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May 21, 2021

Chris McNeil
Lake Massapoag Rod and Gun Club
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Dunstable, MA 01827

Dear Chris,

Thank you for your continued consideration of All Habitat's aquatic plant management services for Massapoag Pond in Tyngsborough, Massachusetts. We are pleased to offer the following 2020 treatment summary for your records.

Season in Review:

In 2018, All Habitat Services (AHS) obtained the following required permitting documents: Notice of Intent, Order of Conditions, Massachusetts Department of Agriculture License to Apply Herbicides, and an EPA National Pollutant Discharge Elimination System (NPDES) Water Quality Permit.

The Notice of Intent (NOI) to apply aquatic herbicides to waters of the Commonwealth was filed on May 7, 2018 and submitted to the Groton, Dunstable, and Tyngsborough Conservation Commissions. In addition, notices were sent to all lake shore homeowners. Once received by the homeowners and the towns, Conservation Commission meetings were scheduled to discuss project implementation and to address any concerns prior to the issue of the three Order of Conditions.

In addition to the approval of the three towns, AHS obtained authorization from the Massachusetts Natural Heritage & Endangered Species Program (NHESP), as Massapoag Pond is habitat for a regionally important extant population of the threatened Blanding's Turtle (*Emydoidea blandingii*). Following a review of the three NOI's and a detailed management program narrative, the MA NHESP concluded that the 2018 season application of Sonar® Genesis (Fluridone) would not adversely affect the Blanding Turtle population. However, per their request, treatments in subsequent years using Sonar® Genesis, or another registered herbicide, will need to approve an updated management plan. This plan is to include the annual treatment plan, a monitoring plan for the threatened species, and, if necessary, an amended OOC from each town.

In June 2018, All Habitat Services applied Sonar® Genesis to the pond's infestations of Eurasian Milfoil and Fanwort using a multiple treatment, lower rate application approach for reduced risk to people, property and the environment of Massapoag Pond. At the time of treatment, the Milfoil species and Fanwort were the dominant plant species, covering approximately 85% of the lake. After treatment, the plants throughout Massapoag Pond experienced high levels of chlorosis and decay. The Robbin's Leaf Pondweed and Bladderwort appeared healthy and had established where the Fanwort cover was reduced. Aquatic vegetation surveys continued to monitor the pond for the return of any invasive species that may impact the quality of the aquatic habitat and recreation in the pond.

In 2019, a pretreatment vegetation survey identified Curly Leaf Pondweed (*Potomageton crispus*) as the prevalent invasive aquatic species dominating the suppressed Eurasian Milfoil and Fanwort throughout approximately 53 acres of the littoral zone in need of management. Curly Leaf Pondweed is a highly competitive invasive aquatic plant that can grow in dense mats when left unchecked. These mats of vegetation can harm native aquatic plant species, degrade the quality of the lake ecosystem, and impair recreational use of the lake.

Figure 1: Curly Leaf Pondweed, *Potomageton crispus*

On June 25, 2019, the Towns of Dunstable, Groton, and Tyngsborough agreed to modify the Lake Massapoag Invasive Weed Treatment Program to include a Diquat dibromide prescription for the management of Curly Leaf Pondweed (*Potamogeton crispus*). With this modification, All Habitat Services began preparing to treat the infestation. All Habitat Services applied Diquat to the treatment area. The vegetation responded appropriately, and the pond remained relatively free of nuisance weeds for the rest of the season.

On May 20, 2020, All Habitat Services performed another pre-treatment survey in anticipation of the 2020 season. Our findings were very similar to that of the 2019 survey: a dense Curly Leaf Pondweed infestation throughout the approximately 53 acre littoral zone of the pond. Scattered dense Coontail patches interspersed among the Curly Leaf Pondweed with a heavier concentration at the northern end, and a small number of Eurasian Watermilfoil plants on the eastern side of the southern end of the pond and in the channel running from the LMRGC boat ramp to the open pond. This infestation has exhibited some persistence likely due to the rate of inflow from Salmon Brook reducing herbicide concentrations and contact time in this area. Attached is the map of our 2020 survey.

On June 29, 2020, All Habitat Services initially treated the Curly Leaf Pondweed infestation with Diquat dibromide. Unlike previous seasons, this treatment focused only on the 40 acre portion of the pond's littoral zone within the jurisdiction of the Towns of Dunstable and Tyngsborough, omitting the section overseen by the Town of Groton. On October 12, 2020, All Habitat Services treated a late season, persistent 5-acre milfoil patch along the southwestern shoreline to the southern corner of the lake using Procellacor. This patch was likely persistent due to high water flow entering from the inlet stem of the lake thus reducing herbicide concentrations. Additionally, this treatment avoided the NHESP regulated zone as it was conducted during the exclusion period.

Future Considerations:

In 2020, the Curly Leaf Pondweed infestation responded well to the Diquat dibromide treatment. The early application of Diquat to these large infestations reduced the number of viable buds and fragments, ultimately reducing the spread of these invasive species. Continued observations and maintenance programs are recommended to ensure that Massapoag Pond continues to recover from the exotic plant infestations.

Figure 2: Fanwort, *Cabomba caroliniana*

An additional concern for the 2021 season is the resurgence of a Fanwort infestation as a dominant vegetative species. Due to previous herbicide treatments, the Eurasian Milfoil and the Curly Leaf Pondweed may have been sufficiently suppressed to encourage the growth of Fanwort over native species. Fanwort distribution in the 2021 season could mimic the distribution in the 2018 season, as seen in Appendix A. Compared to the 2018 season, lower abundances are expected. Because the Fanwort is a late season species, careful observations will need to be conducted over the summer to examine the abundance of the different aquatic plant species. For the 2021 season, All Habitat Services is presently recommending continued treatment of Diquat dibromide applied to 53 acres of littoral zone as was conducted in previous years and, a Procellacor application to the southernmost inlet stem area where Salmon Brook enters the lake on a schedule appropriate for the NHESP restrictions in this zone.

Another option for the treatment of the Eurasian Milfoil and the Fanwort is Sonar® H4C, which is a timed release granular product form of the active ingredient fluridone in Sonar® Genesis which was utilized in 2018. The initial treatment would consist of a shock dose of Sonar Genesis at a concentration of 5 ppb and a single dose of Sonar® H4C, followed by a second dose of Sonar® H4C 3 weeks later. These treatments would raise the concentration of Sonar H4C to the target 60 ppb, which would be sustained for 60 days. These treatments should suppress patches of Eurasian Milfoil and Fanwort that may return in the 2021 season. Following the use of Sonar® H4C, irrigation to turf, ornamentals, and food crops should be suspended for 7 days. While there

are no restrictions on fishing and swimming, it is in best practice to use a conservative approach and avoid use of the water during and immediately after application.

Continued observation for the condition of Curly Leaf Pondweed infestations is also recommended. We recommend continuing to treat these infestations with Diquat dibromide, a foliar contact herbicide that interferes with plant photosynthesis within green plant tissues. Absorption and herbicidal action are usually quite rapid with effects visible within several days of the application. Dense vegetative growth may require more than one application to gain control. Retreatment, if necessary, may be applied on 14-21 day intervals. Following the use of Diquat, be aware that the following water use restrictions apply: 3 days for drinking, 1 day for livestock watering, 3 days for irrigation to turf and landscape ornamentals, 5 days for irrigation to food crops and production ornamentals. While there are no restrictions on fishing and swimming, it is in best practice to use a conservative approach and avoid use of the water during and immediately after application.

These adaptive modifications to Massapoag Pond's management plan are consistent with the previous approvals granted by the three town Conservation Commissions and the MA NHESP. All Habitat Services continues to work with the Lake Massapoag Rod and Gun Club, Town of Tyngsborough, Town of Groton, and Town of Dunstable to ensure all permitting obligations are fulfilled prior to the start of the 2021 treatment season.

Once again, we at All Habitat Services would like to extend our appreciation for the opportunity to manage Massapoag Pond. We hope that this summary report meets with your approval. As always, please feel free to contact us if you have any questions or concerns.

Best Regards,

David Roach

David Roach MDAR–CC-0037221
General Manager
All Habitat Services, LLC

Appendix A: Massapoag Pond Maps

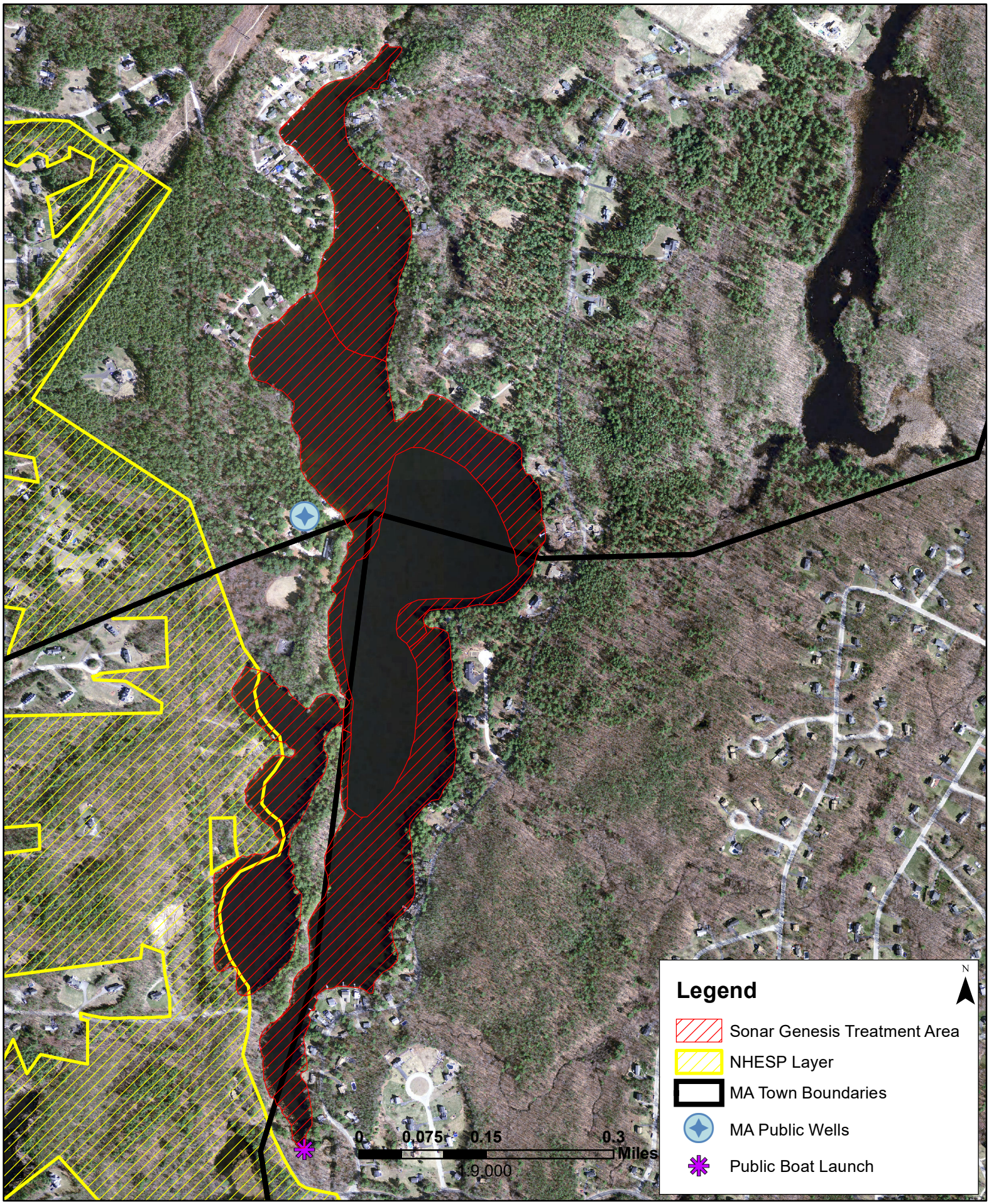
I. Massapoag Pond Project Overview

II. Massapoag Pond Aquatic Plant Survey – May 2018

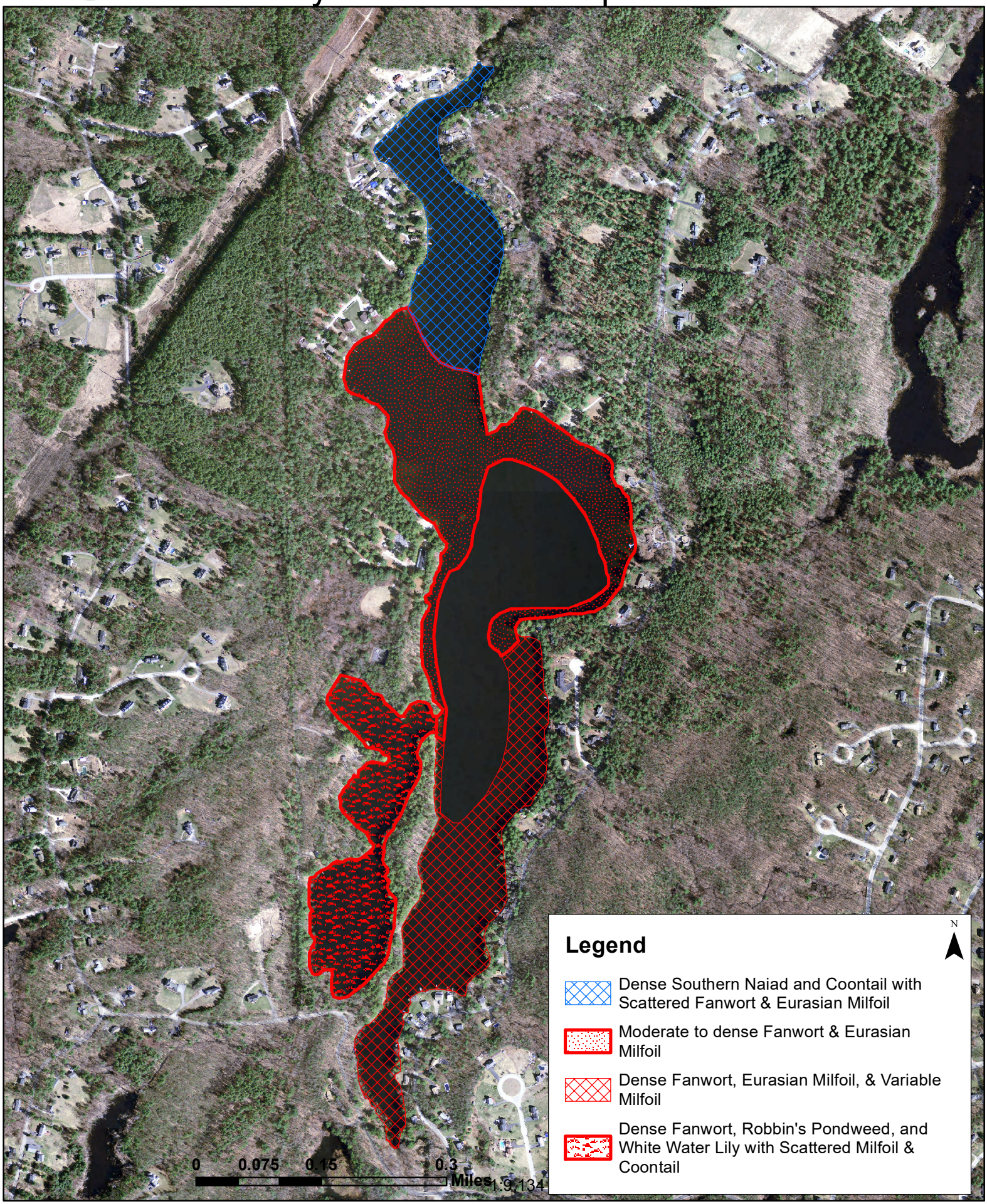
III. Massapoag Pond Aquatic Plant Survey – June 2019

IV. Massapoag Pond Aquatic Plant Survey – May 2020

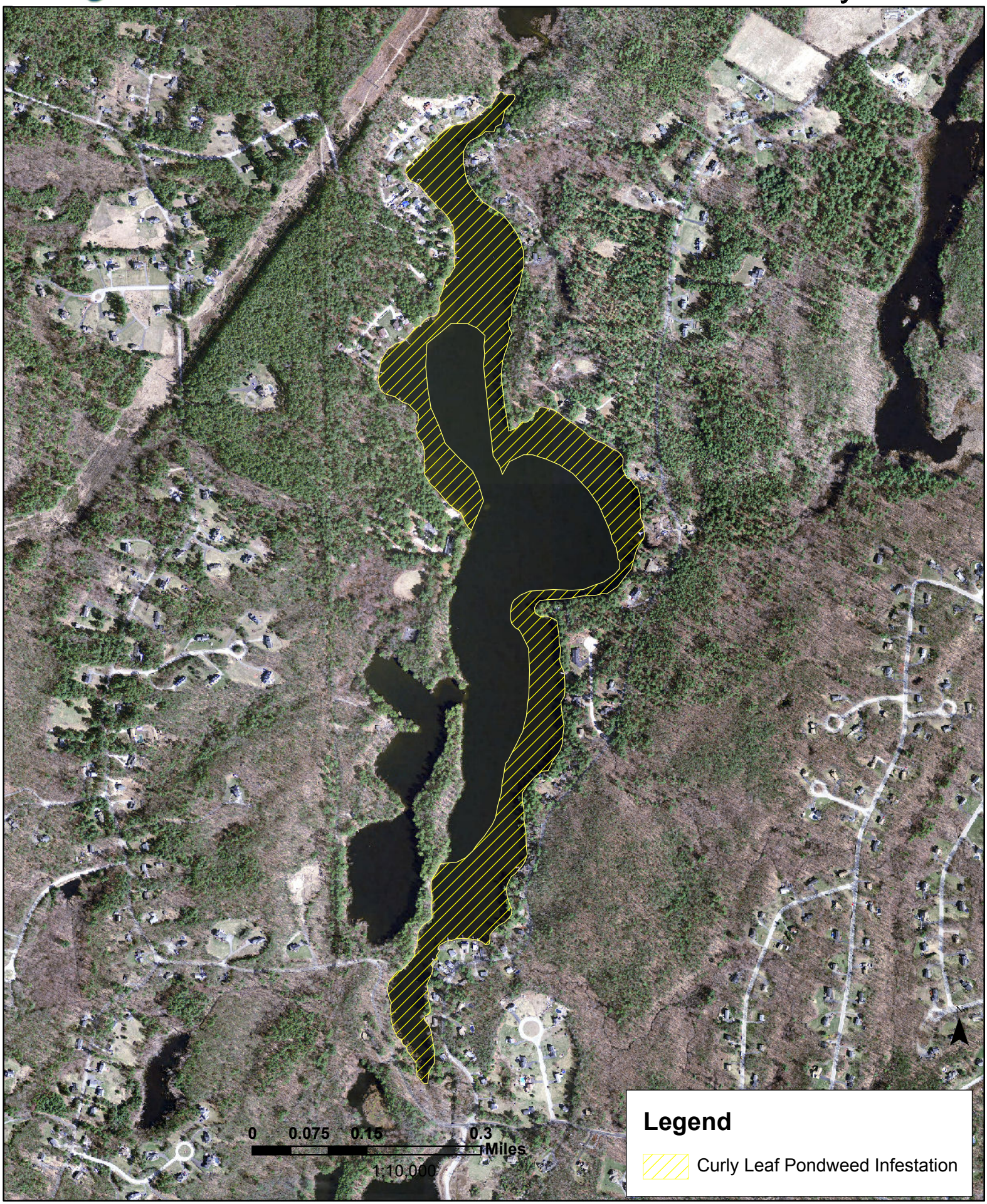
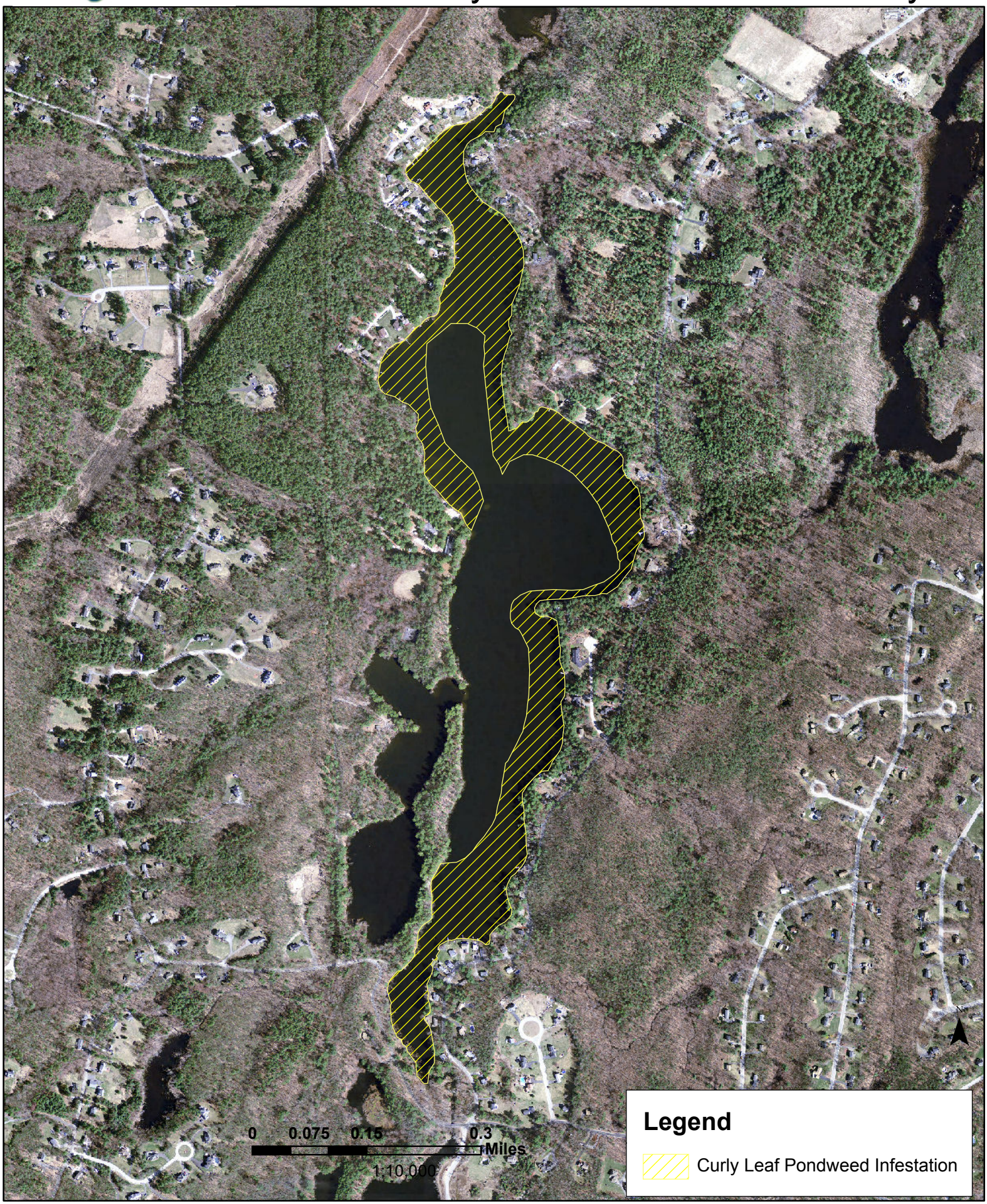
Massapoag Pond
Project Overview Map



Massapoag Pond
May 2018 Plant Composition & Abundance



Massapoag Pond
June 2019 Pretreatment Survey



Massapoag Pond
May 2020 Pretreatment Survey