2014 Year-End Report

Massapoag Lake

Sharon, Massachusetts

On March, 3, 2014, Lycott Environmental (Lycott) was contracted (Contract # 327-14) by the Massapoag Lake Management Committee to conduct an aquatic plant management program to manage invasive and nuisance aquatic vegetation species; *Cabomba caroliniana* (Fanwort) and *Myriophyllum heterophyllum* (Variable Milfoil), in Massapoag Lake during the 2014 management season. In accordance with this contract, the following document serves as a year-end report to summarize the tasks completed in 2014. These tasks included permitting, surveys (pre, interim, and post), a fluridone treatment program, and associated fluridone monitoring.

Permit Information

The following table details the permitting activities that were required and undertaken by Lycott prior to the 2014 herbicide applications.

Table 1. Timeline of permitting activities conducted prior to management at Massapoag Lake in 2014.

Date	Tasks
March 12th	Lycott filed a MESA Project Review Checklist with the Natural Heritage and Endangered Species Program (the NHESP) to review a management plan proposed the use of fluridone to manage two invasive species; *C. caroliniana* and *M. heterophyllum*, in this lake during the 2014 season[1]
April 10th	NHESP issued a determination letter for the 3/12/14 filing. A summary of this letter is provided, as follows: • Fluridone treatment in Fletcher's Cove would not result in a 'take' of the state-listed wetland plant species (i.e., treatment may proceed in this cove as proposed in the 3/2/14 filing) • Additional information needed to determine if the proposed fluridone treatment in the South Cove will result in a 'take' of the state-listed wetland plant species, including: 1) botanical field studies by a qualified botanist throughout the work area and immediate vicinity to identify the distribution of the state-listed wetland plant species, 2) NHESP pre-approval of the qualified botanist, and 3) NHESP pre-approval of proposed survey time-table and protocol[2]
May 6th	The Town of Sharon contracted a qualified field botanist to identify state-listed wetland plant species' habitat and design a protection plan to proceed with management in the South Cove in 2014

Date	Tasks
June 10th	Oxbow Associates (OA) submitted the final 'Habitat Evaluation and Protection Plan' for the state-listed wetland plant species for the NHESP to review. A summary of this document is provided as follows: • Early survey timing did not allow for the positive identification of the state-listed wetland species, but suitable habitat identified in the South Cove • A combination of protective measures was proposed to protect this species during the fluridone treatment and included: 1) a lake-level drawdown to separate treated waters from the presumed (backwater habitat), 2) the installation of sandbags as a precautionary measure in the event that water-levels increased substantially, 3) weekly monitoring to ensure separation, and 4) fluridone testing if separation was not sufficient and/or chlorosis of the state-listed wetland species was observed during the treatment program.
June 18th	NHESP issued an additional determination letter in response to OA's 'Habitat Evaluation and Protection.' In short, this letter indicated that by eliminating the hydrological connectivity between treated waters and the presumed state-listed wetland plant habitat (as specified in OA's plan), the proposed fluridone treatment would not result in a 'take' in the South Cove. The proposed treatment may proceed with the following additional conditions: 1) no fluridone may enter this species' habitat, 2) additional weekly monitoring of this species' presumed habitat one-week and three-weeks following treatment activities must be added to the OA's 'Habitat Evaluation and Protection Plan', and 3) if harm is observed, the Town of Sharon must inquire with the NHESP if filing a Conservation and Management Permit Application is required.
June 23rd	Submitted MassDEP License to Apply Chemicals for Control of Nuisance Aquatic Vegetation Application
June 25th	Received MassDEP License to Apply Chemicals for Control of Nuisance Aquatic Vegetation Permit

[1] Massapoag Lake falls within NHESP 'Priority Estimated Habitats of Rare Wildlife' and NHESP 'Priority Habitats of Rare Species' and therefore requires a MESA Project Review. A MESA project review was performed in the past, but was outdated. NHESP indicated that recent observations noted a state-listed freshwater mussel species and a state-listed wetland plant species, within and in close proximity, respectively, of this lake.

[2] Per an email correspondence with the NHESP on 3/25/14, it was determined that the NHESP was not concerned that the proposed project would adversely impact the state-listed mussel species in Massapoag Lake.

Pre-Management Survey

On June 9, 2014, two Lycott biologists conducted a pre-management survey at Massapoag Lake. The purpose of this survey was to document the distributions and densities of *C. caroliniana* and *M. heterophyllum* within the lake. Results of this survey observed trace *C. caroliniana* within the southern half of Fletcher's Cove and the bottom right corner of the South Cove (total *M. heterophyllum* = 2.1 acres). The additional target species, *M. heterophyllum*, was noted at sparse abundances within the southern half of Fletcher's Cove (4.5 acres) and dense abundances within the northern half of Fletcher's Cove (2.4 acres), as illustrated in 'Figure 1: 2014 June Aquatic Vegetation Distribution' enclosed. In general, target species were early in their growth stage and it was anticipated that these species would increase to the extents observed in 2013 if left unmanaged.

Treatment Notifications & Herbicide Applications

Four treatment events occurred over the course of the 2014 management season to manage *C. caroliniana* and *M. heterophyllum* in Massapoag Lake. Prior to each treatment event, Lycott provided notifications to the Massapoag Lake Management Committee and the Sharon Conservation Commission via email. In compliance with the abovementioned protection plan, the lake's water level was reduced by a minimum of two feet to separate the presumed state-listed wetland plant species' habitat from herbicide treated waters (**Image 1**). Information pertaining to these treatment events, including notification and treatment dates, herbicide product used, and amount of herbicide applied is provided in the following table.

Image 1. Exposed shoreline from the lake-level shoreline.

Table 2. 2014 notification and herbicide management activities.

Notification Date	Treatment Date	Herbicide Product (active ingredient)	Total Amount of Herbicide Used[1]
June 23rd	June 26th	Sonar Q® (fluridone)	181.4 pounds
June 30th	July 10th		
July 16th	July 24th		
August 19th	August 21st		80 pounds

[1] Sonar Q® was applied at a rate of 9.45 pounds per acre (i.e., 35 ppb). The fluridone treatment (initial and 3 booster application) program aimed to maintain a concentration of 10 ppb for 60 to 90 days to effectively manage the target species in Fletcher's and South Cove. Based on the observations of the targeted plant species during the August 12th survey, *M. heterophyllum* in Fletcher's Cove was not exhibiting sufficient chlorosis/degradation and as such, a booster application solely to this cove was needed.

Interim Surveys & Fluridone FasTest Monitoring

Interim surveys and fluridone testing were conducted in conjunction with the fluridone treatment program. These results are summarized in the tables, as follows:

Table 3. 2014 interim survey results.

Date	Observations
July 24th	*C. caroliniana* was observed at trace to sparse densities in Fletcher's Cove and the South Cove; these plants exhibited good chlorosis (i.e., 4-5 inches). *M. heterophyllum* was observed at a trace density in Fletcher's Cove and South Cove with no evidence of chlorosis. Additionally, dissolved oxygen was collected at the off ramp, south end, and Fletcher's Cove; these results ranged from (7.90 – 7.77), (7.01 – 7.66), and (7.02 – 7.13), respectively.[1]
August 12th	*C. caroliniana* was observed at a moderate density in Fletcher's Cove and South Cove exhibiting adequate chlorosis (i.e., 2-4 inches) and severe chlorosis (i.e., 5-6 inches), respectively. *M. heterophyllum* was observed solely in Fletcher's Cove at a sparse to moderate density and exhibited minimal chlorosis and degradation.[2]

[1] As per request of the client, Massapoag Lake Management Committee

[2] Refer to 'Figure 2: 2014 August Aquatic Vegetation Distribution' map

Table 3. 2014 Fluridone FasTest results

Site ID	Date Collected	Fluridone (ppb)[1]
South End	7/10/2014	3.6
South End	7/24/2014	29.9
Fletcher's Cove	7/24/2014	1.9
South End	8/12/2014	2.1
Fletcher's Cove	8/12/2014	2.6
South End	9/18/2014	1.3
Fletcher's Cove	9/18/2014	2.1

[1]Fluridone FasTest samples were gathered from surface waters and represent the fluridone residue leached from the main concentration at the sediment/water interface where the herbicide is being released. These results are not indicative of the values found at the sediment/water interface. Given the severely deteriorated condition of the treated species, *C. caroliniana* and *M. heterophyllum*, sufficient fluridone concentrations and (prolonged) contact exposure time (CET) were maintained to achieve mortality.

Image 2. Severely chlorotic *C. caroliniana* noted during the August 12th interim survey.

Correspondence with the OA botanist throughout the treatment program indicated that sufficient separation between the treatment area and presumed state-listed wetland plant habitat area were maintained throughout this program. Additionally, a survey of this area following all treatment activities noted this species undergoing achieved anthesis and fruiting with no chlorosis apparent.

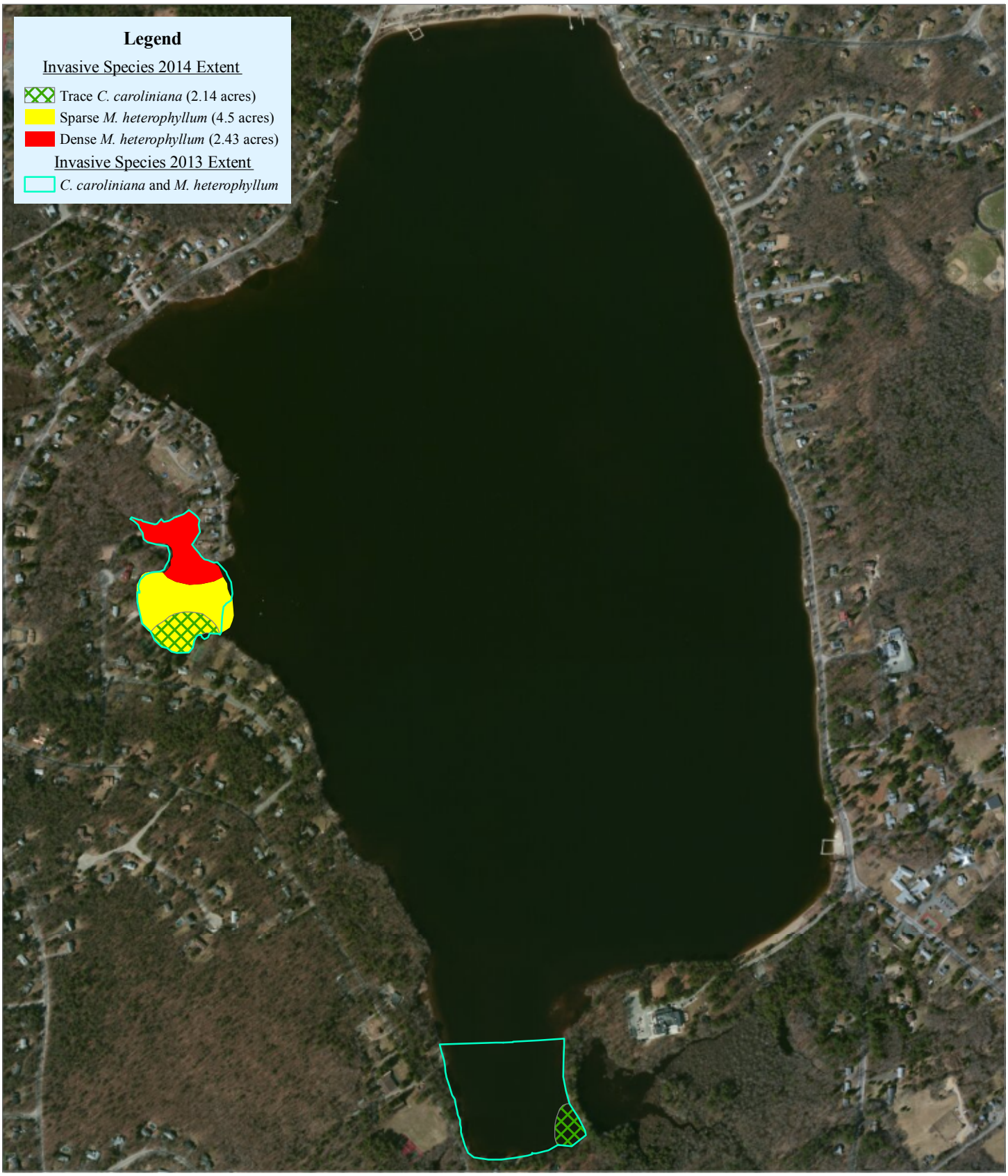
Post-Management Survey

On September 18, 2014, Lycott staff conducted the post-management survey at Massapoag Lake. The survey revealed a significant reduction in overall distribution in the target species, *C. caroliniana* and *M. heterophyllum* within the treated areas. Trace *M. heterophyllum* was observed within the central and bottom portion of Fletcher's Cove; these plants were degraded and defoliated and spanned an estimated area of 3.8 acres refer to '**Figure 3:** 2014 September Aquatic Vegetation Distribution.' The target species, *C. caroliniana*, was not observed during the post-management survey. It should be noted that non-target, native vegetation continued to persist in the two treatment areas. More specifically, sparse water lilies were noted in the northern half of Fletcher's Cove and several additional native species; *C. demersum*, *Utricularia* spp., *P. perfoliatus*, *P. epihydrus*, and *Nitella* spp. were noted along the shoreline of the South Cove at sparse to moderate densities.

Conclusion/Recommendations

Results of the post-management survey indicated that the 2014 herbicide treatment significantly reduced the target species presence within the treatment areas – Fletcher's and the South Coves. A follow-up survey in 2015 will be needed to determine the long-term efficacy of these treatments on the targeted species. Based on our experience with similar projects, it is anticipated that *C. caroliniana* and *M. heterophyllum* will be significantly reduced in 2015 and any observed regrowth will likely be manageable with hand-harvesting or other small-scale management techniques. *M. heterophyllum* (when compared to *C. caroliniana*) is a hardier species and produces viable seeds; therefore, it is likely that this species will rebound more quickly than *C. caroliniana*. Implementation of future work will likely be contingent on coordination with NHESP.

2014 June Aquatic Vegetation Distribution



Massapoag Lake
Sharon, MA

Data Collected: 06/09/2014
Map Prepared: 02/26/2015
For Town of Sharon (#327-14)
Basemap © 2013 Esri

0 500 1,000
1:9,500 Feet

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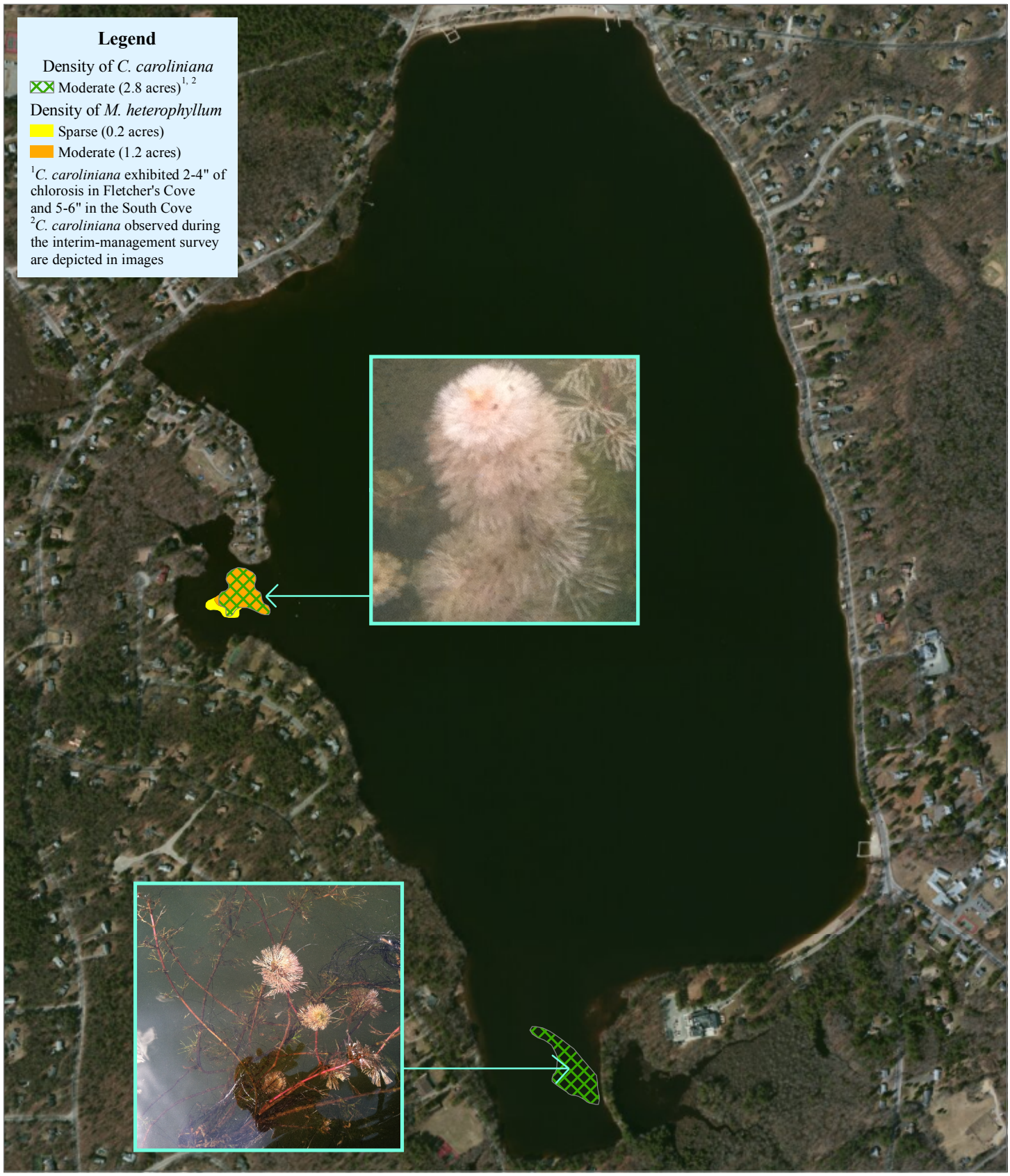
2014 August Aquatic Vegetation Distribution



Massapoag Lake
Sharon, MA

Data Collected: 08/12/2014
Map Prepared: 02/11/2015
For Town of Sharon (#327-14)
Basemap © 2013 Esri

0 400 800
1:9,500 Feet

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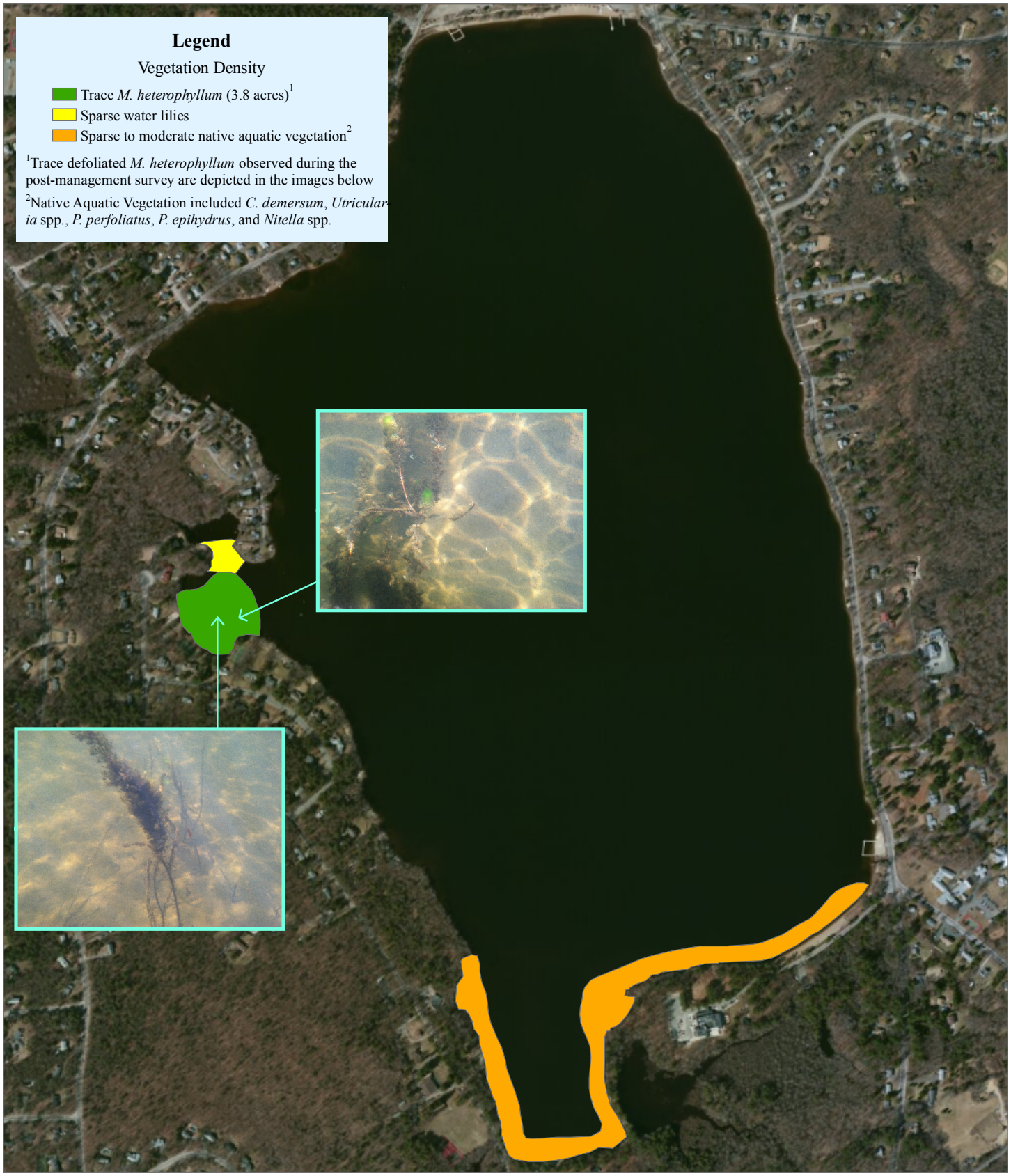
2014 September Aquatic Vegetation Distribution



Massapoag Lake
Sharon, MA

Data Collected: 09/18/2014
Map Prepared: 02/11/2015
For Town of Sharon (#327-14)
Basemap © 2013 Esri

0 500 1,000
1:9,500 Feet

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AQUATIC CONTROL TECHNOLOGY

May 13, 2015

Via E-Mail

RE: Amendments to 2014 Summary Report
of Massapoag Lake, Sharon, MA

Dear Mr. Towner:

Following the review of the 2014 summary report by the Massapoag Lake Management Committee, two (2) amendments are necessary to correct inaccuracies within the aforementioned report. The stated amendment shall replace the corresponding inaccuracy.

Inaccuracy (1): "The lake's water level was reduced by a minimum of two feet to separate the presumed state-listed wetland plant species' habitat from herbicide treated waters."

Amendment (1): The lake's water level was lowered in order to comply with the '*Rotala ramosior* Protection Plan', adequately i.e., (8 inches in 2014) separating the presumed state-listed wetland plant species' habitat from herbicide treated waters.

Inaccuracy (2): "The target species, *C. caroliniana* was not observed during the post-management survey."

Amendment (2): The post-treatment surveys by Aquatic Control Technology and additionally by Massapoag Lake Management Committee noted that the target species, *C. caroliniana*, was not observed within Massapoag Lake.

If you have any questions, please feel free to contact our office at (508) 885-0101.

Sincerely,

Marc D Bellaud

Marc D. Bellaud
President

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