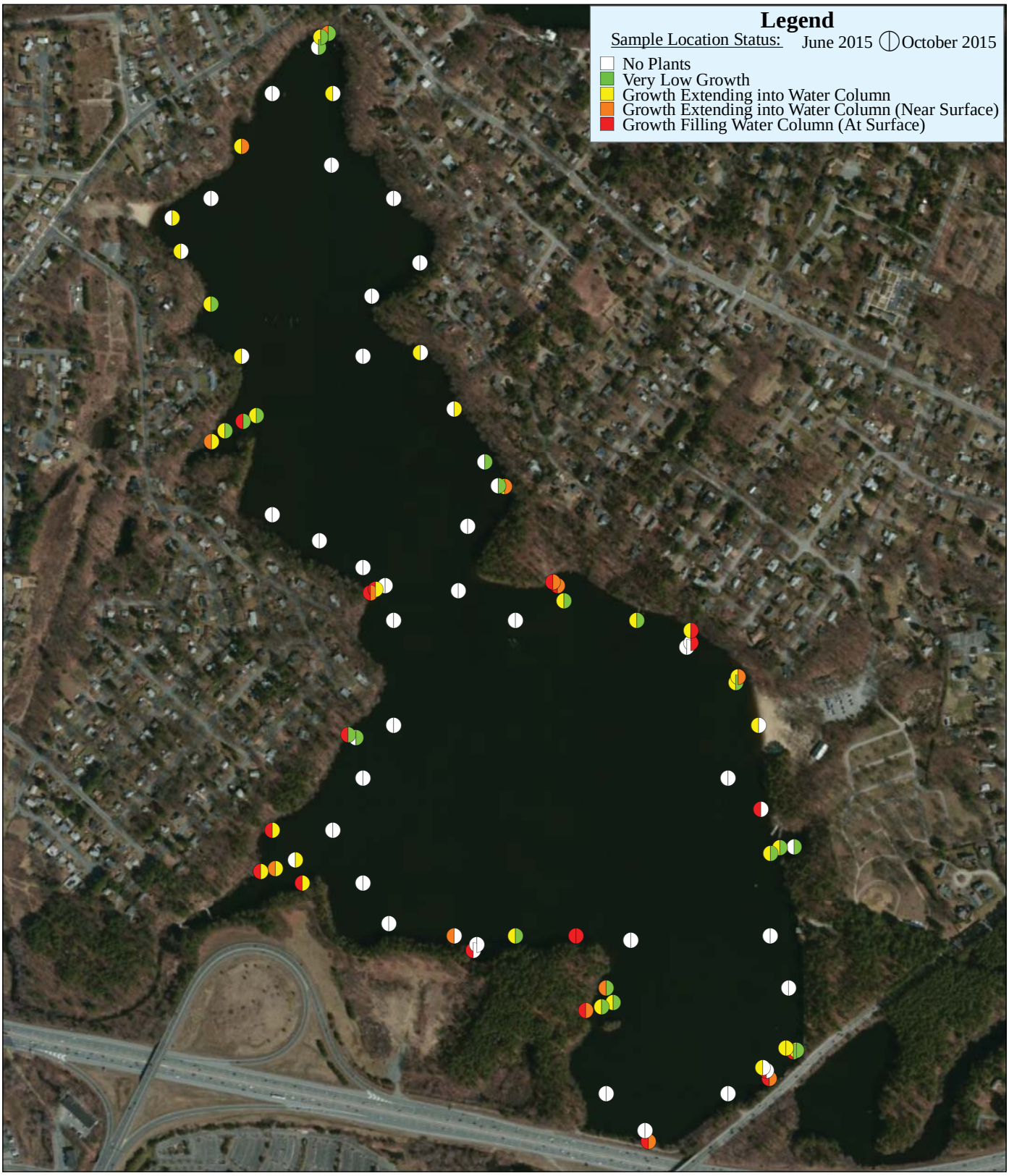
Total Biomass 2015 Pre- and Post-Management



North Pond,
Natick/Framingham/Wayland,
Massachusetts

Data Collected: 06/24/2015 & 10/04/2015
Map Prepared: 12/07/2015
For MA DCR
Contract (#115-14)
Basemap © 2013 Esri

0 375 750
1:9,000 Feet

N

AQUATIC CONTROL TECHNOLOGY

21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Percent Cover of All Observed Species Pre- and Post-Management

North Pond,
Natick/Framingham/Wayland,
Massachusetts

Data Collected: 06/25 & 10/04/15
Map Prepared: 12/7/15
For MA DCR
Contract (#115-14)
Basemap © 2013 Esri

0 187.5 375 750
1:9,000 Feet
N

AQUATIC CONTROL TECHNOLOGY
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508-885-0101

Percent Cover of Target Species Pre- and Post-Management

North Pond,
Natick/Framingham/Wayland,
Massachusetts

Data Collected: 06/25/15 & 10/04/15
Map Prepared: 12/7/15
For MA DCR
Contract (#115-14)
Basemap © 2013 Esri

0 190 380 760 N
1:9,000 Feet

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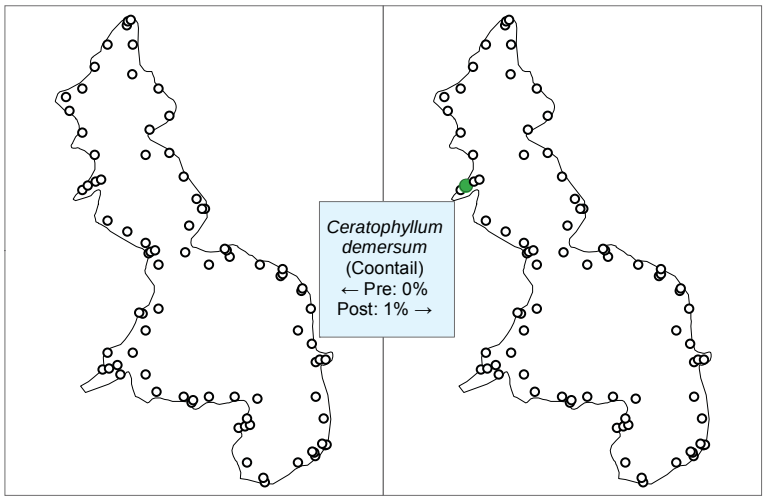
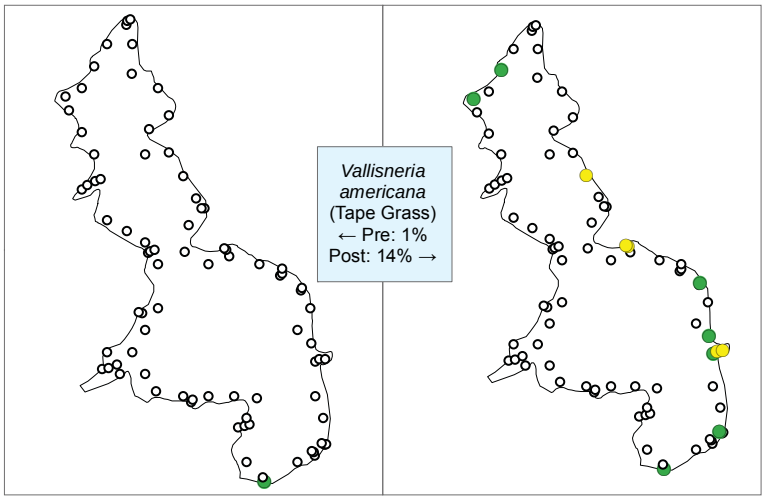
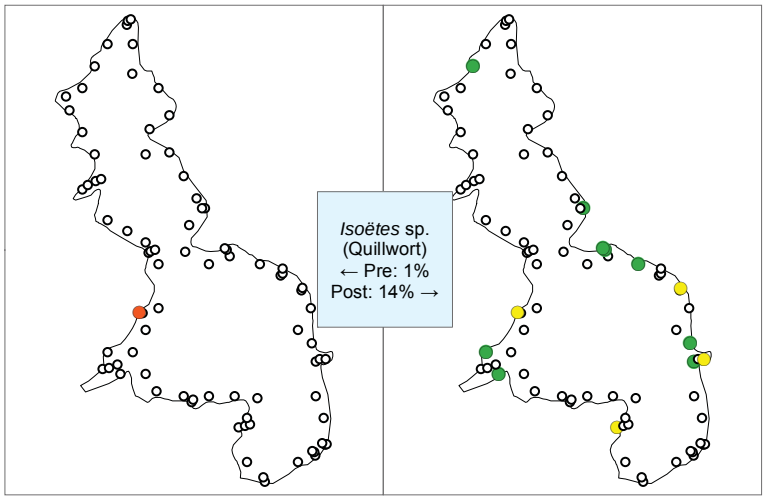
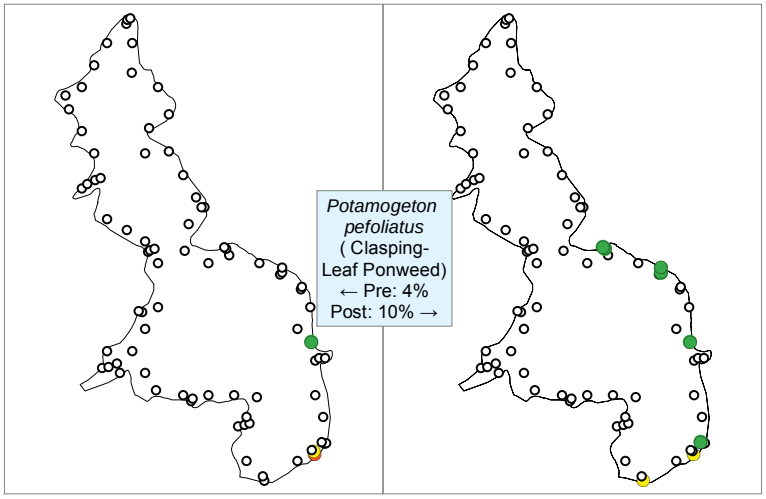
Densities and Percent Occurrence of Observed Species Pre- and Post-Management (1 of 2)









North Pond
Framingham, Natick & Wayland, MA

Data Collected: 6/25, 10/04/15
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend
Zero · Trace · Sparse · Moderate · Dense

N

0 950 1,900
Feet
1:23,000

AQUATIC CONTROL TECHNOLOGY
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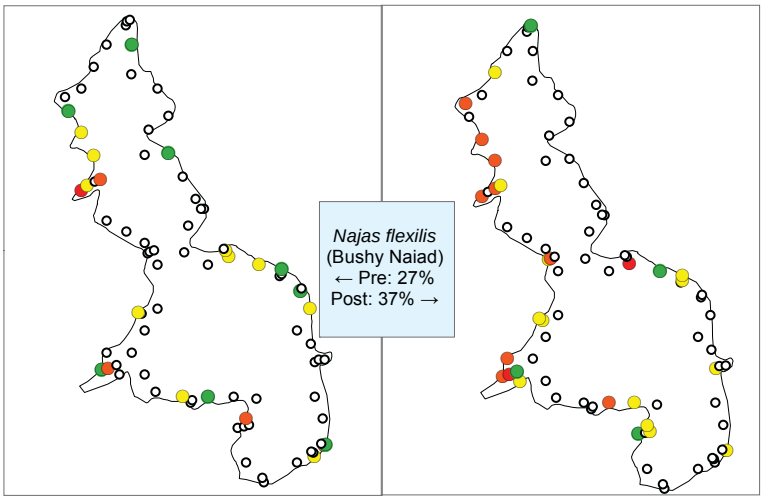
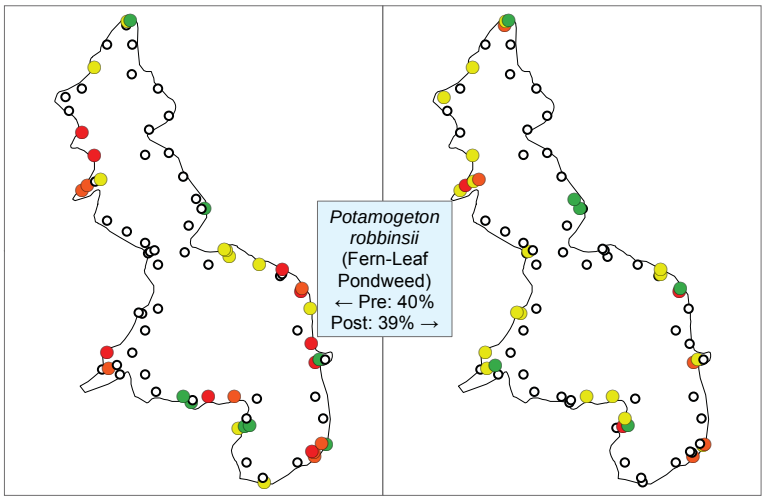
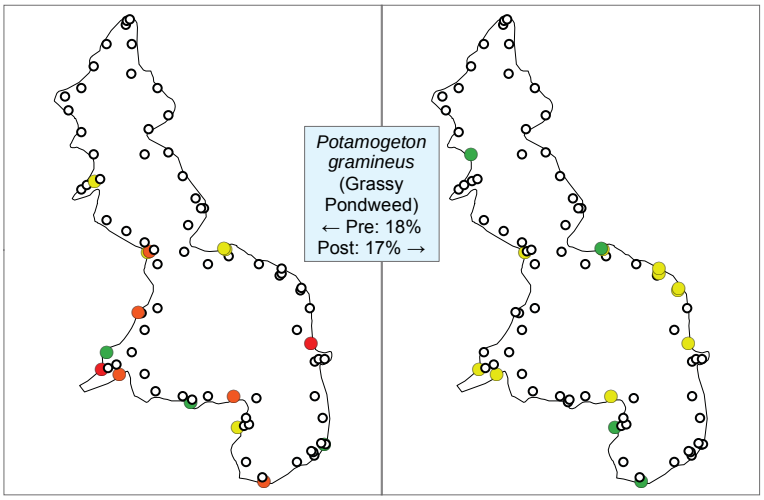
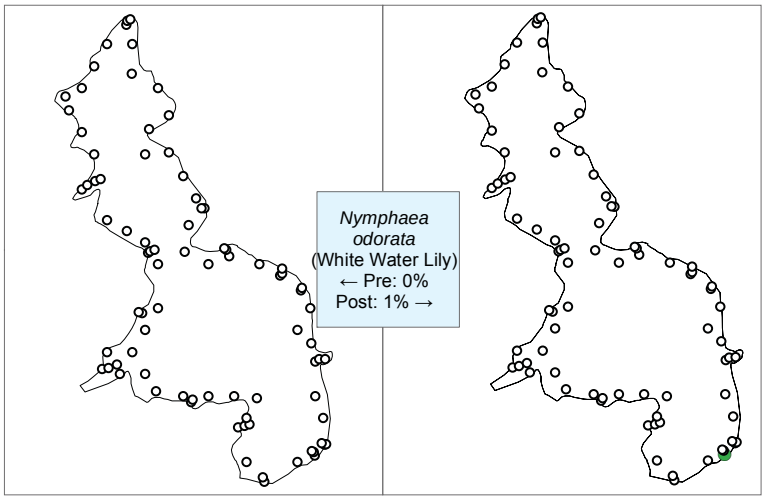
508-885-0101

Densities and Percent Occurrence of Observed Species Pre- and Post-Management (2 of 2)









North Pond
Framingham, Natick & Wayland, MA

Data Collected: 6/25, 10/04/15
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend
Zero, Trace, Sparse, Moderate, Dense

N

0 950 1,900
Feet
1:23,000

AQUATIC CONTROL TECHNOLOGY
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

North Pond 2015 Pre-Management Point-Intercept Survey Raw Data

PT ID	Lat (DD)	Long (DD)	Relative Abundance							% Cover All	% Cover *M. spicatum*	BMI	DEPTH (ft)
			M. spicatum	*Vallisnearia americana*	*P. gramineus*	*P. robbinsii*	*Isoëtes* sp.	*P. perfoliatus*	*N. flexilis*				
1	42.31171997	-71.37497001	X	X	X	X	Z	Z	Z	40	5	4	8.7
2	42.31187998	-71.37504000	Z	Z	Z	Z	Z	Z	Z	0	0	0	16.5
3	42.31242212	-71.37338189	Z	Z	Z	Z	Z	Z	Z	0	0	0	25.0
4	42.31242481	-71.37580778	Z	Z	Z	Z	Z	Z	Z	0	0	0	20.9
5	42.31265003	-71.37255996	Z	Z	Z	X	Z	D	X	60	0	4	5.4
6	42.31276997	-71.37261000	Z	Z	Z	D	Z	X	Z	30	0	4	9.6
7	42.31281004	-71.37268997	Z	Z	Z	D	Z	Z	Z	0	0	2	17
8	42.31304004	-71.37208002	Z	Z	Z	Z	Z	Z	D	25	0	4	4.6
9	42.31305999	-71.37201003	Z	Z	Z	D	Z	Z	X	15	0	2	2
10	42.31309997	-71.37221999	Z	Z	X	D	Z	Z	Z	25	0	1	8
11	42.31365996	-71.37622001	Z	Z	Z	D	Z	Z	Z	65	0	2	3
12	42.31371000	-71.37589999	Z	Z	Z	D	Z	Z	Z	50	0	1	7.5
13	42.31377002	-71.37566999	Z	Z	X	D	Z	Z	Z	5	0	1	13
14	42.31398007	-71.37216568	Z	Z	Z	Z	Z	Z	Z	0	0	0	9
15	42.31398409	-71.37580477	Z	Z	Z	Z	Z	Z	D	0	0	3	15
16	42.31455004	-71.37845999	Z	Z	Z	D	Z	Z	Z	5	0	4	7.2
17	42.31463998	-71.37839000	Z	Z	X	Z	Z	Z	Z	0	0	0	12
18	42.31469622	-71.37532029	Z	Z	Z	Z	Z	Z	Z	0	0	0	20
19	42.31476017	-71.37253180	Z	Z	Z	Z	Z	Z	Z	0	0	0	53.3
20	42.31476436	-71.37640969	Z	Z	Z	D	Z	Z	Z	50	0	4	6.5
21	42.31476570	-71.37762280	Z	Z	Z	D	Z	Z	Z	50	0	2	10
22	42.31476696	-71.37883583	Z	Z	X	X	Z	Z	Z	15	0	3	13.4
23	42.31494952	-71.38014492	Z	Z	Z	Z	Z	Z	Z	0	0	0	24

PT ID	Lat (DD)	Long (DD)	Relative Abundance							% Cover All	% Cover *M. spicatum*	BMI	DEPTH (ft)
			M. spicatum	*Vallisnearia americana*	P. gramineus	*P. robbinsii*	*Isoëtes* sp.	*P. perfoliatus*	*N. flexilis*				
24	42.31554857	-71.38065387	Z	Z	Z	Z	Z	Z	Z	0	0	0	27
25	42.31554983	-71.38186689	Z	Z	Z	Z	Z	Z	Z	0	0	4	4.4
26	42.31572996	-71.38269997	Z	Z	Z	Z	Z	Z	Z	50	0	4	4.8
27	42.31577002	-71.38239998	Z	Z	D	D	Z	Z	D	85	0	3	8.3
28	42.31588997	-71.38200997	Z	Z	D	Z	Z	Z	Z	0	0	0	15
29	42.31597999	-71.37251998	Z	Z	Z	D	Z	Z	Z	60	0	2	7.8
30	42.31607001	-71.37234002	Z	Z	Z	X	Z	Z	Z	50	0	2	2.8
31	42.31607999	-71.37205001	Z	Z	Z	Z	Z	Z	Z	0	0	4	2
32	42.31632893	-71.38125887	Z	Z	Z	Z	Z	Z	Z	0	0	0	19
33	42.31633010	-71.38247198	Z	Z	Z	D	Z	Z	T	40	0	4	7.2
34	42.31663889	-71.37271914	Z	Z	Z	D	Z	X	Z	65	0	4	3.6
35	42.31710023	-71.37337251	Z	Z	D	Z	Z	Z	Z	0	0	0	15.9
36	42.31710786	-71.38065093	Z	Z	D	Z	Z	Z	Z	0	0	0	24
37	42.31771002	-71.38078999	Z	Z	Z	Z	Z	Z	Z	5	0	0	10.3
38	42.31775000	-71.38095000	Z	Z	Z	Z	X	Z	Z	0	0	4	2
39	42.31787916	-71.37276440	Z	Z	Z	X	Z	Z	Z	5	0	2	6
40	42.31788704	-71.38004291	Z	Z	Z	Z	Z	Z	Z	0	0	0	25
41	42.31850998	-71.37320998	Z	Z	X	D	Z	Z	Z	45	0	2	6.3
42	42.31859003	-71.37317000	Z	Z	Z	D	Z	Z	Z	20	0	2	4.1
43	42.31903000	-71.37418999	Z	Z	Z	Z	Z	Z	Z	0	0	0	31.3
44	42.31909999	-71.37411003	Z	Z	Z	Z	Z	Z	Z	0	0	0	16.4
45	42.31929000	-71.37411003	Z	Z	Z	D	Z	Z	Z	0	0	2	4.4

PT ID	Lat (DD)	Long (DD)	Relative Abundance							% Cover All	% Cover *M. spicatum*	BMI	DEPTH (ft)
			M. spicatum	*Vallisnearia americana*	P. gramineus	*P. robbinsii*	*Isoëtes* sp.	*P. perfoliatus*	*N. flexilis*				
46	42.31944121	-71.37518752	Z	Z	Z	X	Z	Z	Z	0	0	2	8.4
47	42.31944381	-71.37761367	Z	Z	Z	Z	Z	Z	Z	0	0	0	37.9
48	42.31944633	-71.38003989	Z	Z	Z	Z	Z	Z	Z	0	0	0	30
49	42.31972000	-71.37664002	Z	Z	Z	X	Z	Z	Z	5	0	2	6.9
50	42.31985000	-71.38049997	Z	Z	Z	Z	Z	Z	Z	40	0	4	2
51	42.31987640	-71.37875000	Z	Z	Z	Z	Z	Z	Z	0	0	0	16.3
52	42.31990004	-71.38039998	Z	Z	D	Z	Z	Z	T	50	0	4	3.3
53	42.31995000	-71.38020996	Z	Z	Z	Z	Z	Z	Z	0	0	0	12.8
54	42.31995000	-71.37677003	Z	Z	D	X	Z	S	S	40	0	4	4.5
55	42.32000004	-71.37685996	Z	Z	Z	X	Z	Z	Z	0	0	4	3
56	42.32022660	-71.38064498	Z	Z	D	Z	Z	Z	Z	0	0	0	24.7
57	42.32062390	-71.38151972	Z	Z	D	Z	Z	Z	Z	0	0	0	36
58	42.32083353	-71.37855713	Z	Z	Z	Z	Z	Z	Z	0	0	0	13.3
59	42.32100821	-71.38246327	Z	Z	Z	Z	Z	Z	Z	0	0	0	18.2
60	42.32142001	-71.37782003	Z	Z	Z	Z	Z	Z	Z	0	0	0	11.4
61	42.32142999	-71.37795003	Z	Z	Z	Z	Z	Z	Z	0	0	0	15.9
62	42.32178337	-71.37821582	Z	Z	Z	Z	Z	Z	Z	0	0	0	211.4
63	42.32208998	-71.38367001	Z	Z	Z	X	Z	Z	Z	30	0	3	3.5
64	42.32224999	-71.38340003	Z	Z	Z	X	Z	Z	Z	10	0	2	5.3
65	42.32238997	-71.38304003	Z	Z	Z	Z	Z	Z	Z	30	0	4	1
66	42.32247001	-71.38276996	Z	Z	Z	D	Z	Z	T	30	0	2	7.6
67	42.32256372	-71.37882091	Z	Z	D	Z	Z	Z	Z	0	0	0	8.9

PT ID	Lat (DD)	Long (DD)	Relative Abundance							% Cover All	% Cover *M. spicatum*	BMI	DEPTH (ft)
			M. spicatum	*Vallisnearia americana*	P. gramineus	*P. robbinsii*	*Isoëtes* sp.	*P. perfoliatus*	*N. flexilis*				
68	42.32334534	-71.38063920	Z	Z	Z	Z	Z	Z	Z	0	0	0	34.1
69	42.32334777	-71.38306551	Z	Z	Z	D	Z	Z	Z	0	0	2	8.4
70	42.32340996	-71.37950001	Z	Z	Z	Z	Z	Z	Z	0	0	3	9.8
71	42.32412812	-71.38367068	Z	Z	Z	D	Z	Z	T	10	0	2	7.9
72	42.32423927	-71.38046167	Z	Z	Z	Z	Z	Z	Z	0	0	0	11
73	42.32473003	-71.37950001	Z	Z	Z	Z	Z	Z	Z	0	0	0	19.6
74	42.32490839	-71.38427594	Z	Z	Z	Z	Z	Z	Z	0	0	2	9.8
75	42.32539999	-71.38445003	Z	Z	Z	Z	Z	Z	Z	0	0	0	19.6
76	42.32568372	-71.38002807	Z	Z	Z	Z	Z	Z	Z	0	0	0	15.2
77	42.32568741	-71.38366783	Z	Z	Z	Z	Z	Z	Z	0	0	0	21
78	42.32619024	-71.38127027	Z	Z	Z	Z	Z	Z	Z	0	0	0	29.4
79	42.32646651	-71.38305981	Z	Z	Z	D	Z	Z	M	60	0	2	4.4
80	42.32724426	-71.38123842	Z	Z	Z	Z	Z	Z	Z	0	0	2	11.8
81	42.32724552	-71.38245170	Z	Z	Z	Z	Z	Z	Z	0	0	0	20
82	42.32792999	-71.38151997	Z	Z	Z	Z	Z	Z	Z	0	0	0	16.5
83	42.32808002	-71.38147999	Z	Z	Z	D	Z	Z	Z	0	0	2	3.3
84	42.32812998	-71.38133003	X	Z	Z	X	Z	Z	Z	0	5	3	1

North Pond 2015 Post-Management Point-Intercept Survey Raw Data

PT ID	LAT	LONG	Relative Abundance										BMI	% COVER ALL	Depth (ft.)
			P. robbinsii	*N. flexilis*	*V. americana*	*P. perfoliatus*	*C. demersum*	*P. gramenius*	*Sagittaria* sp.	*P. amplifolius*	*Isoëtes* sp.	*P. pusillus*			
1	42.311720	-71.374970	Z	Z	M	S	Z	Z	Z	Z	Z	Z	4	65	2
2	42.311880	-71.375040	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	0	5	21.5
3	42.312422	-71.373382	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	17
4	42.312425	-71.375808	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	21
5	42.312650	-71.372560	T	Z	S	Z	T	T	Z	Z	Z	Z	4	50	4
6	42.312770	-71.372610	T	Z	Z	S	Z	Z	Z	Z	Z	Z	4	35	7
7	42.312810	-71.372690	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	20
8	42.313040	-71.372080	S	T	Z	Z	Z	Z	Z	Z	Z	Z	2	40	5.9
9	42.313060	-71.372010	D	T	Z	Z	Z	Z	Z	Z	Z	Z	4	100	7
10	42.313100	-71.372220	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	2	25	9
11	42.313660	-71.376220	Z	Z	T	Z	Z	T	D	Z	Z	Z	3	85	<1
12	42.313710	-71.375900	S	T	Z	Z	Z	Z	Z	Z	Z	Z	2	40	7.4
13	42.313770	-71.375670	S	T	Z	Z	Z	Z	Z	Z	Z	Z	2	45	10.8
14	42.313980	-71.372166	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	32
15	42.313984	-71.375805	S	T	Z	Z	Z	Z	Z	Z	Z	Z	2	40	9
16	42.314550	-71.378460	S	Z	Z	Z	Z	T	Z	Z	Z	Z	4	30	4.5
17	42.314640	-71.378390	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	13
18	42.314696	-71.375320	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	24
19	42.314760	-71.372532	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	50
20	42.314764	-71.376410	S	Z	Z	Z	Z	T	Z	Z	Z	Z	4	40	5
21	42.314766	-71.377623	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	25	8
22	42.314767	-71.378836	T	T	Z	Z	Z	Z	Z	Z	Z	Z	2	20	9
23	42.314950	-71.380145	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	21
24	42.315549	-71.380654	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	25
25	42.315550	-71.381867	Z	Z	Z	Z	Z	M	Z	Z	Z	Z	4	60	2
26	42.315730	-71.382700	Z	T	Z	Z	Z	M	S	Z	Z	Z	4	65	3
27	42.315770	-71.382400	M	M	T	Z	Z	Z	Z	T	Z	Z	2	90	6.5
28	42.315890	-71.382010	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	2	5	13.5
29	42.315980	-71.372520	D	S	Z	Z	Z	Z	Z	Z	Z	Z	2	100	10.7
30	42.316070	-71.372340	S	Z	S	Z	Z	Z	Z	Z	Z	Z	2	40	3.7
31	42.316080	-71.372050	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	2.5
32	42.316329	-71.381259	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	19.4
33	42.316330	-71.382472	S	T	Z	Z	Z	Z	Z	Z	Z	Z	4	35	5
34	42.316639	-71.372719	S	Z	Z	D	Z	Z	Z	Z	Z	Z	4	80	2

PT ID	LAT	LONG	Relative Abundance										BMI	% COVER ALL	Depth (ft.)
			P. robbinsii	*N. flexilis*	*V. americana*	P. perfoliatus	*C. demersum*	*P. gramenius*	*Sagittaria* sp.	*P. amplifolius*	*Isoëtes* sp.	*P. pusillus*			
35	42.317100	-71.373373	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	19
36	42.317108	-71.380651	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	22
37	42.317710	-71.380790	T	M	Z	Z	Z	Z	Z	Z	Z	Z	2	75	8
38	42.317750	-71.380950	Z	Z	Z	Z	Z	S	Z	Z	D	Z	4	95	1
39	42.317879	-71.372764	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	3
40	42.317887	-71.380043	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	20
41	42.318510	-71.373210	D	S	Z	Z	Z	Z	Z	Z	Z	Z	2	80	4.9
42	42.318590	-71.373170	Z	Z	M	T	Z	D	Z	Z	Z	Z	4	85	<2
43	42.319030	-71.374190	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	23
44	42.319100	-71.374110	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	2	<5	11
45	42.319290	-71.374110	Z	Z	T	Z	Z	D	Z	Z	Z	Z	4	75	2
46	42.319441	-71.375188	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	2	40	11
47	42.319444	-71.377614	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	30
48	42.319446	-71.380040	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	28.5
49	42.319720	-71.376640	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	2	30	7
50	42.319850	-71.380500	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	4	15	<1
51	42.319876	-71.378750	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	32
52	42.319900	-71.380400	Z	Z	Z	Z	Z	D	Z	Z	Z	Z	4	80	2
53	42.319950	-71.380210	S	Z	Z	Z	Z	T	Z	Z	Z	Z	4	35	12.2
54	42.319950	-71.376770	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	15	3
55	42.320000	-71.376860	Z	Z	Z	Z	Z	S	S	Z	Z	Z	3	40	1
56	42.320227	-71.380645	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	20
57	42.320624	-71.381520	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	33.7
58	42.320834	-71.378557	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	16.8
59	42.321008	-71.382463	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	21.5
60	42.321420	-71.377820	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	1
61	42.321430	-71.377950	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	90	8.8
62	42.321783	-71.378216	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	17.7
63	42.322090	-71.383670	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	50	5.1
64	42.322250	-71.383400	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	25	5.8
65	42.322390	-71.383040	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	5.3
66	42.322470	-71.382770	S	S	Z	Z	Z	Z	Z	Z	Z	Z	2	65	10.5
67	42.322564	-71.378821	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	4	10	8.4
68	42.323345	-71.380639	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	44
69	42.323348	-71.383066	T	T	Z	Z	Z	Z	Z	Z	Z	Z	2	30	10.5
70	42.323410	-71.379500	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	10

PT ID	LAT	LONG	Relative Abundance										BMI	% COVER ALL	Depth (ft.)
			P. robbinsii	*N. flexilis*	*V. americana*	P. perfoliatus	*C. demersum*	*P. gramenius*	*Sagittaria* sp.	*P. amplifolius*	*Isoëtes* sp.	*P. pusillus*			
71	42.324128	-71.383671	T	D	Z	Z	Z	Z	Z	Z	Z	Z	2	90	9.5
72	42.324239	-71.380462	S	Z	T	Z	Z	Z	Z	Z	Z	T	3	50	9
73	42.324730	-71.379500	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	15
74	42.324908	-71.384276	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	2	5	8
75	42.325400	-71.384450	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	16
76	42.325684	-71.380028	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	10
77	42.325687	-71.383668	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	2	<5	20.3
78	42.326190	-71.381270	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	28.5
79	42.326467	-71.383060	M	T	Z	Z	Z	Z	Z	Z	Z	Z	2	50	3
80	42.327244	-71.381238	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	20.3
81	42.327246	-71.382452	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	25.3
82	42.327930	-71.381520	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	15
83	42.328080	-71.381480	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	1
84	42.328130	-71.381330	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	1

AQUATIC CONTROL TECHNOLOGY

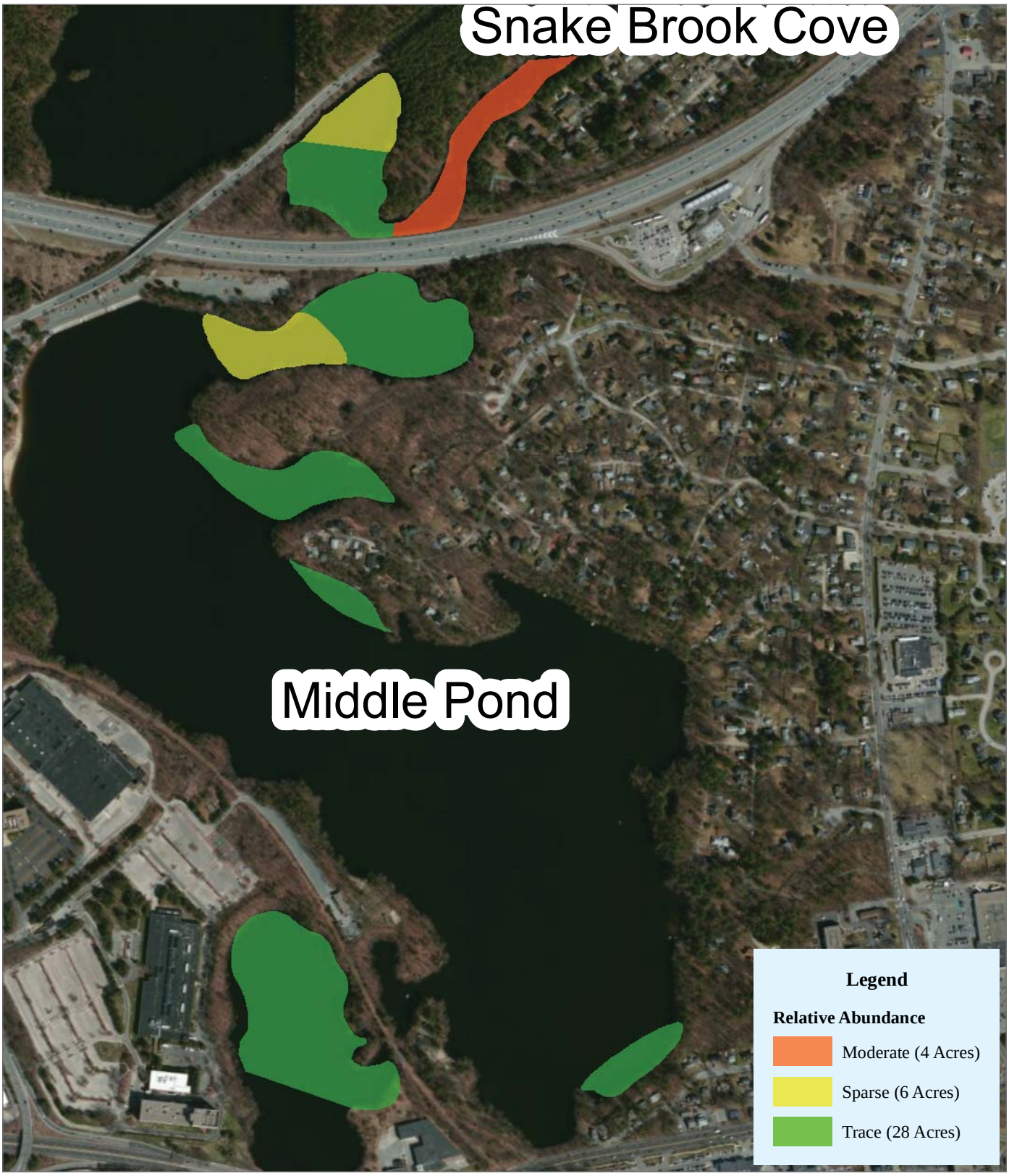
Appendix C

Middle Pond 2015 Pre, Interim, and Post Management Survey Maps and Raw Data

info@aquaticcontroltech.com
(p) 508-885-0101
(f) 774-745-0277

590 Lake Street
Shrewsbury, MA 01545

2015 June *M. spicatum* Distribution and Relative Abundance



Snake Brook, Middle, Carling Natick, Framingham, & Wayland, Massachusetts

Data Collected: 6/23 - 6/25/15
Map Created: 6/30/15
For MA DCR
Basemap © 2013 Esri

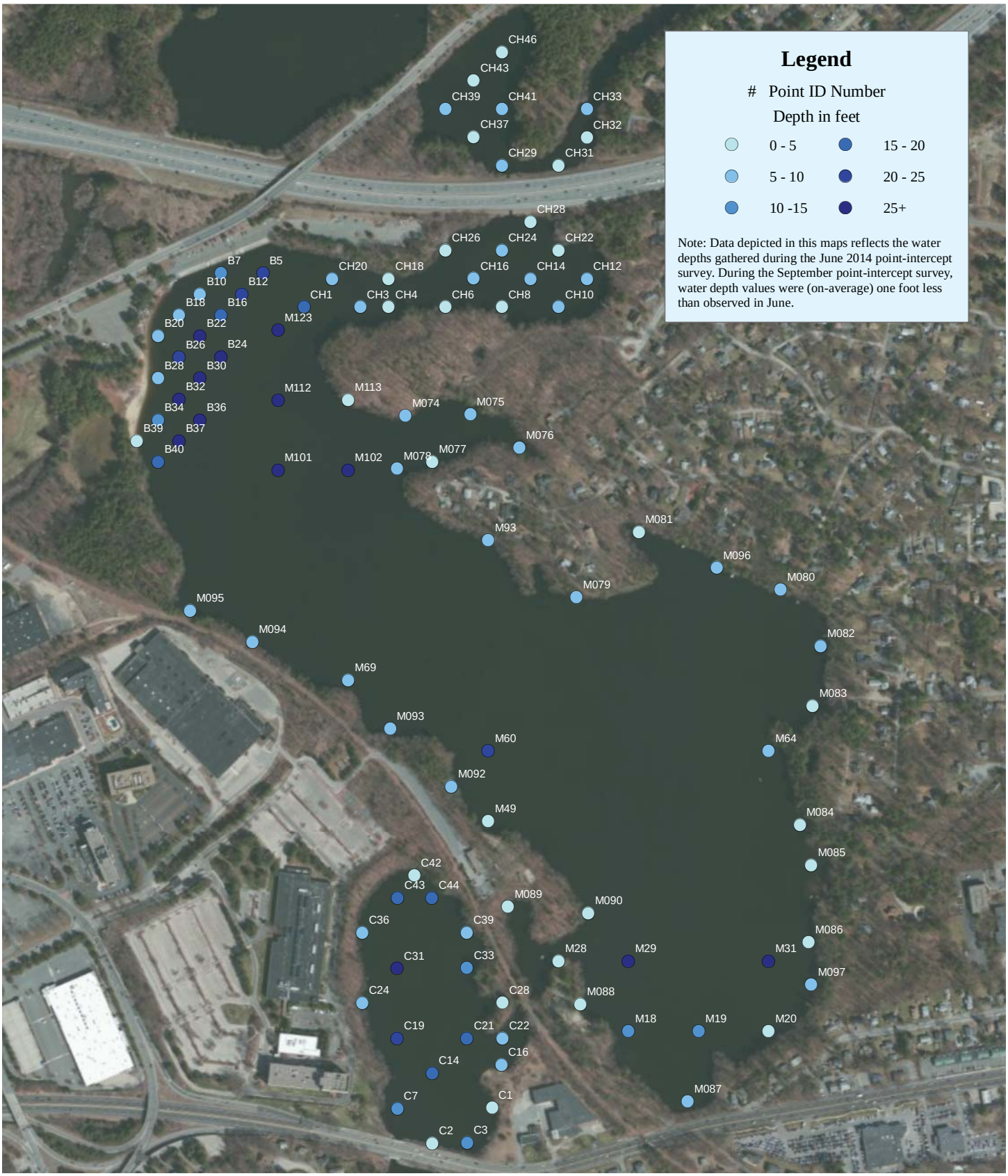
0 375 750
Feet

N

AQUATIC CONTROL TECHNOLOGY

21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

2015 Depth of Survey Points Pre- and Post-Management



Snake Brook, Middle Pond, & Carling Basin
Natick & Wayland, MA

Data Collected: 6/25/15 & 10/04/15
Map Prepared: 12/7/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

0 375 750
1:7,500 Feet

N

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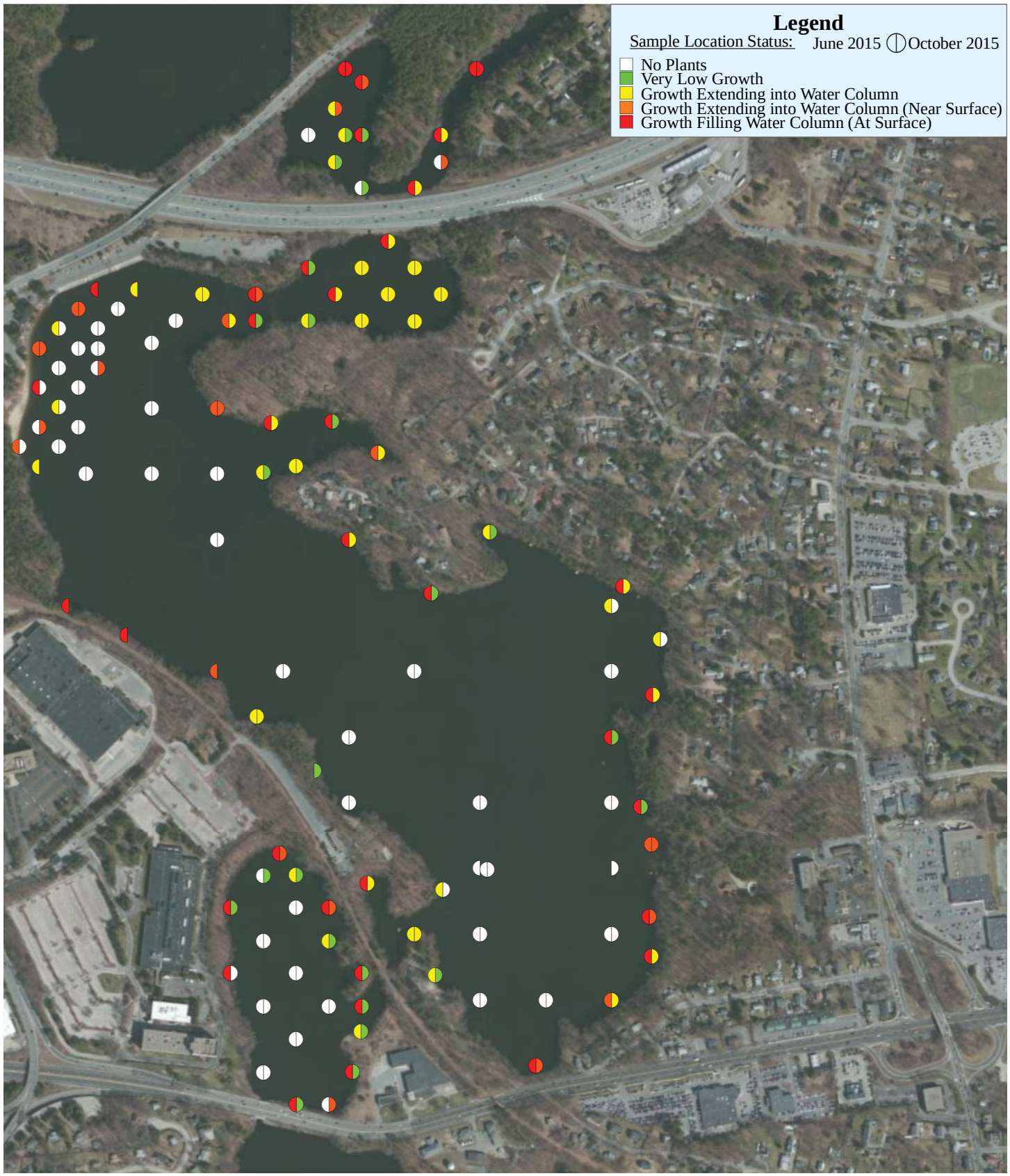
Total Biomass 2015 Pre- and Post-Management



South Pond
Natick, MA

Data Collected: 6/25, 10/04/2015
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

0 275 550 1,100
Feet
1:8,000

N

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info@aquaticcontroltech.com
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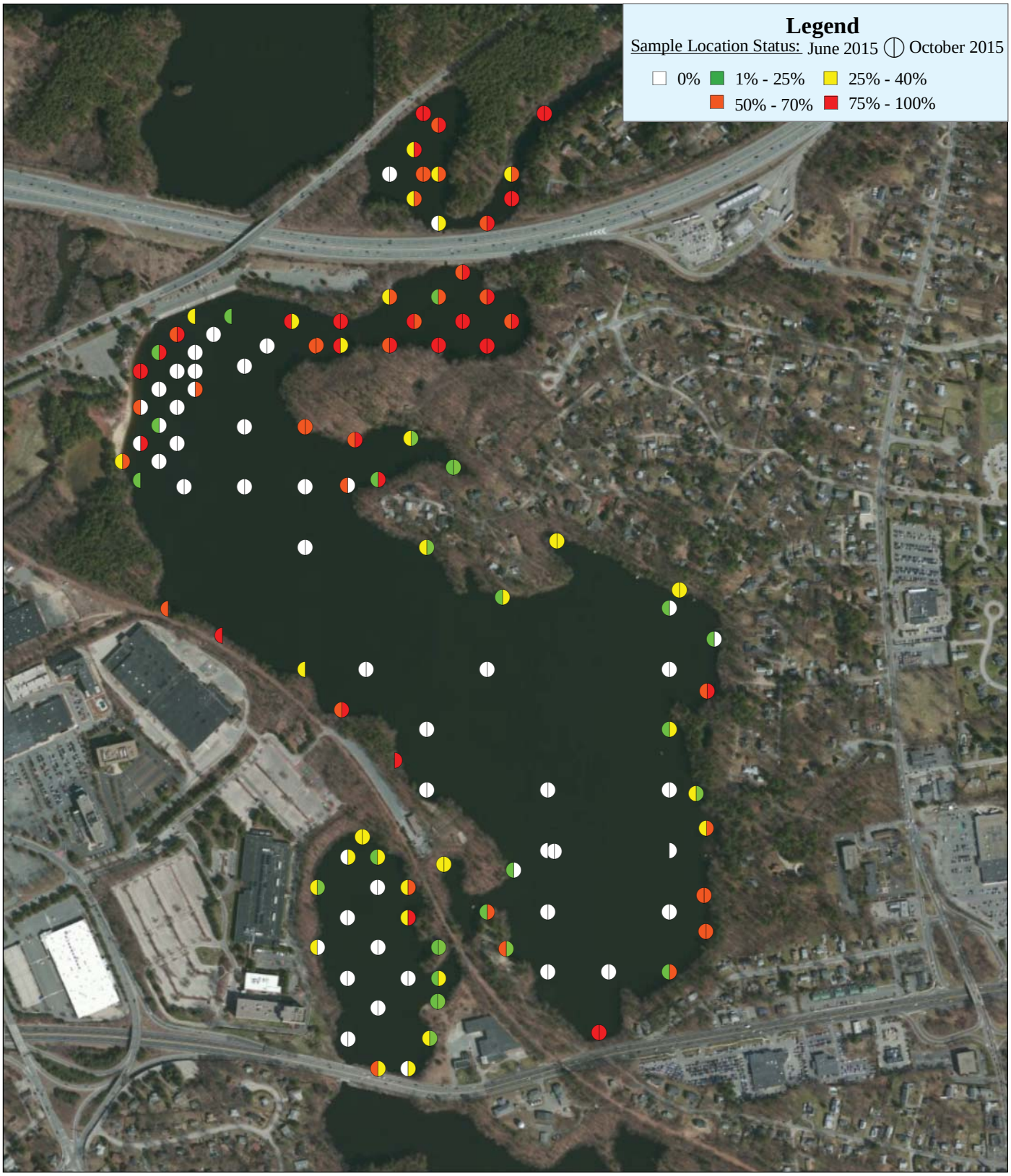
Percent Cover of All Observed Species Pre- and Post-Management



Snake Brook, Middle Pond, & Carling Basin
Natick & Wayland, MA

Data Collected: 06/25 & 10/04/15
Map Prepared: 12/7/15
For MA DCR
Contract (#115-14)
Basemap © 2013 Esri

0 187.5 375 750
1:9,000 Feet
N

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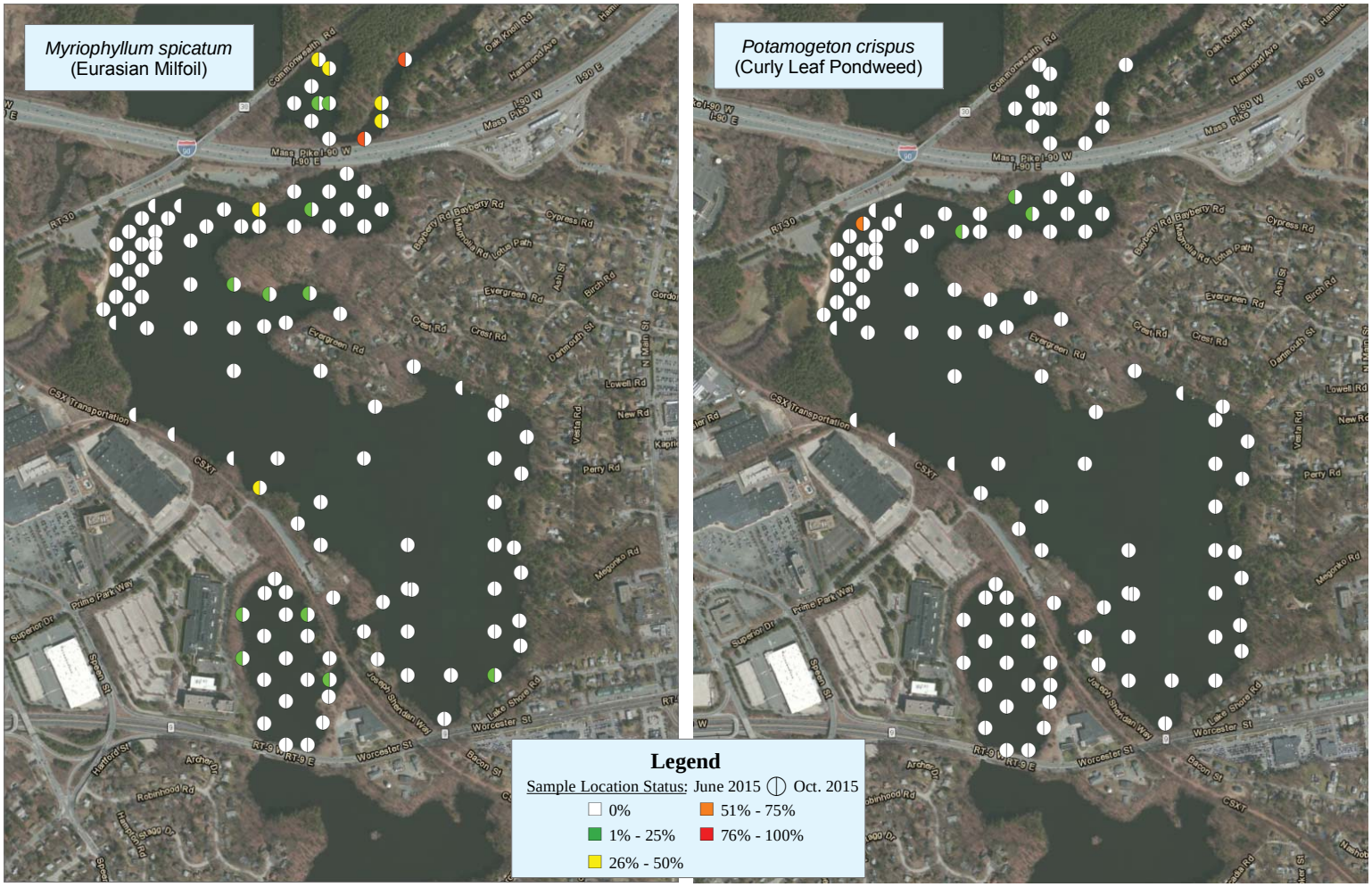
Percent Cover of Target Species 2015 Pre- and Post-Management



Snake Brook, Middle Pond, & Carling Basin
Natick & Wayland, MA

Data Collected: 6/25-10/04/2015
Map Prepared: 12/16/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

0 375 750 1,500 2,250
1:12,000 Feet

N

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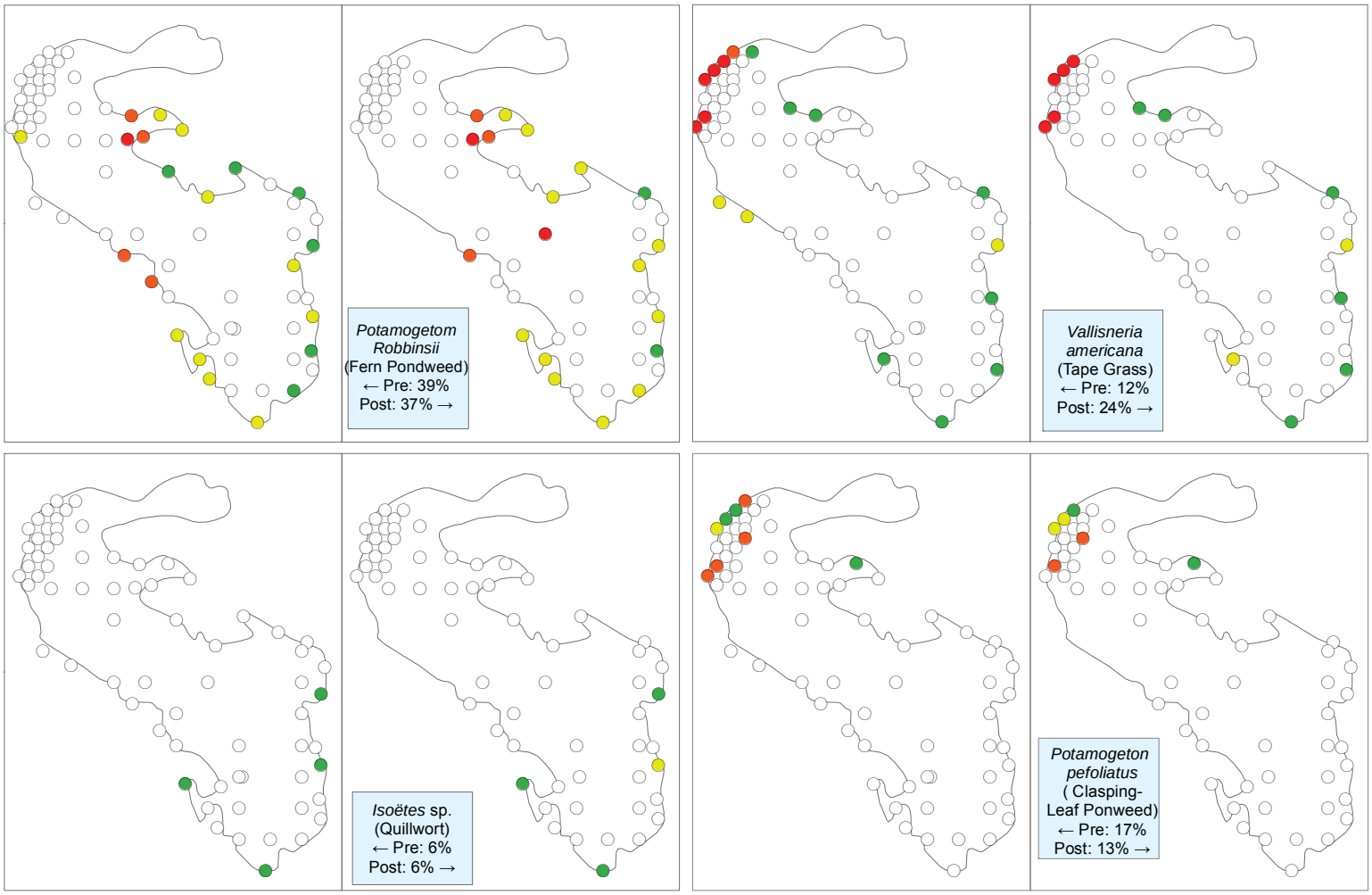
Densities and Percent Occurrence of Observed Species Pre- and Post-Management (1 of 3)



Middle Pond
Natick, Framingham
Massachusetts

Data Collected: 6/25, 10/04/15
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend
Zero · Trace · Sparse · Moderate · Dense

N

0 700 1,400
Feet
1:16,665

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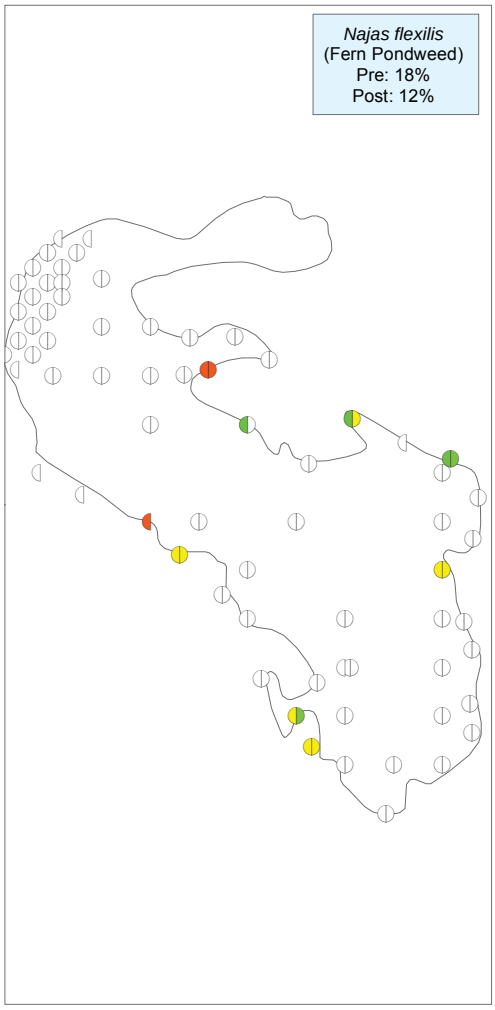
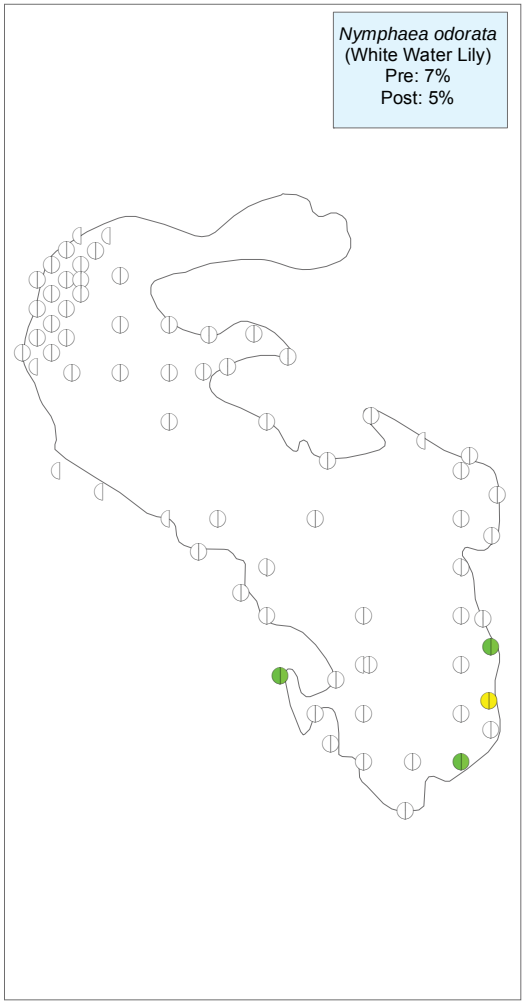
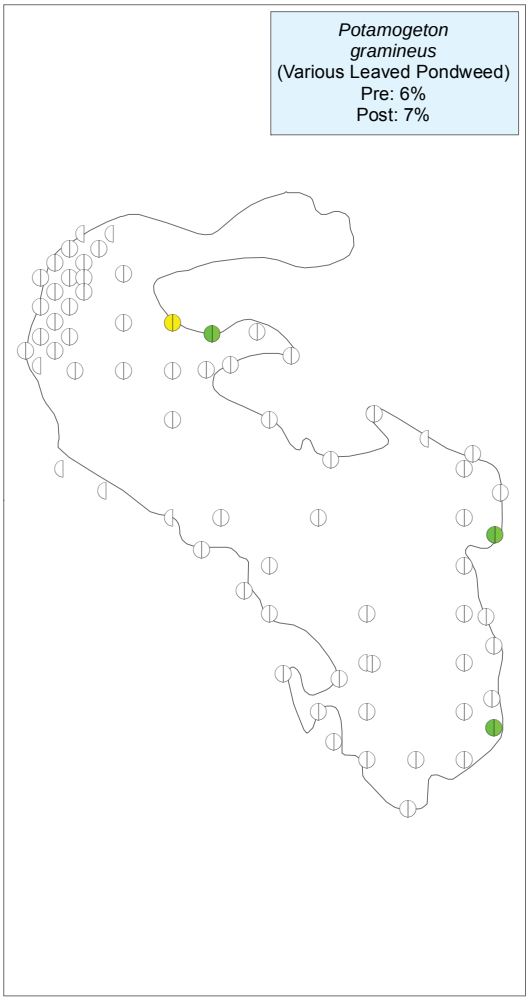
info@aquaticcontroltech.com
508-885-0101

Densities and Percent Occurrence of Observed Species Pre- and Post-Management (2 of 2)







Middle Pond
Natick, Framingham
Massachusetts

Data Collected: 6/25, 10/04/15
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend

Sample Location Status: June 2015 October 2015

0% Trace Sparse
Moderate Dense

0 250 500 1,000
1:12,000 Feet

N

AQUATIC CONTROL TECHNOLOGY
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Middle Pond (Including Snake Brook & Carling Basin) <u>2015 Pre-Management</u> Point-Intercept Survey Raw Data

PT ID	LAT (DD)	LONG (DD)	Relative Abundance													BMI	% COVER ALL	% COVER *M. SPICATUM*	% COVER *P. crispus*	Depth (Ft.)
			M. spicatum	*P. crispus*	*P. robbinsii*	*P. gramineus*	*P. epihydrus*	*P. perfoliatus*	*N. flexilis*	*N. odorata*	*C. demersum*	*Isoëtes sp.*	*Utricularia sp.*	*E. canadensis*	*T. natans*					
B10	42.309813	-71.375828	D	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	3	90	0	0	9.8
B12	42.309812	-71.375101	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	23.7
B16	42.309542	-71.375465	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	15.2
B18	42.309543	-71.376192	D	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	3	90	0	0	10
B20	42.309274	-71.376556	D	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	90	0	0	5.5
B22	42.309273	-71.375829	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	25.2
B26	42.309003	-71.376193	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	21.4
B28	42.308734	-71.376557	S	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	4	80	0	0	6
B34	42.308194	-71.376558	Z	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	4	75	0	0	13.8
B39	42.307925	-71.376922	T	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	4	45	5	0	3
B40	42.307655	-71.376559	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	16
B5	42.310081	-71.374737	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	25
B7	42.310082	-71.375464	Z	Z	T	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	2	30	0	0	12
C1	42.29935691	-71.37079163	M	Z	Z	Z	Z	S	Z	T	Z	Z	Z	Z	Z	4	65	0	0	2.5
C14	42.29980358	-71.37182814	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	17.8
C16	42.29990358	-71.37062936	S	Z	S	Z	Z	T	Z	Z	Z	Z	T	Z	Z	4	60	0	0	6
C19	42.30025026	-71.37243205	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	21
C2	42.29890362	-71.37182814	S	Z	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	4	30	0	0	4
C21	42.30025026	-71.37122430	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	20
C22	42.30025026	-71.37061133	D	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	4	90	15	0	7
C24	42.30070363	-71.37303597	S	Z	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	4	35	40	0	8
C28	42.30070363	-71.37061133	S	Z	Z	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	4	40	0	0	3
C3	42.29890362	-71.37122430	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	15
C31	42.30115022	-71.37243205	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	28
C33	42.30115022	-71.37122430	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	11
C36	42.30160360	-71.37303597	D	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	75	5	0	9
C39	42.30160360	-71.37122430	T	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	60	10	0	7.2
C42	42.30234355	-71.37213466	T	Z	Z	Z	Z	Z	Z	S	T	Z	Z	Z	T	4	40	0	0	1
C43	42.30205019	-71.37242308	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	17
C44	42.30205019	-71.37182814	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	18
C7	42.29935029	-71.37243205	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	12.5
CH1	42.309643	-71.374029	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	20
CH10	42.309638	-71.369620	T	Z	T	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	3	20	0	0	6
CH12	42.310001	-71.369130	Z	Z	D	Z	Z	Z	T	Z	T	Z	Z	Z	Z	2	80	0	0	6
CH14	42.310002	-71.370109	Z	Z	M	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	2	50	0	0	5.5
CH16	42.310004	-71.371089	T	Z	S	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	3	70	25	0	6
CH18	42.310005	-71.372559	D	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	90	25	0	3.4
CH20	42.310006	-71.373539	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	3	90	0	0	9
CH22	42.310366	-71.369619	T	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	2	5	0	0	4

PT ID	LAT (DD)	LONG (DD)	Relative Abundance													BMI	% COVER ALL	% COVER *M. SPICATUM*	% COVER *P. crispus*	Depth (Ft.)
			M. spicatum	*P. crispus*	*P. robbinsii*	*P. gramineus*	*P. epihydrus*	*P. perfoliatus*	*N. flexilis*	*N. odorata*	*C. demersum*	*Isoëtes sp.*	*Utricularia sp.*	*E. canadensis*	*T. natans*					
CH24	42.310367	-71.370599	T	Z	M	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	3	60	15	0	6.2
CH26	42.310368	-71.371578	D	Z	T	Z	Z	Z	Z	Z	Z	S	Z	Z	Z	4	75	5	0	4
CH28	42.310730	-71.370108	S	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	3	60	25	0	3
CH29	42.311458	-71.370596	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	7
CH3	42.309642	-71.373050	S	Z	T	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	3	40	5	0	5.5
CH31	42.311456	-71.369616	T	T	Z	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	3	15	40	0	4
CH32	42.311819	-71.369126	Z	Z	Z	Z	T	Z	Z	Z	T	Z	Z	Z	Z	2	15	0	0	4
CH33	42.312183	-71.369125	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	T	Z	2	5	25	0	5.5
CH37	42.311822	-71.371086	T	Z	Z	Z	T	Z	Z	Z	Z	Z	T	Z	Z	2	25	0	0	5
CH39	42.312186	-71.371575	S	Z	Z	Z	T	Z	Z	Z	S	Z	Z	T	Z	3	45	0	0	6
CH4	42.309642	-71.372560	Z	Z	S	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	2	70	0	0	5
CH41	42.312185	-71.370595	T	Z	T	Z	Z	Z	T	Z	S	Z	T	Z	Z	3	35	5	0	5.5
CH43	42.312549	-71.371084	T	Z	M	Z	Z	Z	T	Z	Z	Z	Z	S	Z	2	75	0	0	3.6
CH46	42.312912	-71.370593	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	3	10	30	0	5
CH6	42.309641	-71.371580	M	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	60	0	0	2.7
CH8	42.309639	-71.370600	S	Z	S	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	3	35	0	0	4.6
M074	42.308247	-71.372272	M	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	75	0	0	5.5
M075	42.308266	-71.371152	T	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	3	10	5	0	7.8
M076	42.307832	-71.370303	T	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	3	25	0	0	5.2
M077	42.307655	-71.371814	T	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	25	0	0	5
M078	42.307568	-71.372419	S	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	40	0	0	7.2
M079	42.305910	-71.369323	D	Z	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	4	85	0	0	6
M080	42.306005	-71.365783	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	T	Z	4	80	0	0	9
M081	42.306747	-71.368237	T	Z	T	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	3	95	0	0	5
M082	42.305279	-71.365094	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	30	0	0	7
M083	42.304511	-71.365236	M	Z	Z	Z	Z	D	Z	S	Z	Z	Z	Z	Z	4	95	0	0	2.5
M084	42.302981	-71.365456	T	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	4	80	0	0	3.6
M085	42.302465	-71.365263	M	Z	Z	Z	Z	M	Z	S	Z	Z	Z	Z	Z	4	100	0	0	3.7
M086	42.301475	-71.365310	D	Z	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	4	80	0	0	5
M087	42.299436	-71.367407	S	Z	Z	Z	Z	M	Z	S	Z	Z	Z	Z	Z	4	60	0	0	7
M088	42.300679	-71.369261	T	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	4	75	0	0	5
M089	42.301941	-71.370513	S	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	4	40	0	5	5
M090	42.301853	-71.369118	T	Z	S	Z	Z	D	T	Z	Z	Z	Z	Z	Z	4	80	0	0	4
M092	42.303481	-71.371489	S	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	50	0	0	6
M093	42.304231	-71.372547	D	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	100	0	0	6
M094	42.305340	-71.374931	M	Z	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	4	90	0	0	5.5
M095	42.305747	-71.376009	M	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	60	0	0	9
M096	42.306284	-71.366890	D	Z	T	Z	Z	T	T	Z	Z	Z	Z	Z	Z	4	90	0	0	6.5
M097	42.300936	-71.365267	T	Z	Z	Z	Z	D	Z	T	Z	Z	Z	Z	Z	4	85	0	0	6

PT ID	LAT (DD)	LONG (DD)	Relative Abundance													BMI	% COVER ALL	% COVER *M. SPICATUM*	% COVER *P. crispus*	Depth (Ft.)
			M. spicatum	*P. crispus*	*P. robbinsii*	*P. gramineus*	*P. epihydrus*	*P. perfoliatus*	*N. flexilis*	*N. odorata*	*C. demersum*	*Isoëtes sp.*	*Utricularia sp.*	*E. canadensis*	*T. natans*					
M102	42.307546	-71.373267	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	29.5
M113	42.308446	-71.373265	M	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	90	15	0	3
M123	42.309347	-71.374476	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	26
M18	42.300338	-71.368430	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	13
M19	42.300336	-71.367217	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	11.5
M20	42.300335	-71.366005	T	Z	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	4	50	10	0	4.3
M28	42.301239	-71.369641	S	Z	T	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	4	75	0	0	5
M31	42.301235	-71.366003	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	26
M49	42.303041	-71.370850	D	Z	T	Z	Z	S	T	Z	Z	Z	Z	Z	Z	4	90	0	0	3.5
M60	42.303942	-71.370848	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	22.4
M64	42.303936	-71.365997	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	85	0	0	7
M69	42.304845	-71.373272	D	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	4	80	0	0	5.2
M93	42.306643	-71.370843	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	50	25	0	7

Middle Pond (Including Snake Brook & Carling Basin) <u>2015 Post-Management</u> Point-Intercept Survey Raw Data

PT ID	LAT (DD)	LONG (DD)	Relative Abundance																	BMI	% COVER ALL	% COVER *M. spicatum*	Depth (Ft.)
			M. spicatum	*P. robbinsii*	*N. odorata*	*N. variegata*	*N,flexilis*	*Utricularia sp.*	*V. americana*	*C. demersum*	*P. perfoliatus*	*Lemna sp.*	*Wolffia sp.*	*P. gramenius*	*Sagittaria sp.*	*P. amplifolius*	*Isoëtes sp.*	*P. epihydrus*	*P. pusillus*				
B10	42.309813	-71.375828	Z	Z	Z	Z	S	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	3	65	0	9
B12	42.309812	-71.375101	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	23.5
B16	42.309542	-71.375465	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	14
B18	42.309543	-71.376192	Z	Z	Z	Z	T	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	10	0	8.6
B20	42.309274	-71.376556	Z	Z	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	100	0	3.8
B22	42.309273	-71.375829	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	24
B26	42.309003	-71.376193	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	19.6
B28	42.308734	-71.376557	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	2.5
B34	42.308194	-71.376558	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	30	0	9.8
B39	42.307925	-71.376922	Z	Z	Z	Z	T	Z	S	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	4	75	0	2
B40	42.307655	-71.376559	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	13.4
B5	42.310081	-71.374737	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	19.4
B7	42.310082	-71.375464	Z	Z	Z	Z	Z	Z	T	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	4	10	0	11
C1	42.29935691	-71.37079163	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	15	0	5.5
C14	42.29980358	-71.37182814	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	16.6

PT ID	LAT (DD)	LONG (DD)	Relative Abundance																	BMI	% COVER ALL	% COVER *M. spicatum*	Depth (Ft.)
			M. spicatum	*P. robbinsii*	*N. odorata*	*N. variegata*	*N.flexilis*	*Utricularia sp.*	*V. americana*	*C. demersum*	*P. perfoliatus*	*Lemna sp.*	*Wolffia sp.*	*P. gramenius*	*Sagittaria sp.*	*P. amplifolius*	*Isoëtes sp.*	*P. epihydrus*	*P. pusillus*				
C16	42.29990358	-71.37062936	Z	S	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	40	0	4.2
C19	42.30025026	-71.37243205	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	19.5
C2	42.29890362	-71.37182814	Z	Z	Z	Z	T	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	5	0	5
C21	42.30025026	-71.37122430	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	19.3
C22	42.30025026	-71.37061133	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	30	0	7
C24	42.30070363	-71.37303597	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	1	0	0	11.5
C28	42.30070363	-71.37061133	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	20	0	1
C3	42.29890362	-71.37122430	Z	T	Z	Z	T	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	10	0	13
C31	42.30115022	-71.37243205	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	25	0	27.1
C33	42.30115022	-71.37122430	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	8.7
C36	42.30160360	-71.37303597	Z	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	65	0	8.3
7	42.30160360	-71.37122430	Z	M	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	0	0	6.5
C42	42.30234355	-71.37213466	Z	S	M	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	70	0	5.5
C43	42.30205019	-71.37242308	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	65	0	16
C44	42.30205019	-71.37182814	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	13.3
C7	42.29935029	-71.37243205	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	5	0	5
CH1	42.309643	-71.374029	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	19
CH10	42.309638	-71.369620	Z	D	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	5.3
CH12	42.310001	-71.369130	Z	D	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	5.6
CH14	42.31000200	-71.37010900	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	5.2
CH16	42.310004	-71.371089	Z	D	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	5.8
CH18	42.310005	-71.372559	Z	S	Z	Z	Z	Z	D	Z	Z	Z	Z	M	M	Z	Z	Z	Z	4	85	0	2
CH20	42.310006	-71.373539	Z	T	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	20	0	6.4
CH22	42.310366	-71.369619	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	65	0	2.5
CH24	42.310367	-71.370599	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	40	0	5.9
CH26	42.310368	-71.371578	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	50	0	4.6
CH28	42.310730	-71.370108	Z	S	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	M	Z	Z	Z	Z	4	75	0	2
CH29	42.311458	-71.370596	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	4.9
CH3	42.309642	-71.373050	Z	S	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	40	0	6
CH31	42.311456	-71.369616	Z	D	Z	Z	Z	S	Z	T	S	Z	Z	Z	Z	Z	Z	Z	Z	4	75	0	2.3
CH32	42.311819	-71.369126	Z	S	Z	Z	Z	S	Z	T	Z	T	S	Z	Z	Z	Z	Z	Z	4	50	0	4
CH33	42.312183	-71.369125	Z	Z	Z	Z	Z	T	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	30	0	4.8
CH37	42.311822	-71.371086	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	5.1
CH39	42.312186	-71.371575	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	5.2
CH4	42.309642	-71.372560	Z	S	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	40	0	4.8
CH41	42.312185	-71.370595	Z	S	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	T	T	4	40	0	5
CH43	42.312549	-71.371084	Z	S	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	25	0	3.7
CH46	42.312912	-71.370593	Z	T	S	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	15	0	2.3
CH6	42.309641	-71.371580	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	4.3

PT ID	LAT (DD)	LONG (DD)	Relative Abundance																	BMI	% COVER ALL	% COVER *M. spicatum*	Depth (Ft.)
			M. spicatum	*P. robbinsii*	*N. odorata*	*N. variegata*	*N.flexilis*	*Utricularia sp.*	*V. americana*	*C. demersum*	*P. perfoliatus*	*Lemna sp.*	*Wolffia sp.*	*P. gramenius*	*Sagittaria sp.*	*P. amplifolius*	*Isoëtes sp.*	*P. epihydrus*	*P. pusillus*				
CH8	42.309639	-71.370600	Z	D	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	3	100	0	5.7
M074	42.308247	-71.372272	Z	Z	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	75	0	3
M075	42.308266	-71.371152	Z	S	Z	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	4	25	0	6.6
M076	42.307832	-71.370303	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	15	0	5
M077	42.307655	-71.371814	Z	D	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	13.4
M078	42.307568	-71.372419	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	10	0	6.6
M079	42.305910	-71.369323	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	1	10	0	1
M080	42.306005	-71.365783	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	5
M081	42.306747	-71.368237	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	40	0	5
M082	42.305279	-71.365094	Z	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	4	35	0	5.7
M083	42.304511	-71.365236	Z	S	M	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	50	0	3.5
M084	42.302981	-71.365456	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	2
M085	42.302465	-71.365263	Z	M	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	65	0	3
M086	42.301475	-71.365310	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	10	0	4.6
M087	42.299436	-71.367407	Z	M	S	Z	Z	Z	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	4	65	0	5.8
M088	42.300679	-71.369261	Z	S	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	4	50	0	2
M089	42.301941	-71.370513	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	0	0	0	2
M090	42.301853	-71.369118	Z	D	Z	Z	T	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	11
M092	42.303481	-71.371489	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	M	Z	Z	Z	Z	2	50	0	2
M093	42.304231	-71.372547	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	7
M094	42.305340	-71.374931	Z	Z	Z	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	4	15	0	2
M095	42.305747	-71.376009	Z	T	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	4	75	0	2
M096	42.306284	-71.366890	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	3
M097	42.300936	-71.365267	Z	Z	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	M	Z	Z	Z	Z	4	75	0	3
M102	42.307546	-71.373267	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	28.3
M113	42.308446	-71.373265	Z	Z	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	40	0	2
M123	42.309347	-71.374476	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	24.7
M18	42.300338	-71.368430	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	20	0	16
M19	42.300336	-71.367217	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	50	0	12
M20	42.300335	-71.366005	Z	Z	S	Z	Z	Z	D	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	4	100	0	5
M28	42.301239	-71.369641	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	4.8
M31	42.301235	-71.366003	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	27.6
M49	42.303041	-71.370850	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	40	0	7
M60	42.303942	-71.370848	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	27.1
M64	42.303936	-71.365997	Z	S	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	2	30	0	12.2
M69	42.304845	-71.373272	Z	M	Z	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	85	0	4
M93	42.306643	-71.370843	Z	Z	Z	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	50	0	2

AQUATIC CONTROL TECHNOLOGY

Appendix D

South Pond 2015 Pre, Interim, and Post Management Survey Maps and Raw Data

info@aquaticcontroltech.com
(p) 508-885-0101
(f) 774-745-0277

590 Lake Street
Shrewsbury, MA 01545

2015 Invasive Macrophyte Species Distribution and Relative Abundance

South Pond
Natick, Framingham, &
Wayland, Massachusetts

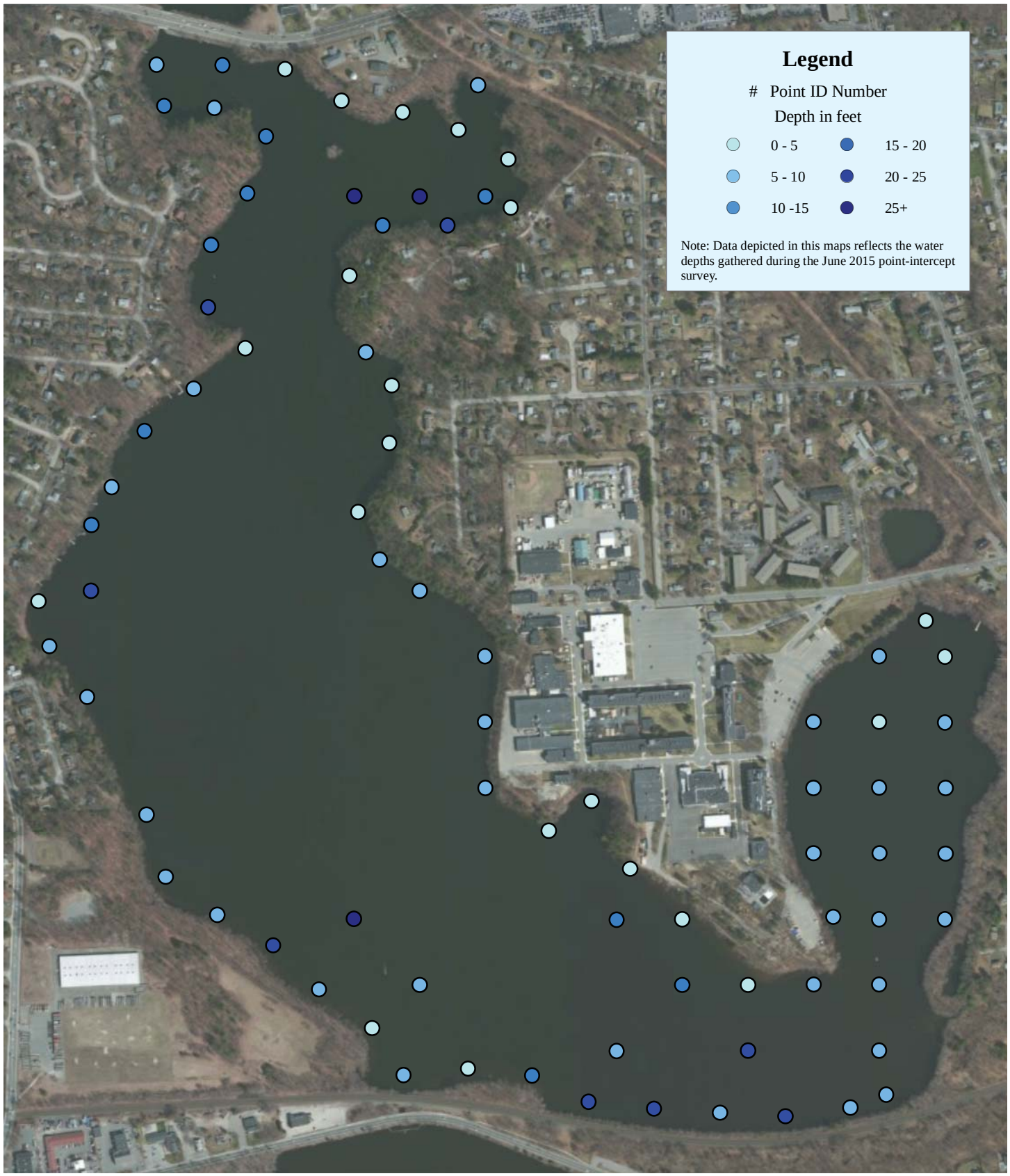
Data Collected: 6/23 - 6/25/15
Map Created: 6/30/15; rev.7/29/15
For MA DCR
Basemap © 2013 Esri

0 550 1,100
1:9,000 Feet

N

AQUATIC CONTROL TECHNOLOGY
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Average Depth of Survey Points Pre- and Post-Management



South Pond
Natick, MA

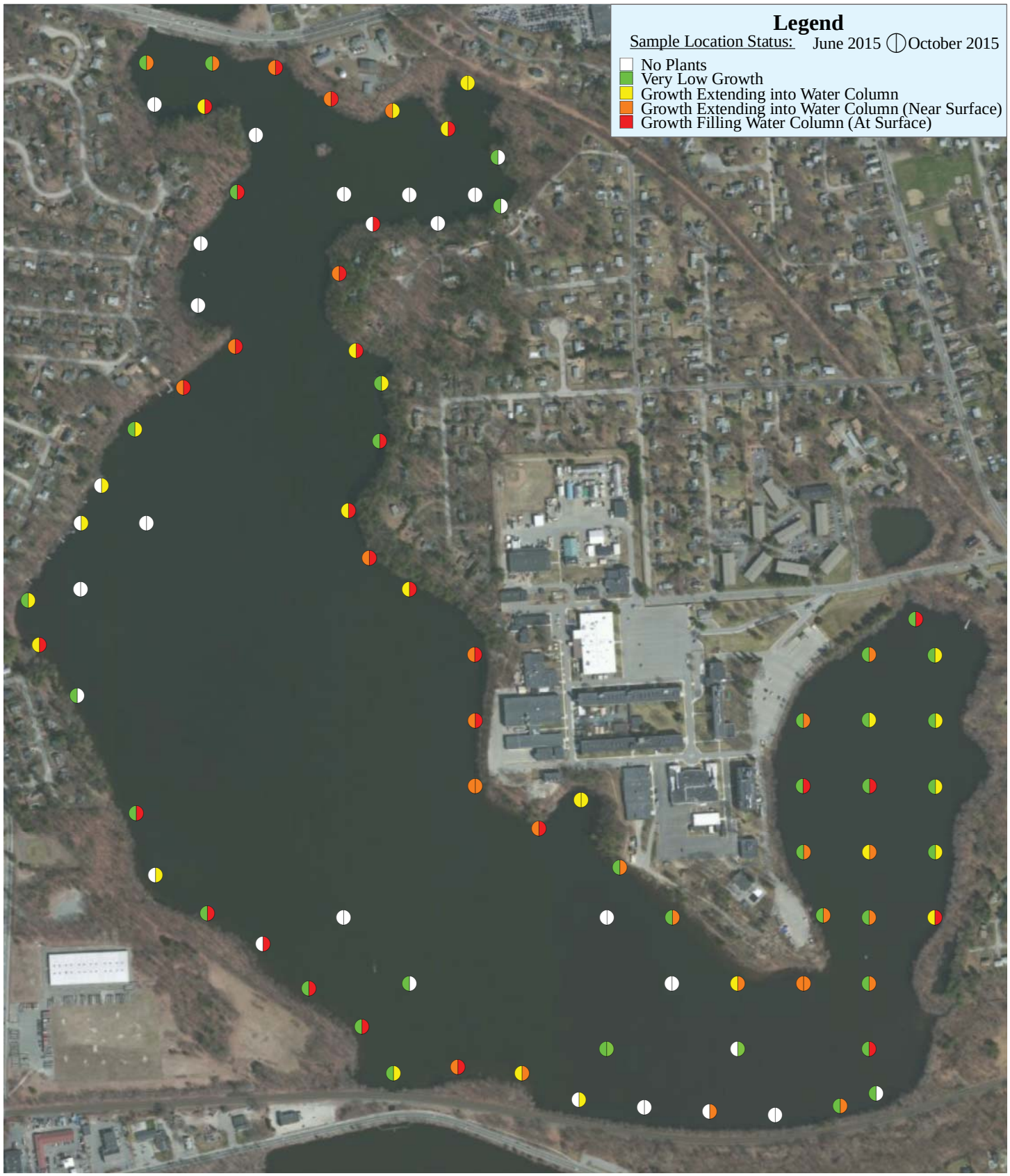
Data Collected: 6/25/15, 10/04/2015
Map Prepared: 12/16/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

0 375 750
1:8,000 Feet

N

AQUATIC CONTROL TECHNOLOGY
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Total Biomass 2015 Pre- and Post-Management



South Pond
Natick, MA

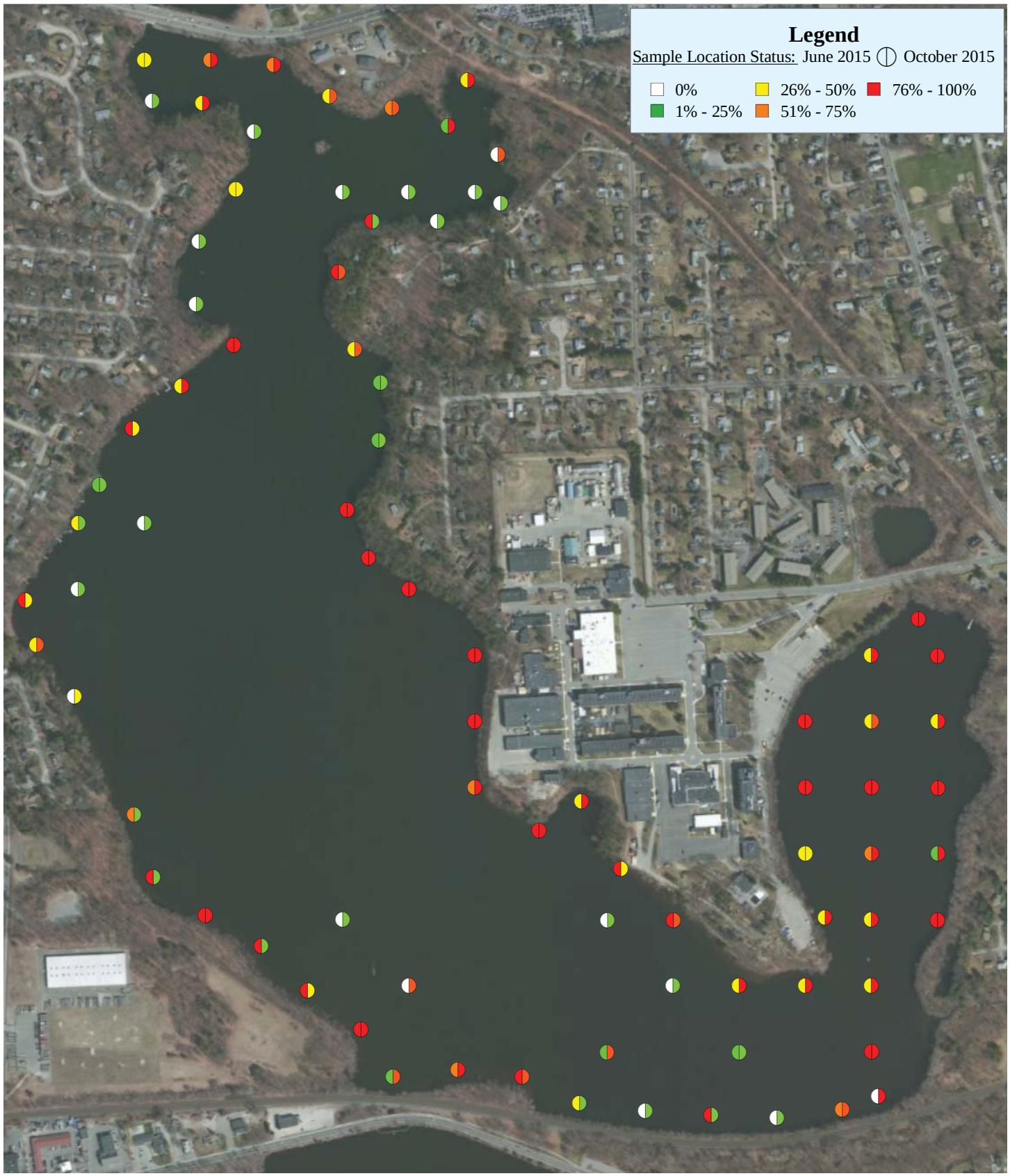
Data Collected: 6/25, 10/04/2015
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

0 375 750 1,500
1:8,000 Feet

N

AQUATIC CONTROL TECHNOLOGY
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Total Percent Cover of All Observed Species 2015 Pre- and Post-Management



South Pond
Natick, MA

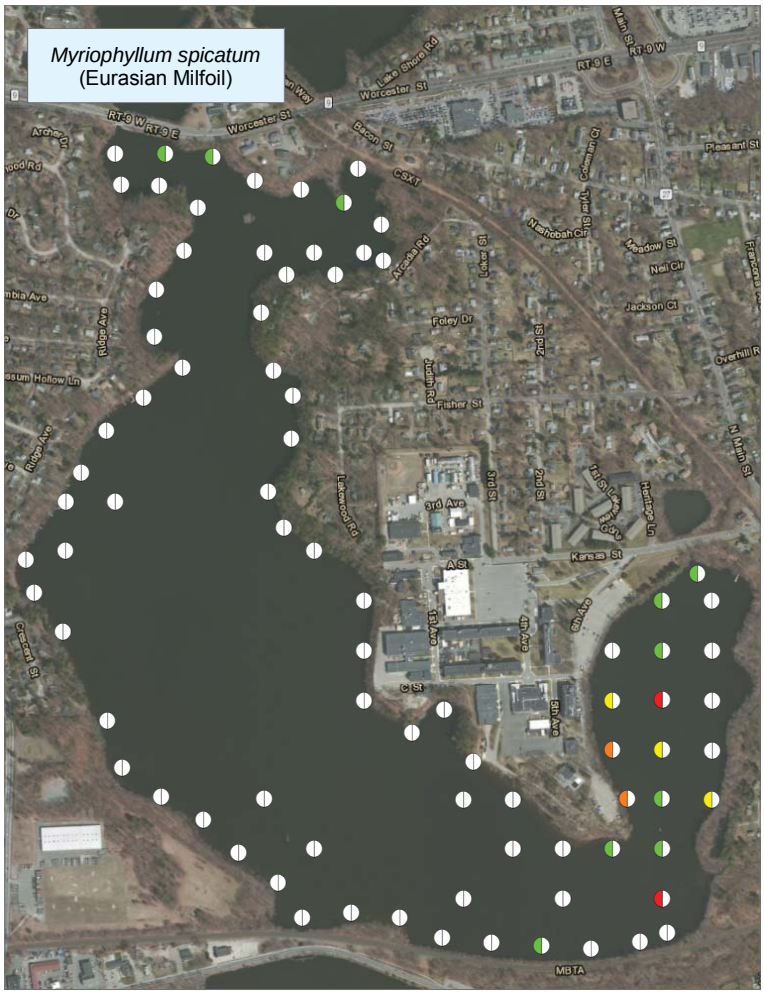
Data Collected: 6/25/15, 10/4/2015
Map Prepared: 12/16/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

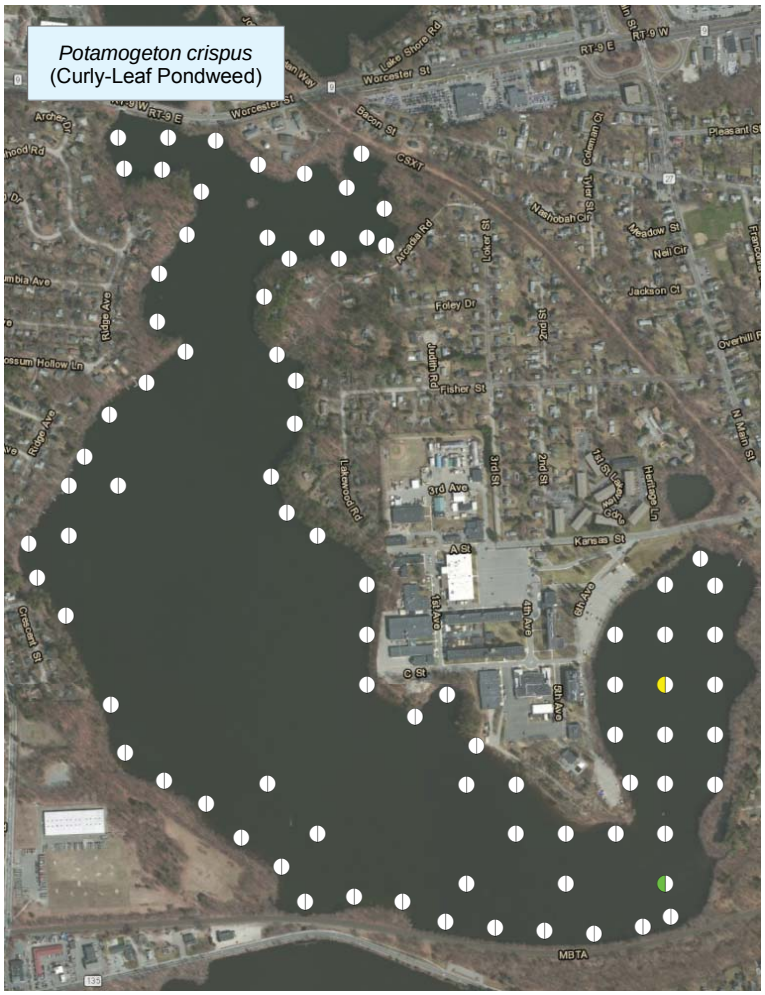
0 375 750
1:7,950 Feet

N

AQUATIC CONTROL TECHNOLOGY
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Percent Cover of Target Species 2015 Pre- and Post-Management





South Pond
Natick, MA

Data Collected: 6/25, 10/8/15
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend

Sample Location Status: June 2015 / October 2015

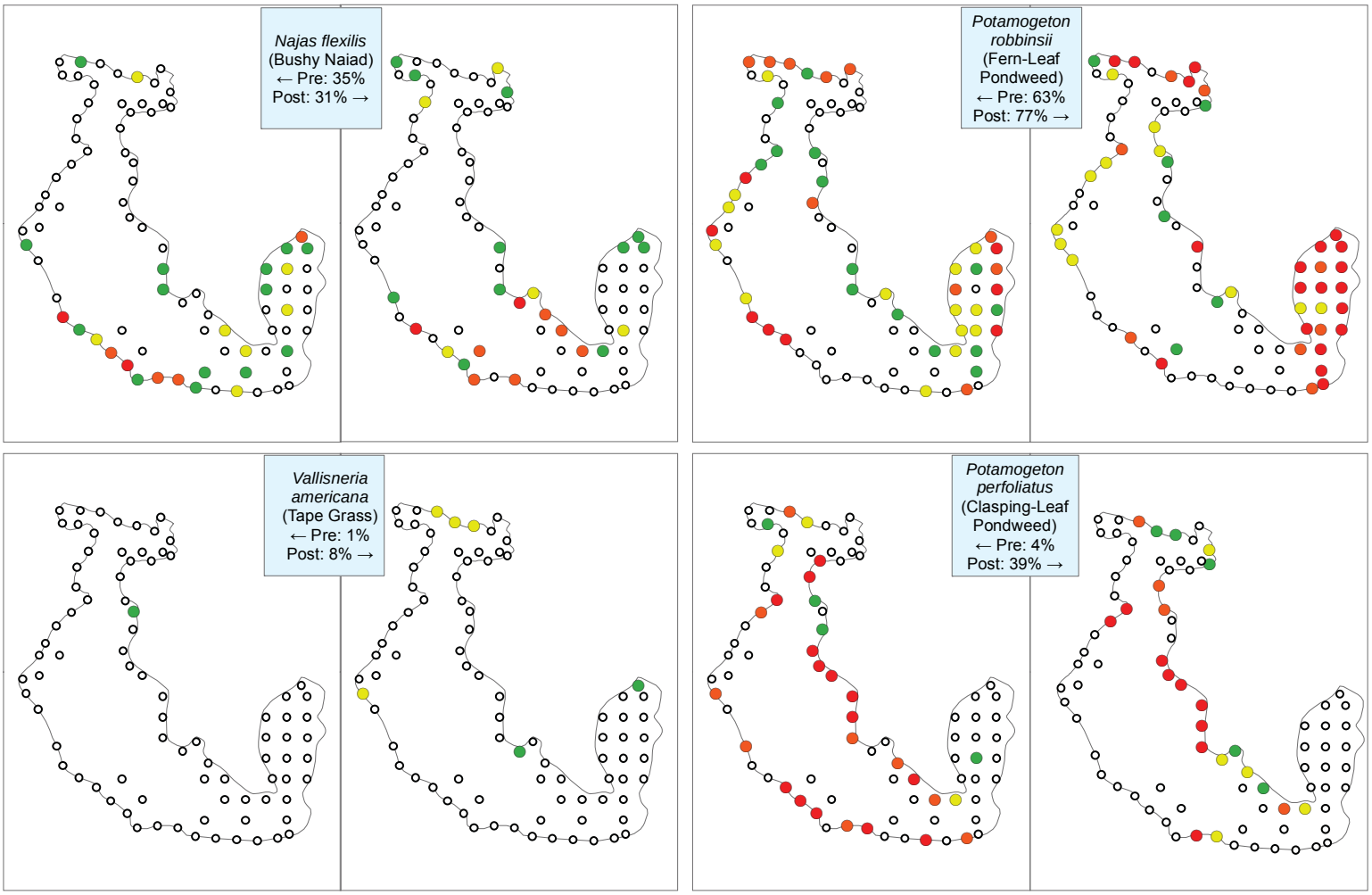
0% | 1% - 25% | 26% - 50% | 51% - 75% | 76% - 100%

N

0 370 740
Feet
1:11,750

AQUATIC CONTROL TECHNOLOGY
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Densities and Percent Occurrence of Observed Species Pre- and Post-Management (1 of 2)



South Pond
Framingham, Natick & Wayland, MA

Data Collected: 6/25, 10/4/2015
Map Prepared: 12/9/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend
Zero, Trace, Sparse, Moderate, Dense

0 375 750 1,500 2,250 3,000
Feet
1:25,265

N

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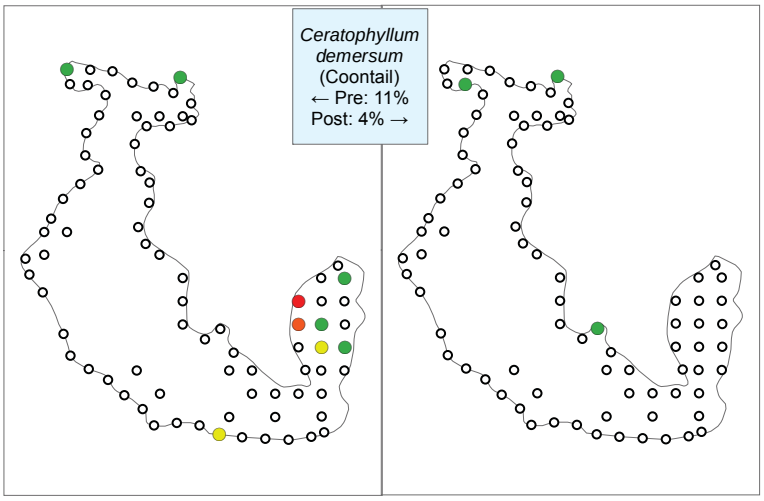
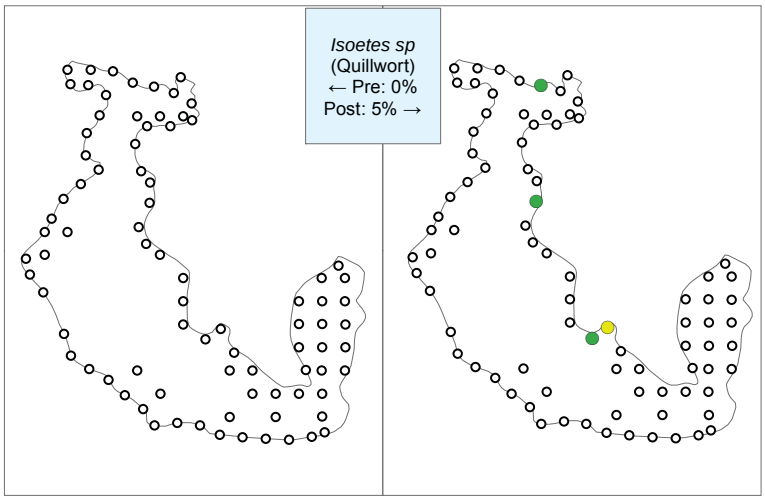
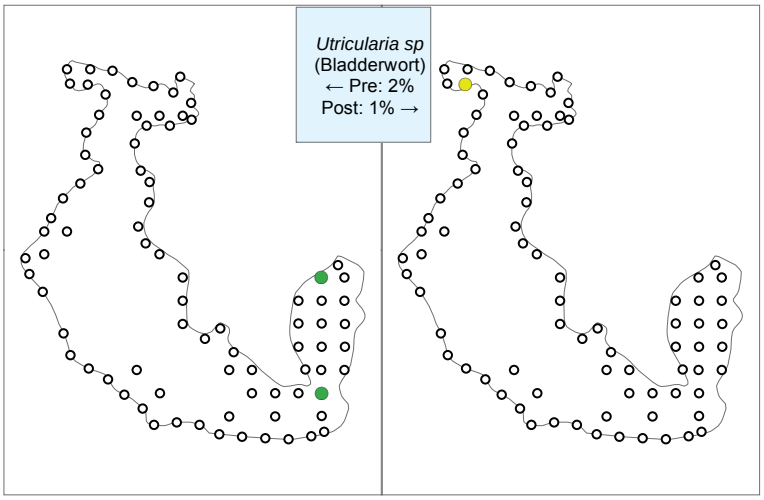
Densities and Percent Occurrence of Observed Species Pre- and Post-Management (2 of 2)







South Pond
Natick, MA

Data Collected: 6/25, 10/8/15
Map Prepared: 12/9/15
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend

○ Zero ● Trace ● Sparse
● Moderate ● Dense

N

0 375 750 1,500 2,250 3,000 3,750
1:25,265 Feet

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21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

South Pond 2015 Pre-Management Point-Intercept Survey Raw Data

PT ID	LAT (DD)	LONG (DD)	Relative Abundance											BMI	% COVER ALL	% COVER *M. Spicatum*	% COVER *P. crispus*	DEPTH (ft.)
			M. spicatum	*P. crispus*	*P. robbinsii*	*P. pusillus*	*P. perfoliatus*	*N. flexilis*	*C. demersum*	*Isoëtes* sp.	*Utricularia* sp.	*E. canadensis*	*E. densa*					
	42.2969250	-71.3661190	M	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	4	60	0	0	5.0
1	42.2962660	-71.3660730	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	10	0	0	5.0
10	42.2879440	-71.3655550	S	Z	T	Z	T	Z	Z	Z	Z	Z	Z	4	50	0	0	3.0
11	42.2881330	-71.3646020	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	40	0	10	4.0
12	42.2865360	-71.3601390	Z	Z	S	Z	Z	Z	T	Z	Z	Z	Z	2	45	50	0	6.0
13	42.2905290	-71.3584390	T	Z	D	Z	Z	T	S	Z	Z	Z	Z	3	100	15	0	6.2
14	42.2841380	-71.3586580	T	Z	Z	Z	Z	Z	Z	Z	T	Z	S	4	80	0	60	6.8
15	42.2839290	-71.3598310	T	Z	S	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	4.6
16	42.2838100	-71.3610310	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	13.6
17	42.2838570	-71.3622420	S	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	3	30	5	0	8.2
18	42.2839180	-71.3634510	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	15.4
19	42.2840150	-71.3646560	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	12.5
2	42.2960280	-71.3672360	Z	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	3	5	0	0	7.0
20	42.2843790	-71.3656980	S	Z	Z	Z	D	T	Z	Z	Z	Z	Z	4	100	0	0	5.5
21	42.2844690	-71.3668830	Z	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	4	30	0	0	2.6
22	42.2843840	-71.3680720	Z	Z	Z	Z	Z	Z	Z	Z	T	Z	Z	2	15	0	0	8.4
23	42.2850250	-71.3686590	D	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	4.0
24	42.2855620	-71.3696270	S	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	3.5
25	42.2861630	-71.3704740	S	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	6.0
26	42.2865880	-71.3715030	T	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	90	0	0	4.0
27	42.2871000	-71.3724600	D	Z	T	Z	M	Z	Z	Z	Z	Z	Z	4	100	0	0	8.2
28	42.2879610	-71.3728140	M	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	50	0	0	6.0
29	42.2887820	-71.3733080	S	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	5	5.3
3	42.2960270	-71.3684350	S	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	4	55	0	0	3.5
30	42.2895660	-71.3738990	S	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	90	0	0	6.0
31	42.2902660	-71.3745940	T	Z	T	Z	T	Z	Z	Z	Z	Z	Z	4	30	0	0	4.0
32	42.2910290	-71.3747280	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	100	0	0	4.0
33	42.2924470	-71.3734460	D	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	4	100	0	0	6.0
34	42.2932140	-71.3728360	S	Z	S	Z	Z	Z	T	Z	Z	Z	Z	4	55	0	0	10.0
35	42.2937920	-71.3719220	D	Z	S	Z	S	Z	Z	Z	Z	Z	Z	4	100	0	0	7.0
36	42.2943440	-71.3709750	M	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	5.2
37	42.2949010	-71.3716610	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	14.5
38	42.2957560	-71.3716060	D	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	4	75	0	0	11.5
39	42.2964650	-71.3709340	D	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	4	75	0	0	7.2
4	42.2953430	-71.3690550	M	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	4	80	0	0	4.0
40	42.2972480	-71.3705870	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	13.8
41	42.2976430	-71.3715280	S	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	4	50	0	0	8.0
42	42.2976660	-71.3724580	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	11.0
43	42.2981650	-71.3702230	D	Z	T	Z	S	Z	Z	Z	Z	Z	Z	4	80	5	0	6.0

PT ID	LAT (DD)	LONG (DD)	Relative Abundance											BMI	% COVER ALL	% COVER *M. Spicatum*	% COVER *P. crispus*	DEPTH (ft.)
			M. spicatum	*P. crispus*	*P. robbinsii*	*P. pusillus*	*P. perfoliatus*	*N. flexilis*	*C. demersum*	*Isoëtes* sp.	*Utricularia* sp.	*E. canadensis*	*E. densa*					
44	42.2977280	-71.3691980	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	1.0
45	42.2975680	-71.3680620	S	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	4	60	0	0	7.8
46	42.2973260	-71.3670340	T	Z	Z	Z	T	Z	Z	S	Z	Z	Z	4	40	15	0	2.0
47	42.2979430	-71.3666760	T	Z	T	Z	Z	T	Z	Z	Z	Z	Z	4	30	0	0	4.5
5	42.2944940	-71.3688300	D	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	4	90	0	0	7.6
6	42.2939010	-71.3680320	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	7.4
7	42.2930110	-71.3680870	T	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	4	65	0	0	5.3
8	42.2922100	-71.3686030	M	Z	Z	Z	M	Z	Z	Z	Z	Z	Z	4	95	0	0	6.0
9	42.2914280	-71.3681120	D	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	6.5
103	42.2892180	-71.3665580	M	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	5.8
108	42.2892110	-71.3604950	T	Z	Z	Z	Z	Z	M	Z	Z	T	Z	3	60	0	0	5.5
109	42.2892100	-71.3592820	Z	Z	D	Z	Z	Z	S	Z	Z	Z	Z	2	100	0	0	4.5
110	42.2892080	-71.3580700	Z	Z	D	Z	Z	T	Z	Z	Z	Z	Z	3	100	0	0	4.0
114	42.2901260	-71.3726180	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	34.5
119	42.2901190	-71.3665560	S	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	7.0
125	42.2901100	-71.3592800	T	T	S	Z	Z	Z	T	Z	T	Z	Z	3	30	5	0	7.0
126	42.2901090	-71.3580680	S	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	4	100	0	0	6.0
129	42.2910270	-71.3738290	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	19.0
134	42.2910200	-71.3677660	S	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	7.5
145	42.2919280	-71.3738270	M	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	80	0	0	7.5
146	42.2919260	-71.3726150	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	25.8
229	42.2964240	-71.3689680	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	17.5
230	42.2964220	-71.3677550	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	17.0
231	42.2964210	-71.3665420	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	16.5
258	42.2982280	-71.3726020	S	Z	T	T	Z	Z	T	Z	Z	Z	Z	4	60	0	0	9.0
259	42.2982270	-71.3713890	S	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	4	35	5	0	10.5
27	42.2847110	-71.3617170	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	16.5
29	42.2847080	-71.3592920	S	T	T	Z	Z	Z	Z	Z	Z	T	Z	4	65	75	0	7.0
38	42.2856190	-71.3677780	T	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	3	5	0	0	9.5
42	42.2856130	-71.3629280	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	12.6
43	42.2856120	-71.3617150	S	Z	S	Z	D	S	Z	Z	Z	Z	Z	4	75	0	0	5.5
44	42.2856100	-71.3605030	T	Z	M	Z	D	Z	Z	Z	Z	Z	Z	4	100	0	0	5.5
45	42.2856090	-71.3592900	S	T	S	Z	Z	Z	T	Z	Z	Z	Z	4	60	15	0	7.0
53	42.2865200	-71.3689880	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	22.0
57	42.2865150	-71.3641380	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	10.7
58	42.2865130	-71.3629260	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	Z	4	10	0	0	2.3
61	42.2865090	-71.3592880	D	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	4	100	0	0	7.6
62	42.2865070	-71.3580760	Z	Z	S	Z	Z	Z	Z	Z	Z	Z	Z	2	30	30	0	6.0
73	42.2874150	-71.3641360	T	Z	Z	Z	S	Z	Z	Z	Z	Z	Z	4	40	0	0	2.0

PT ID	LAT (DD)	LONG (DD)	Relative Abundance											BMI	% COVER ALL	% COVER *M. Spicatum*	% COVER *P. crispus*	DEPTH (ft.)
			M. spicatum	*P. crispus*	*P. robbinsii*	*P. pusillus*	*P. perfoliatus*	*N. flexilis*	*C. demersum*	*Isoëtes* sp.	*Utricularia* sp.	*E. canadensis*	*E. densa*					
76	42.2874110	-71.3604990	D	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	4	75	50	0	6.5
77	42.2874090	-71.3592860	M	T	T	Z	Z	Z	S	Z	Z	Z	Z	3	85	30	0	7.2
78	42.2874080	-71.3580740	Z	Z	D	Z	Z	Z	T	Z	Z	Z	Z	3	100	0	0	6.0
87	42.2883180	-71.3665600	S	Z	Z	Z	D	Z	Z	Z	Z	Z	Z	4	90	0	0	9.0
92	42.2883110	-71.3604970	S	Z	S	Z	Z	T	M	Z	Z	Z	Z	4	70	30	0	7.0
93	42.2883100	-71.3592840	M	T	D	Z	Z	Z	T	Z	Z	Z	Z	4	90	30	30	6.8
94	42.2883080	-71.3580720	Z	Z	D	Z	Z	Z	Z	Z	Z	Z	Z	2	100	0	0	4.5

South Pond <u>2015 Post-Management</u> Point-Intercept Survey Raw Data

PT ID	LAT (DD)	LONG (DD)	Relative Abundance								BMI	% Cover All	% Cover *M. spicatum*	DEPTH (FT)
			M. spicatum	*P. robbinsii*	*N. flexilis*	*V. americana*	*P. perfoliatus*	*C. demersum*	*P. gramenius*	*Utricularia* sp.				
0	42.29692356	-71.36611369	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	1.0
10	42.28772928	-71.36538363	Z	Z	Z	D	T	Z	Z	Z	4	75	0	1.0
1	42.29626357	-71.36606859	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	3.3
11	42.28812935	-71.36459941	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	1.0
12	42.28653570	-71.36013781	Z	D	Z	Z	Z	Z	Z	Z	2	100	0	3.7
13	42.29059640	-71.35841625	Z	S	Z	Z	Z	S	Z	Z	2	30	0	5.8
14	42.28410185	-71.35916442	Z	M	S	Z	Z	M	Z	Z	2	100	0	2.8
15	42.28392843	-71.35983137	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	11.4
16	42.28380840	-71.36103015	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	14.2
17	42.28385508	-71.36223798	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	10.5
18	42.28391510	-71.36344573	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	17.1
19	42.28401518	-71.36465356	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	12.9
2	42.29602351	-71.36723133	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	9.2
20	42.28437527	-71.36569912	Z	Z	S	Z	Z	Z	Z	Z	1	20	0	8.4
21	42.28446856	-71.36687980	Z	Z	Z	S	S	Z	D	Z	4	100	0	1.0
22	42.28438189	-71.36806961	Z	Z	Z	Z	Z	Z	Z	Z	1	30	0	13.1
23	42.28502201	-71.36865550	Z	Z	Z	Z	D	Z	Z	Z	4	100	0	1.5
24	42.28555552	-71.36962889	Z	D	Z	Z	S	Z	Z	Z	3	100	0	4.5
25	42.28616229	-71.37047613	Z	M	Z	Z	Z	Z	Z	Z	2	50	0	5.7
26	42.28658239	-71.37150367	Z	Z	S	Z	D	Z	Z	Z	4	100	0	4.6

PT ID	LAT (DD)	LONG (DD)	Relative Abundance								BMI	% Cover All	% Cover *M. spicatum*	DEPTH (FT)
			M. spicatum	*P. robbinsii*	*N. flexilis*	*V. americana*	*P. perfoliatus*	*C. demersum*	*P. gramenius*	*Utricularia* sp.				
27	42.28710249	-71.37245913	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	9.7
28	42.28795593	-71.37281066	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	8.2
29	42.28877610	-71.37330637	Z	Z	Z	Z	D	Z	Z	Z	4	80	0	2.8
3	42.29602351	-71.36843011	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	4.8
30	42.28956291	-71.37390123	Z	M	Z	Z	Z	Z	Z	Z	4	40	0	7.3
31	42.29026297	-71.37459525	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	4.2
32	42.29087644	-71.37480262	Z	M	Z	S	Z	Z	Z	Z	2	70	0	2.3
33	42.29244327	-71.37344157	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	9.7
34	42.29321004	-71.37282868	Z	D	Z	Z	M	Z	Z	Z	4	100	0	7.0
35	42.29379007	-71.37192729	Z	S	Z	Z	D	Z	Z	Z	4	100	0	4.5
36	42.29434344	-71.37097192	Z	S	Z	T	S	Z	Z	Z	2	30	0	3.3
37	42.29490344	-71.37165689	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	17.2
38	42.29575688	-71.37160283	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	9.3
39	42.29646356	-71.37092683	Z	S	Z	Z	Z	Z	Z	Z	2	40	0	9.7
4	42.29533687	-71.36905205	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	1.0
40	42.29724358	-71.37058435	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	10.9
41	42.29763695	-71.37153075	Z	S	T	Z	Z	Z	Z	Z	2	25	0	6.5
42	42.29766360	-71.37245913	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	8.9
43	42.29816358	-71.37022376	Z	Z	Z	M	M	Z	Z	Z	4	75	0	5.1
44	42.29773024	-71.36919630	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	2.0
45	42.29757023	-71.36806055	Z	D	Z	Z	Z	Z	Z	Z	2	100	0	9.6
46	42.29732363	-71.36703310	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	1.0
47	42.29794364	-71.36667251	Z	S	Z	Z	Z	T	Z	Z	4	40	0	1.0
5	42.29428343	-71.36874561	Z	T	Z	Z	Z	T	Z	Z	2	10	0	7.2
6	42.29383005	-71.36827689	Z	Z	Z	S	Z	Z	Z	Z	4	40	0	2.0
7	42.29304333	-71.36831293	Z	S	Z	Z	Z	Z	Z	Z	2	25	0	7.5
8	42.29209659	-71.36888978	Z	Z	Z	Z	D	Z	Z	Z	4	100	0	4.3
9	42.29144314	-71.36850228	Z	Z	Z	Z	D	Z	Z	Z	4	80	0	6.2
103	42.28921615	-71.36655533	Z	Z	Z	S	D	Z	Z	Z	4	100	0	3.6
108	42.28920953	-71.36049840	Z	D	Z	Z	Z	Z	Z	Z	2	100	0	4.9
109	42.28920953	-71.35928160	Z	D	Z	Z	Z	T	Z	Z	2	100	0	5.9
110	42.28920282	-71.35806472	Z	S	Z	Z	Z	Z	Z	Z	2	40	0	5.3
114	42.29012299	-71.37262132	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	38.1
119	42.29011628	-71.36655533	Z	T	Z	Z	Z	Z	Z	Z	2	15	0	8.3
125	42.29010966	-71.35928160	Z	M	Z	Z	Z	T	Z	T	2	80	0	4.9
126	42.29010296	-71.35806472	Z	M	S	Z	Z	S	Z	Z	2	100	0	4.9
129	42.29102312	-71.37382915	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	13.4
134	42.29101642	-71.36776316	Z	Z	Z	Z	D	Z	Z	Z	4	100	0	5.6
145	42.29192317	-71.37382009	Z	S	Z	Z	Z	Z	Z	Z	1	20	0	7.4
146	42.29192317	-71.37261235	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	28.4
229	42.29642358	-71.36896194	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	16.3

PT ID	LAT (DD)	LONG (DD)	Relative Abundance								BMI	% Cover All	% Cover *M. spicatum*	DEPTH (FT)
			M. spicatum	*P. robbinsii*	*N. flexilis*	*V. americana*	*P. perfoliatus*	*C. demersum*	*P. gramenius*	*Utricularia* sp.				
230	42.29641688	-71.36775411	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	16.2
231	42.29641688	-71.36653731	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	15.8
258	42.29823030	-71.37260329	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	8.4
259	42.29822359	-71.37138649	Z	D	Z	Z	Z	Z	Z	Z	2	100	0	8.2
27	42.28470861	-71.36171520	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	9.5
29	42.28470861	-71.35929057	Z	S	T	Z	Z	Z	Z	Z	2	20	0	5.8
38	42.28561554	-71.36777213	Z	S	T	Z	Z	Z	Z	Z	1	30	0	8.4
42	42.28560883	-71.36293200	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	13.3
43	42.28560883	-71.36171520	Z	S	D	Z	Z	Z	Z	Z	2	100	0	5.2
44	42.28560883	-71.36049840	Z	D	Z	Z	Z	Z	Z	Z	2	75	0	4.8
45	42.28560883	-71.35929057	Z	S	S	Z	Z	T	Z	Z	4	50	0	6.5
53	42.28652237	-71.36898893	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	26.4
57	42.28650905	-71.36413078	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	9.9
58	42.28650905	-71.36292295	Z	Z	Z	M	D	Z	Z	Z	4	100	0	2.5
61	42.28650905	-71.35929057	Z	D	Z	Z	Z	S	Z	Z	2	100	0	16.8
62	42.28650234	-71.35807377	Z	D	T	Z	Z	T	Z	Z	2	100	0	14.8
73	42.28720248	-71.36388737	Z	Z	Z	M	Z	Z	Z	Z	4	50	0	1.0
76	42.28740918	-71.36049840	Z	M	Z	Z	Z	S	Z	Z	2	100	0	7.3
77	42.28740918	-71.35928160	Z	D	Z	Z	Z	S	Z	Z	2	100	0	16.2
78	42.28740256	-71.35806472	Z	D	Z	Z	Z	T	Z	Z	2	100	0	5.0
87	42.28831602	-71.36655533	Z	Z	T	S	D	Z	Z	Z	4	100	0	3.4
92	42.28830940	-71.36049840	Z	D	Z	Z	Z	T	Z	Z	2	100	0	4.7
93	42.28830940	-71.35928160	Z	D	Z	Z	Z	Z	Z	Z	2	100	0	15.2
94	42.28830269	-71.35806472	Z	M	Z	Z	Z	Z	Z	Z	2	70	0	5.9

AQUATIC CONTROL TECHNOLOGY

Appendix E

Fiske Pond 2015 Pre, Interim, and Post Management Survey Maps and Raw Data

info@aquaticcontroltech.com
(p) 508-885-0101
(f) 774-745-0277

590 Lake Street
Shrewsbury, MA 01545

2015 June Invasive Macrophyte Distribution & Relative Abundance

Fiske Pond
Natick, MA

Data Collected: 6/29/2015
For MA DCR Contract #(115-14)
Basemap © 2013 Esri

0 125 250 500 750
1:7,000 Feet

N

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21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

June 2015 Hand-Harvesting Removal Locations of *Trapa natans*

Fiske Pond
Natick, MA

Map Prepared: 12/22/15
For: MA DCR (#115-14)
Basemap © 2013 Esri

0 300 600
1:6,000 Feet

N

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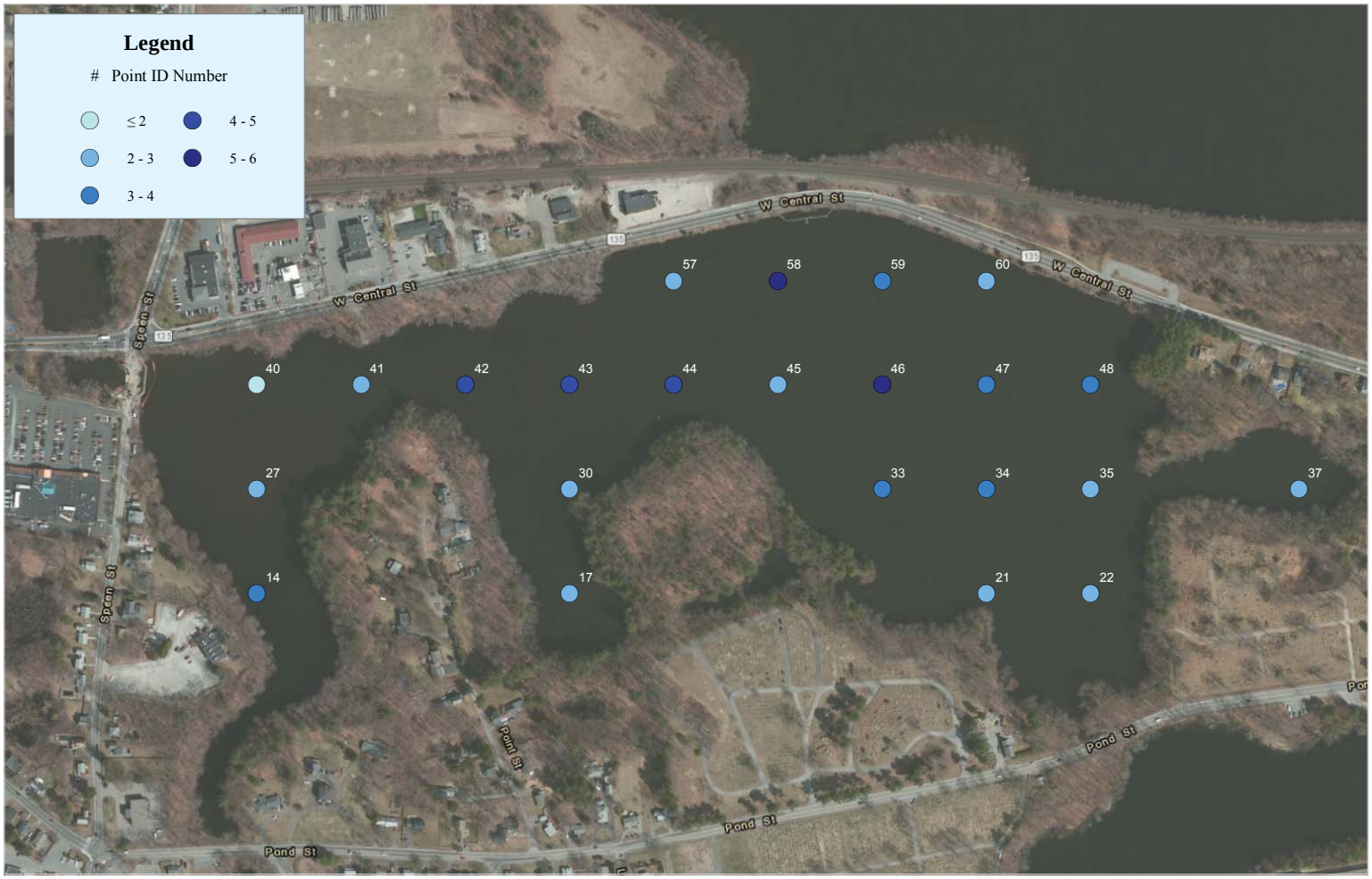
Average Depth of Survey Points Pre- and Post-Management



Fiske Pond
Natick/Framingham/Wayland
Massachusetts

Data Collected: 06/29/2015
Map Prepared: 12/16/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

N

0 125 250 500 750
1:5,000 Feet

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508-885-0101

Total Biomass 2015 Pre-and Post-Management

Fiske Pond,
Natick/Framingham/Wayland,
Massachusetts

Data Collected: 06/29-07/17/2015
Map Prepared: 12/18/2015
For MA DCR
Contract (#115-14)
Basemap © 2013 Esri

0 130 260 520
1:4,750 Feet

N

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info@aquaticcontroltech.com
508-885-0101

Percent Cover of All Observed Species Pre- and Post-Management

Fiske Pond,
Natick/Framingham/Wayland,
Massachusetts

Data Collected: 06/29-07/17/2015
Map Prepared: 12/18/2015
For MA DCR
Contract (#115-14)
Basemap © 2013 Esri

0 130 260 520
1:4,750 Feet

N

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Percent Cover of Target Species 2015 Pre- and Post-Management

Fiske Pond
Natick/Framingham/Wayland
Massachusetts

Data Collected: 6/25-10/04/2015
Map Prepared: 12/16/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

0 375 750 1,500
1:9,000 Feet

N

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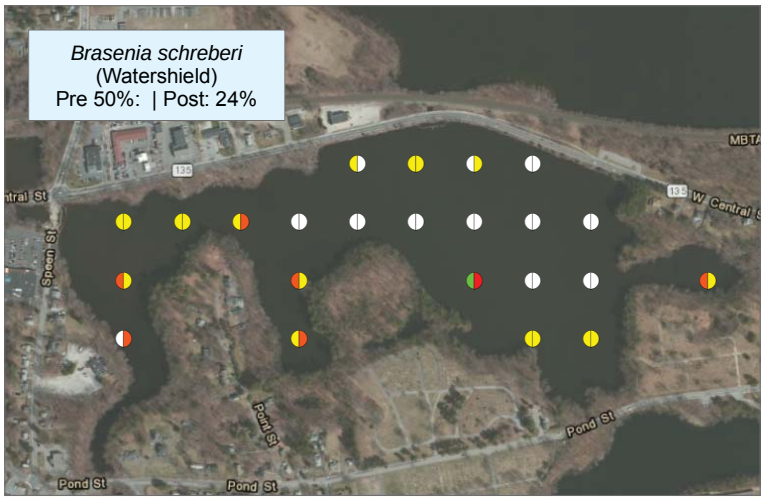
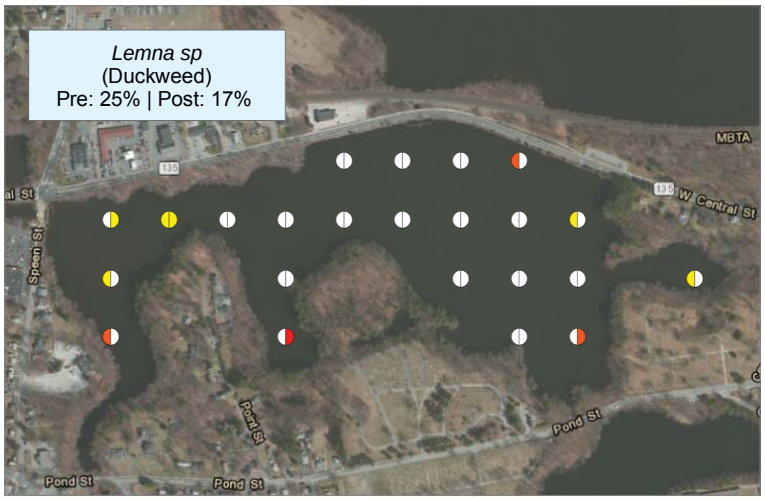
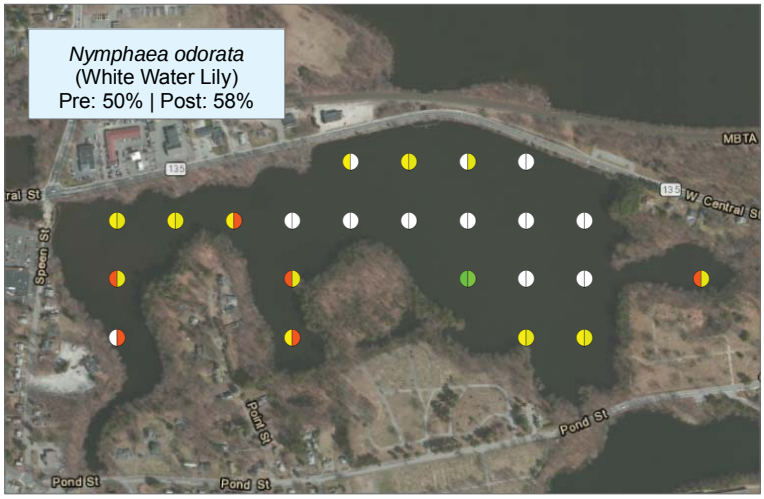
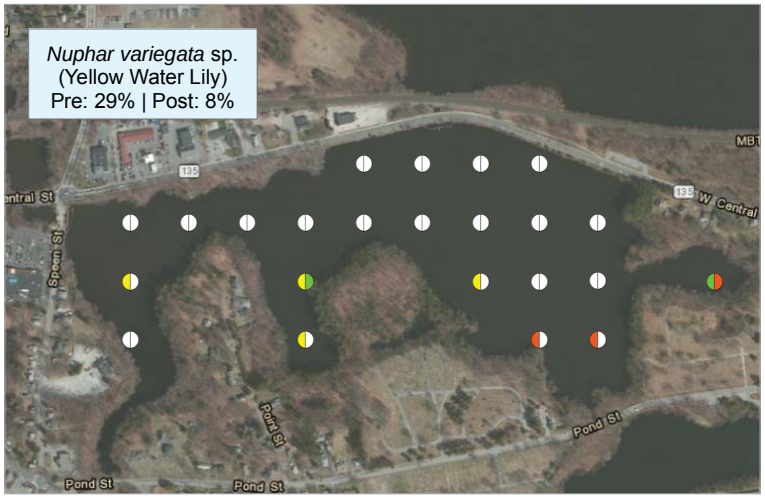
info@aquaticcontrotech.com
508-885-0101

Densities and Percent Occurrence of Observed Species Pre- and Post-Management (1 of 2)









Fiske Pond
Framingham/Natick/
Wayland, MA

Data Collected: 06/29-07/17/2015
Map Prepared: 12/18/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend

Sample Location Status: June 2015 ⦶ July 2015

Zero Trace Sparse Moderate Dense

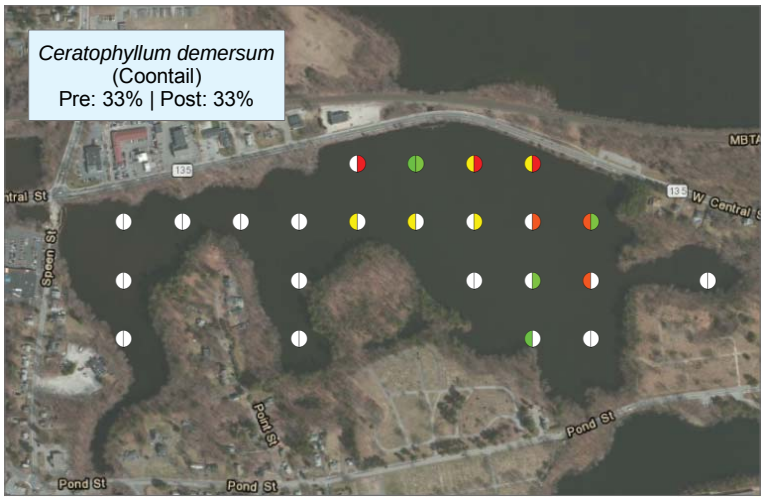
N

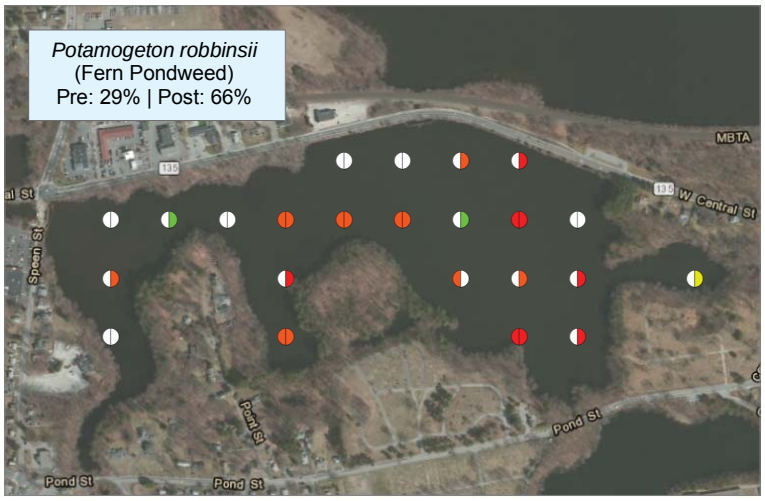
0 320 640
Feet
1:10,000

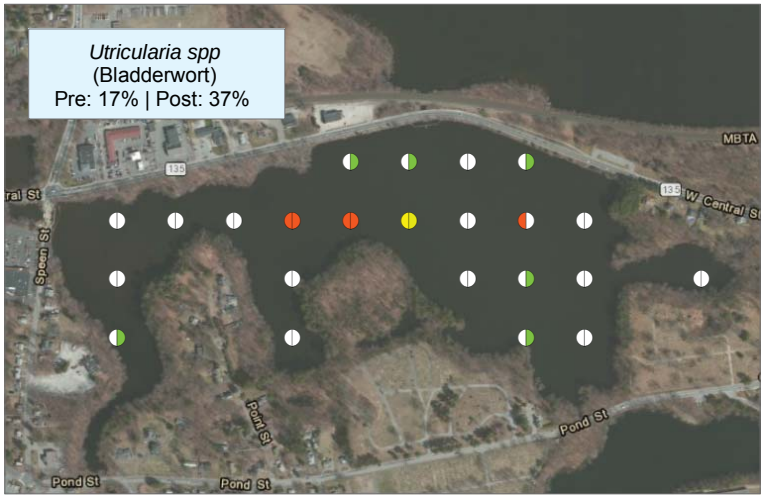
AQUATIC CONTROL TECHNOLOGY

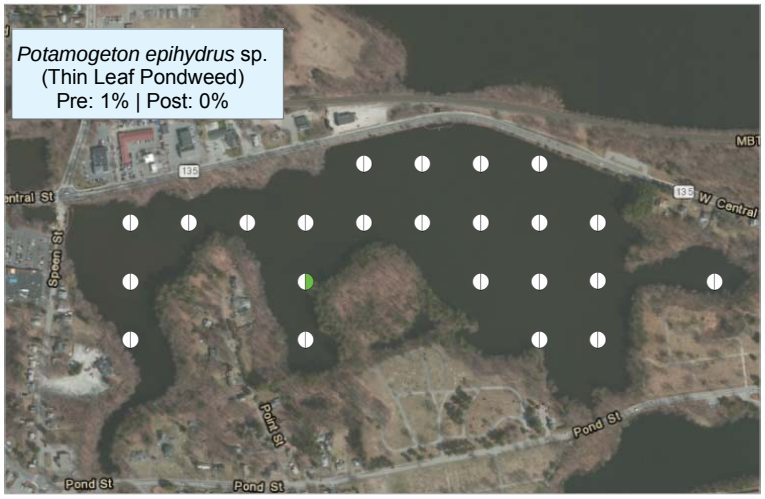
21 West Main Street • Spencer, MA
info@aquaticcontroltech.com
508-885-0101

Densities and Percent Occurrence of Observed Species Pre- and Post-Management (2 of 2)









Fiske Pond
Framingham/Natick/
Wayland, MA

Data Collected: 06/29-07/17/2015
Map Prepared: 12/18/2015
For: MA DCR Contract #115-14
Basemap © 2013 Esri

Legend

Sample Location Status: June 2015 ⦶ July 2015

Zero, Trace, Sparse, Moderate, Dense

N

0 320 640
Feet
1:10,000

AQUATIC CONTROL TECHNOLOGY

21 West Main Street • Spencer, MA
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508-885-0101

July 2015 Post-Treatment Distribution of Observed Species

Fiske Pond,
Natick/Framingham/Wayland,
Massachusetts

Data Collected: 07/17/2015
Map Prepared: 12/16/2015
For MA DCR
Contract (#115-14)
Basemap © 2013 Esri

0 140 280 560
1:5,000 Feet

N

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Fiske Pond 2015 Pre-Management Point-Intercept Survey Raw Data

PT ID	LAT (DD)	LONG (DD)	Relative Abundance											BMI	% COVER ALL	% Cover *M. heterophyllum*	% Cover *C. demersum*	% COVER *T. natans*	DEPTH (FT)
			T. natans	*M. heterophyllum*	*C. demersum*	*Utricularia sp.*	*N. variegata*	*N. odorata*	*B. schreberi*	*P. robbinsii*	*P. natans*	*N. flexilis*	*E. canadensis*						
14	42.28038615	-71.37446473	T	T	M	S	Z	Z	Z	S	Z	Z	Z	3	70	30	30	15	3.7
17	42.28038212	-71.37082763	Z	Z	T	Z	Z	Z	S	T	Z	Z	Z	4	80	0	5	0	2.6
21	42.28037656	-71.36597816	Z	T	Z	Z	Z	Z	Z	D	Z	Z	Z	4	80	0	0	0	2.9
22	42.28037514	-71.36476579	Z	Z	D	Z	Z	Z	Z	D	Z	Z	Z	4	60	0	60	0	2.6
27	42.28128644	-71.37446294	T	D	S	S	T	Z	Z	T	Z	Z	Z	4	90	0	50	5	2.7
30	42.28128241	-71.37082579	Z	Z	T	M	T	Z	T	S	Z	S	Z	4	90	0	0	0	2.7
33	42.28127826	-71.36718864	Z	Z	T	Z	Z	Z	Z	S	Z	Z	Z	3	50	0	0	0	3.7
34	42.28127685	-71.36597626	Z	Z	D	T	Z	Z	Z	S	Z	Z	Z	0	0	0	0	0	3.9
35	42.28127543	-71.36476387	Z	Z	T	Z	Z	Z	Z	M	Z	Z	Z	4	50	60	0	20	2.8
37	42.28127255	-71.36233910	T	Z	S	T	Z	Z	T	D	M	Z	Z	4	100	70	0	80	2.8
40	42.28218673	-71.37446116	T	Z	S	T	Z	Z	Z	Z	T	Z	Z	2	40	0	0	0	1.8
41	42.28218540	-71.37324876	Z	Z	M	Z	T	Z	Z	T	Z	Z	Z	4	80	0	30	0	2.8
42	42.28218406	-71.37203636	Z	Z	Z	Z	Z	T	Z	Z	Z	Z	Z	1	10	0	0	0	4.4
43	42.28218270	-71.37082395	Z	Z	S	T	Z	Z	Z	Z	Z	Z	Z	2	70	0	25	0	4.2
44	42.28218133	-71.36961155	Z	S	D	S	Z	Z	Z	S	Z	Z	Z	4	100	0	45	0	4.4
45	42.28217995	-71.36839915	Z	T	S	S	Z	Z	Z	S	Z	Z	Z	3	70	0	20	0	2.6
46	42.28217855	-71.36718675	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	0	0	0	0	5.3
47	42.28217714	-71.36597435	Z	Z	S	Z	Z	Z	Z	D	Z	Z	Z	4	100	0	5	0	3.1
48	42.28217572	-71.36476195	Z	Z	S	T	Z	Z	Z	M	Z	Z	Z	3	50	20	5	15	3.5
57	42.28308162	-71.36960970	Z	M	T	S	T	Z	Z	Z	Z	M	T	3	50	0	10	0	2.4
58	42.28308024	-71.36839728	Z	Z	T	Z	Z	Z	Z	Z	Z	Z	Z	3	40	0	30	0	5.8
59	42.28307885	-71.36718486	Z	Z	S	M	Z	Z	Z	S	Z	Z	Z	3	70	0	0	0	3.6
60	42.28307744	-71.36597245	Z	T	D	T	Z	Z	Z	S	Z	Z	T	4	60	0	0	0	2.8

Fiske Pond 2015 Post-Management Point-Intercept Survey Raw Data

PT ID	LAT (DD)	LONG (DD)	Relative Abundance						BMI	% Cover All	Depth (ft.)
			C. demersum	*Utricularia* sp.	*Lemna* sp.	*P. robbinsii*	*N. odorata*	*B. schreberi*			
14	42.280386	-71.374465	M	Z	Z	T	Z	Z	2	40	4.2
17	42.280382	-71.370828	Z	D	Z	S	Z	S	3	100	2.5
21	42.280377	-71.365978	T	Z	Z	D	Z	Z	2	80	3.5
22	42.280375	-71.364766	T	T	Z	D	Z	Z	2	80	2.9
27	42.281286	-71.374463	T	T	S	T	S	Z	2	50	2.8
30	42.281282	-71.370826	Z	D	Z	D	Z	Z	3	80	2.2
33	42.281278	-71.367189	S	Z	Z	M	Z	Z	2	20	4.4
34	42.281277	-71.365976	S	T	Z	M	Z	Z	2	30	5.2
35	42.281275	-71.364764	Z	S	Z	D	Z	Z	2	40	2.8
37	42.281273	-71.362339	T	D	Z	D	Z	Z	4	70	1.3
40	42.282187	-71.374461	Z	Z	Z	Z	Z	Z	1	50	1
41	42.282185	-71.373249	Z	D	Z	T	Z	Z	3	40	3
42	42.282184	-71.372036	Z	T	Z	Z	Z	Z	1	40	3.6
43	42.282183	-71.370824	Z	M	Z	M	Z	Z	3	60	2.4
44	42.282181	-71.369612	S	M	Z	M	Z	Z	2	70	3.3
45	42.282180	-71.368399	S	S	Z	M	Z	Z	2	70	2.5
46	42.282179	-71.367187	Z	Z	Z	Z	Z	Z	0	0	5.9
47	42.282177	-71.365974	Z	M	Z	D	Z	Z	2	70	5.7
48	42.282176	-71.364762	Z	Z	Z	D	Z	Z	2	70	2.7
57	42.283082	-71.369610	T	M	Z	Z	S	Z	3	50	2.3
58	42.283080	-71.368397	T	T	Z	Z	Z	Z	1	40	6
59	42.283079	-71.367185	S	S	Z	M	Z	Z	2	70	4.7
60	42.283077	-71.365972	T	S	Z	D	Z	Z	3	100	4.4