

## **Pine Meadow, Flannagan, and Sandy Ponds**

### **Ayer, Massachusetts**

### **2020 Year-End Report**

Report Prepared for: Ayer Conservation Commission  
Town Hall, One Main Street  
Ayer, MA 01432  
concom@ayer.ma.us

Prepared On: November 23, 2020

---

In accordance with the existing aquatic plant management contract between SŌlitude Lake Management and the Ayer Conservation Commission for Pine Meadow, Flannagan, and Sandy Ponds, the following document serves to provide this year's treatment and survey results, as well as management recommendations for next season.

All management activities performed in 2020 were consistent with the Order of Conditions (DEP #100-0293), and the License's to Apply Chemicals issued by the MA DEP – Office of Watershed Management.

- Pine Meadow Pond: LTAC# - WM04-0000150
- Flannagan Pond: LTAC# - WM04-0000149
- Sandy Pond: LTAC# - WM04-0000148

#### **Introduction**

Over many years, Pine Meadow, Flannagan, and Sandy Ponds have been treated intermittently for the control of invasive aquatic vegetation, including fanwort (*Cabomba caroliniana*), variable milfoil (*Myriophyllum heterophyllum*) and curlyleaf pondweed (*Potamogeton crispus*). Management has been consistently performed on an annual basis since 2017. These treatments also served to reduce the nuisance growth of native waterlilies (*Nuphar/Nymphaea*), which can become relatively dense in the ponds.

In 2020, SŌlitude Lake Management was contracted by the Ayer Conservation Commission to continue managing invasive and nuisance aquatic plant species in Pine Meadow, Flannagan, and Sandy Ponds. A unique management plan was devised for each pond, in order to achieve management goals. Elements of each plan included:

- Pre-treatment surveys to identify the distribution and abundance of target vegetation species, both invasive and nuisance, and to assess the best timing and range of treatment.
- Submission of Applications to Apply Herbicides to the Waters of the Commonwealth to the Massachusetts Department of Environmental Protection (MassDEP) and Division of Watershed



Management (DWM), to permit the use of herbicides in each pond. These applications were submitted in April and approved on May 1<sup>st</sup>, 2020.

- Treatments to defined areas of each pond, based on spring and fall monitoring, to manage the target invasive and nuisance species.
- Notifications to the appropriate persons prior to any and all treatment events.
- Post-management surveys to identify the distribution and abundance of target vegetation species, and to evaluate the efficacy of the management program.

### Early Season Surveys

A pre-treatment survey of Pine Meadow, Flannagan, and Sandy Ponds was conducted on July 6<sup>th</sup>, to assess the distribution and abundance of variable milfoil and fanwort, as well as other invasive and/or nuisance species. Each pond was surveyed by traveling along the littoral zone while documenting observed plant growth. The littoral zone is the area adjacent to the shore where sunlight penetrates to the sediment and allows aquatic vegetation to grow. The survey was completed through visual observation and with analysis of a “throw-rake”. A “throw-rake” was used to help locate any submersed vegetation where it was not visible from the surface. The plant composition was recorded using a handheld GPS to plot target plant locations and field notes to document the specific species present. The pre-treatment target plant assemblage and proposed treatment areas can be observed in (Figure 1).

#### Pine Meadow Pond

Minimal invasive species were observed in Pine Meadow Pond during this year’s pre-management survey. Variable milfoil was observed in the northern end of the pond only but no curlyleaf pondweed or fanwort was observed this year. White and yellow waterlilies (*Nymphaea odorata* and *Nuphar variegata*) and watershield (*Brasenia schreberi*) were documented primarily around the north and northwestern perimeter of the pond in dense amounts. Throughout the center and the southern portions of the shoreline was scattered sparse to moderate growth of all three floating-leaf aquatic plants. Additional species observed in sparse amounts included bladderwort (*Utricularia spp.*), coontail (*Ceratophyllum demersum*) and stonewort (*Nitella spp.*).

#### Flannagan Pond

Throughout the survey, curly-leaf pondweed was observed scattered throughout most of the waterbody in trace to sparse quantities. Variable milfoil was observed in sparse to moderate quantities in the both the western and eastern ends of the pond. Fanwort observations were similar to the assemblage noted in the 2019 fall survey, but this species was not a target in this year’s program. Sparse to moderate patches of yellow and white waterlilies along with benthic growth of stonewort (*Nitella sp.*) were dispersed along the entire shoreline, especially in the northwestern and eastern basins. Other species observed in trace to sparse density included bladderwort, Robbins pondweed (*Potamogeton robbinsii*) and ribbonleaf pondweed (*Potamogeton epihydrus*)

#### Sandy Pond

At the time of inspection, variable milfoil and fanwort were observed in trace amounts in scattered patches near the southeastern inlet, the northwestern inlet, and near the beach. In years past, these species have also been observed along the eastern shoreline from the outlet to Flannagan Pond to the southern shoreline past the beach. A few curlyleaf pondweed plants were observed during the survey.



Trace amounts of ribbon-leaf pondweed and Robbins pondweed were documented at the northwestern inlet and along the southeastern shoreline. There was a trace amount observed of waterlilies along the shoreline in small sporadic patches. Other species observed in trace to sparse amounts were coontail and tapegrass (*Vallisneria americana*)

### Herbicide Treatments

Over the course of the 2020 season, multiple treatment events were performed at each pond. The treatment approach differed for each waterbody based on the target species and distribution (**Table 1**). Tribune (diquat) herbicide was chosen to manage both variable milfoil and curlyleaf pondweed while the Sonar (fluridone) herbicide was used in Sandy Pond to control fanwort. Treatment of the waterlilies was conducted using a foliar application of AquaNeat (glyphosate).

**Table 1**

Pond	Target Plant(s)	Approach
<b>Pine Meadow</b>	Variable milfoil Waterlilies/Watershield	Spot treatment with Tribune (diquat) herbicide for control of milfoil & spot treatment with AquaNeat (glyphosate) for floating leaf plants
<b>Flannagan</b>	Curlyleaf pondweed Variable milfoil Bladderwort Waterlilies/Watershield	Spot treatment with Tribune (diquat) herbicide for curlyleaf pondweed, variable milfoil and bladderwort control & spot treatment of nuisance floating leaf plants with AquaNeat (glyphosate) in high use areas.
<b>Sandy</b>	Variable milfoil Fanwort Waterlilies/Watershield	Spot treatment with the pellet formulation of Sonar (fluridone) herbicide for Fanwort, spot treatment with Tribune (diquat) herbicide for milfoil control & spot treatment of nuisance floating leaf plants with AquaNeat (glyphosate)

Information pertaining to these treatment events including dates and herbicide product used is provided in **Table 2**.

**Table 2:**

Pond	Treatment Date	Herbicide Product (tradename)
<b>Pine Meadow</b>	July 13 <sup>th</sup>	Tribune
	September 23 <sup>rd</sup>	AquaNeat
<b>Flannagan</b>	July 13 <sup>th</sup>	Tribune
	September 23 <sup>rd</sup>	AquaNeat
<b>Sandy</b>	July 13 <sup>th</sup>	Sonar One and Tribune
	September 23 <sup>rd</sup>	Sonar ONE and AquaNeat



The Town was notified well in advance of the July treatment, and the shoreline of each pond was thoroughly posted with caution signs in order to inform the residents of the upcoming treatment and warn of the temporary water use restrictions. Due to an oversight on our part, posters were not put up ahead of time for the September treatment. We apologize for this error and will take every effort to ensure that postings are completed ahead of time, per the contract specifications, in the future. At no time during any of the treatments were fish mortalities or significant non-target impacts to other aquatic organisms or wildlife either observed or reported.

#### Pine Meadow Pond

The initial treatment of Pine Meadow Pond was conducted on July 13<sup>th</sup>, utilizing the herbicide Tribune (diquat). The treatment was conducted utilizing a 12-foot Jon boat equipped with a low-pressure spray pump and an onboard mixing tank, where the herbicide was mixed with pond water and evenly distributed throughout the pond via submersed hoses. Throughout the north end of the pond, patches of invasive species variable milfoil were targeted during the treatment. The second treatment was conducted on September 23<sup>rd</sup>, utilizing the herbicide AquaNeat (glyphosate). The treatment targeted waterlily species throughout the middle of the pond, similarly to the previous treatment, the herbicide was mixed onboard in a mixing tank but applied to the floating leaves of the waterlily species.

#### Flannagan Pond

The initial treatment of Flannagan Pond was conducted on July 13<sup>th</sup>, utilizing the herbicide Tribune (diquat). The treatment was conducted utilizing a 10-foot jon boat equipped with a low-pressure spray pump and an onboard mixing tank, where the herbicide was mixed with pond water and evenly distributed throughout the pond via submersed hoses. Growth of milfoil and curlyleaf pondweed as well as the nuisance native species bladderwort were targeted during the treatment in the western and eastern portions of the waterbody. The second treatment was conducted on September 23<sup>rd</sup>, utilizing the herbicide AquaNeat (glyphosate). The treatment targeted waterlily species throughout the middle of the pond and along high use areas of the shoreline, similarly to the previous treatment, the herbicide was mixed onboard in a mixing tank but applied to the floating leaves of the waterlily species.

#### Sandy Pond

In Sandy Pond, fanwort and milfoil distribution were observed in both inlets of the pond, similar to the 2018 treatment season. Targeted applications of granular Sonar herbicide were used in these areas to treat fanwort, while similar treatments with Tribune (diquat) were used for control of milfoil. As in previous years, an extended contact time was required, so multiple treatments were performed throughout the season. The first herbicide treatment was conducted on July 13<sup>th</sup>, and the second herbicide treatment was conducted on September 23<sup>rd</sup>.

Each treatment was conducted using a 10-foot jon boat equipped with a low-volume spray pump and 55-gallon drum. The pelletized herbicide Sonar One (fluridone) was dispersed using a backpack, gas powered blower. The liquid herbicide, Tribune, was combined with pond water in an onboard mixing tank and applied to both the surface and subsurface a spray nozzle and weighted hose. Treatment for waterlilies and watershield was conducted on September 23<sup>rd</sup>, a majority of the shoreline was selectively treated. This treatment was selective because there was not an overwhelming amount of floating-leaf species present and these species provide good habitat for fish, frogs and other wildlife species.





### Late Season Surveys

The late season surveys for all three ponds, Pine Meadow, Flannagan, and Sandy Pond, were conducted on October 22<sup>nd</sup> to assess the overall effectiveness of the management program. The surveys were performed with the same techniques as the early season surveys. The late season surveys revealed a significant overall reduction in the target species, variable milfoil, fanwort & curlyleaf pondweed (**Figure 2**). Since fanwort growth in Flannagans Pond was not addressed this year, a slightly expanded extent was observed there in the fall survey as expected. **Figures 3, 4 & 5** depict the assemblage of native species present during the late season surveys.

#### Pine Meadow Pond

Observations from the late season survey included sparse densities of coontail (*Ceratophyllum demersum*), common bladderwort (*Utricularia vulgaris*), floating bladderwort (*Utricularia gibba*) and purple bladderwort (*Utricularia purpurea*), as well as moderate densities of stonewort in scattered patches throughout the entirety of the pond. Along the perimeter and the northern portion of the pond, waterlilies and watershield were observed, with a significant reduction in the treatment areas of these species. The invasive species variable milfoil, fanwort, or curly-leaf pondweed were not observed at this time.

#### Flannagan Pond

During the survey, variable milfoil or curly-leaf pondweed were not observed at this time, but sparse to moderate amounts of fanwort were observed in scattered patches in the western, southern, and the southeastern portion of the pond. Since no management was approved this year, growth of fanwort was slightly expanded from that observed in the fall of 2019 and during this year's pre-management survey.

Scattered throughout the waterbody in sparse to moderate densities were, ribbon-leaf pondweed common bladderwort, floating bladderwort and purple bladderwort. Along the western shoreline, Robbins' pondweed was observed in moderate quantities. A significant reduction in the waterlily and watershield populations was observed in the treatment areas, with a healthy quantity of waterlilies left for habitat.

#### Sandy Pond

Observations during this survey displayed a healthy assemblage of native vegetation throughout the littoral zone of the pond. Curly-leaf pondweed was not observed at this time. The native vegetation observed were waterlilies, watershield, common bladderwort, purple bladderwort, tapegrass, Robbins' pondweed in sparse quantities, and ribbon-leaf pondweed in sparse to moderate quantities. The waterlilies and watershield that were treated, displayed a significant reduction in density, along the road of the eastern shoreline watershield and waterlilies were left to maintain habitat for aquatic life. Trace amounts of variable milfoil re-growth was observed only at the southeast inlet. No fanwort was observed indicating a successful treatment.

### Ongoing Management Recommendations

Based on the observations made during the late-season surveys, the 2020 management program significantly reduced the target species, curlyleaf pondweed, variable milfoil, and fanwort, and reduced the nuisance growth of waterlilies in all three ponds. Based on the characteristics and history of the species within these waterbodies, it is likely that ongoing management will continue to be required to maintain a balanced aquatic ecosystem.



### Pine Meadow Pond

Over the course of the 2020 season, the presence of fanwort was not observed and the overall distribution/abundance of variable milfoil, curlyleaf pondweed and waterlilies in Pine Meadow Pond was significantly reduced. Due to the shallowness of the pond and the continued aggressive re-growth expected, SŌLitude recommends continuing with a similar program for the 2021 season, including early/late season monitoring and separate herbicide treatments for curly-leaf, milfoil and waterlily regrowth.

### Flannagan Pond

Over the course of the 2020 season, the distribution and abundance of curlyleaf pondweed and variable milfoil was significantly reduced throughout the entirety of Flannagan Pond. Fanwort growth, which was not addressed with this year's program increased slightly in extent. The nuisance growth of waterlilies was also reduced significantly; however, these species can be highly aggressive, especially in the shallower areas and as such needs to be treated consistently each year.

SŌLitude recommends a similar management program including early/late season monitoring, continued spot treatments with Tribune to control any variable milfoil and curly-leaf regrowth and spot treatments with AquaPro for control of waterlily and watershield. Unfortunately, related to the endangered species in the area, the use of flumioxazin herbicide (Clipper) to spot-treat fanwort growth is not allowed, so it is recommended to spot treat with the fluridone (Sonar) herbicide to control and reduce any fanwort growth observed during the season. As a result of the many years of increased biomass in the east and west basins of Flannagan Pond, areas of the waterbody are becoming increasingly shallow. SŌLitude recommends targeted hydro-raking of the shoreline in these areas to remove a portion of the built-up sediment and restore some depth to these areas.

### Sandy Pond

Over the course of the 2020 season, the distribution and abundance of variable milfoil and fanwort was substantially reduced. SŌLitude recommends continuing with a similar management program in 2021, including: early/late season monitoring and targeted diquat/AquaPro treatments to continue reducing the distribution of the invasive and nuisance vegetation (we suspect, due to a higher flow rate, that there is possibility of new Fanwort growth in the inlet areas). With no viable Fanwort being observed in the post-treatment survey, we recommend monitoring for Fanwort and possible treatment using Sonar if necessary, in 2021.

We understand that there have also been requests by residents to manage shoreline common reed (*Phragmites*), which is a non-native species, as well as native cattails (*Typha sp.*). The plants can be treated with the same herbicide as the waterlilies and could easily be added as late summer task in the management program if so desired. Certainly, we concur that *Phragmites* should be managed at all locations, however the cattails should be selectively managed only where interfering with intended uses of the pond.

Overall, we recommend instituting on-going, annual programs at these ponds to monitor vegetation conditions and conduct management of invasive plants and other nuisance vegetation as needed. This is preferable to allowing the ponds to return to pre-management conditions that will require large scale management efforts and may actually reduce costs and herbicide usage over the long term. In terms of budget for 2021, we suggest the following ranges (**Table 3**), but would be happy to work with the Commission to develop more definitive, detailed costs based on the Town's goals.

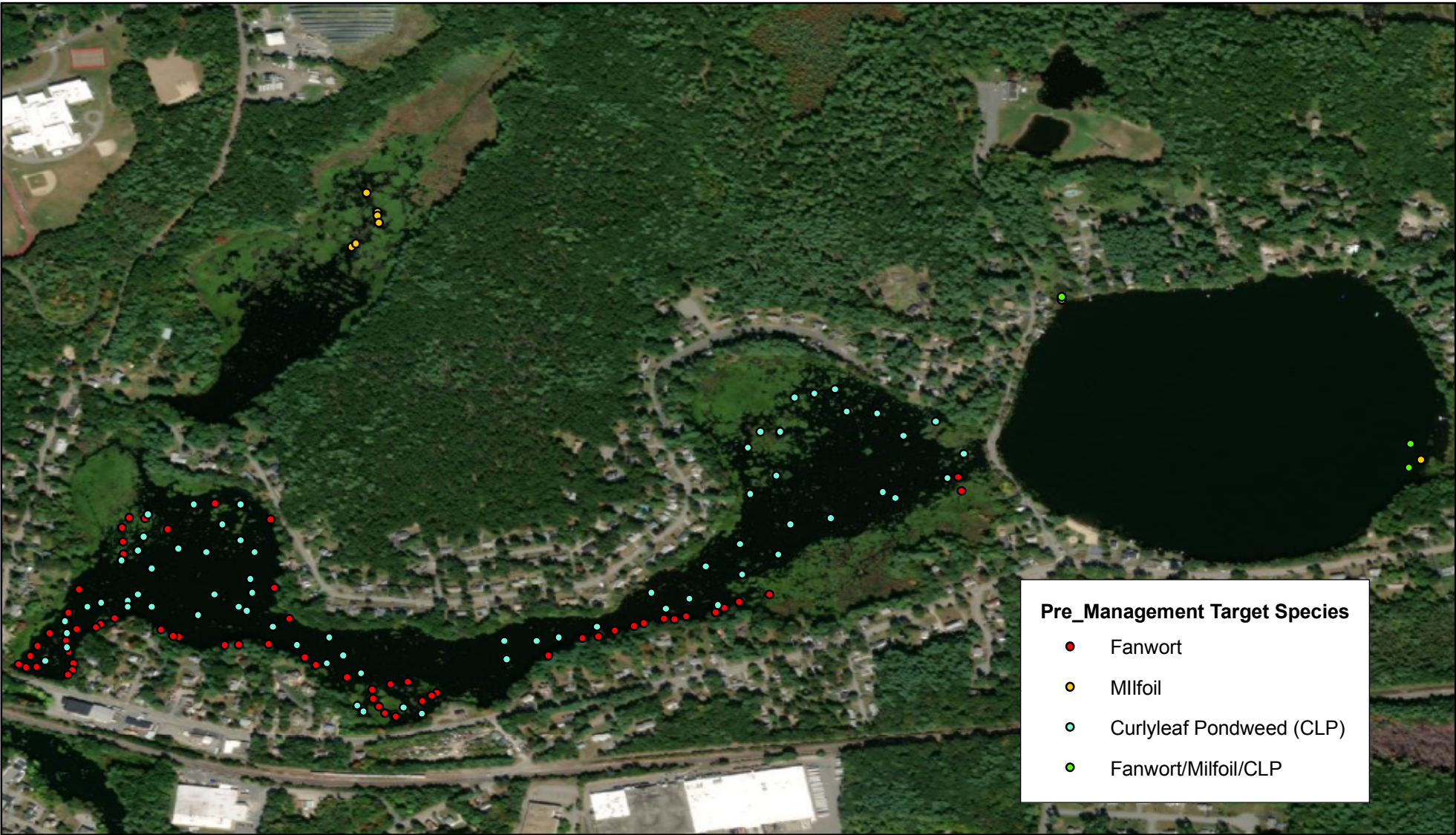


**Table 3**

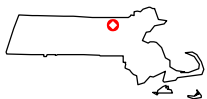
Pond	2018 Management Actions	Budget
<b>Pine Meadow</b>	<ul style="list-style-type: none"> <li>• Monitor early and late season vegetation.</li> <li>• Manage curlyleaf pondweed and variable milfoil with spot treatments using diquat herbicides.</li> <li>• Continue to thin out floating leaf plants using glyphosate herbicide.</li> </ul>	\$5,000-\$7,500
<b>Flannagan</b>	<ul style="list-style-type: none"> <li>• Monitor early and late season vegetation.</li> <li>• Conduct spot treatment with Sonar (fluridone) to any areas of re-growth of fanwort.</li> <li>• Manage curlyleaf pondweed and variable milfoil with spot treatments using diquat herbicides.</li> <li>• Maintain levels of floating leaf plants using glyphosate herbicide.</li> </ul>	\$12,500-\$17,500
<b>Sandy</b>	<ul style="list-style-type: none"> <li>• Monitor early and late season vegetation.</li> <li>• Manage variable milfoil and curlyleaf pondweed with spot treatments using diquat herbicides.</li> <li>• Manage all areas of Phragmites and nuisance lilies and cattails in high use areas.</li> </ul>	\$3,000-\$6,000



FIGURE 1: 2020 Pre-Treatment Distribution of Target Species



Ayer Ponds  
Ayer,  
Massachusetts



1:10,751

**Ayer Ponds**

0 400 800 1,600  
Feet



Map Date: 11/24/2020  
Prepared by: DM  
Office: Shrewsbury, MA



FIGURE 2: 2020 Post-Management Distribution of Target Species



Ayer Ponds  
Ayer,  
Massachusetts

**Ayer Ponds**

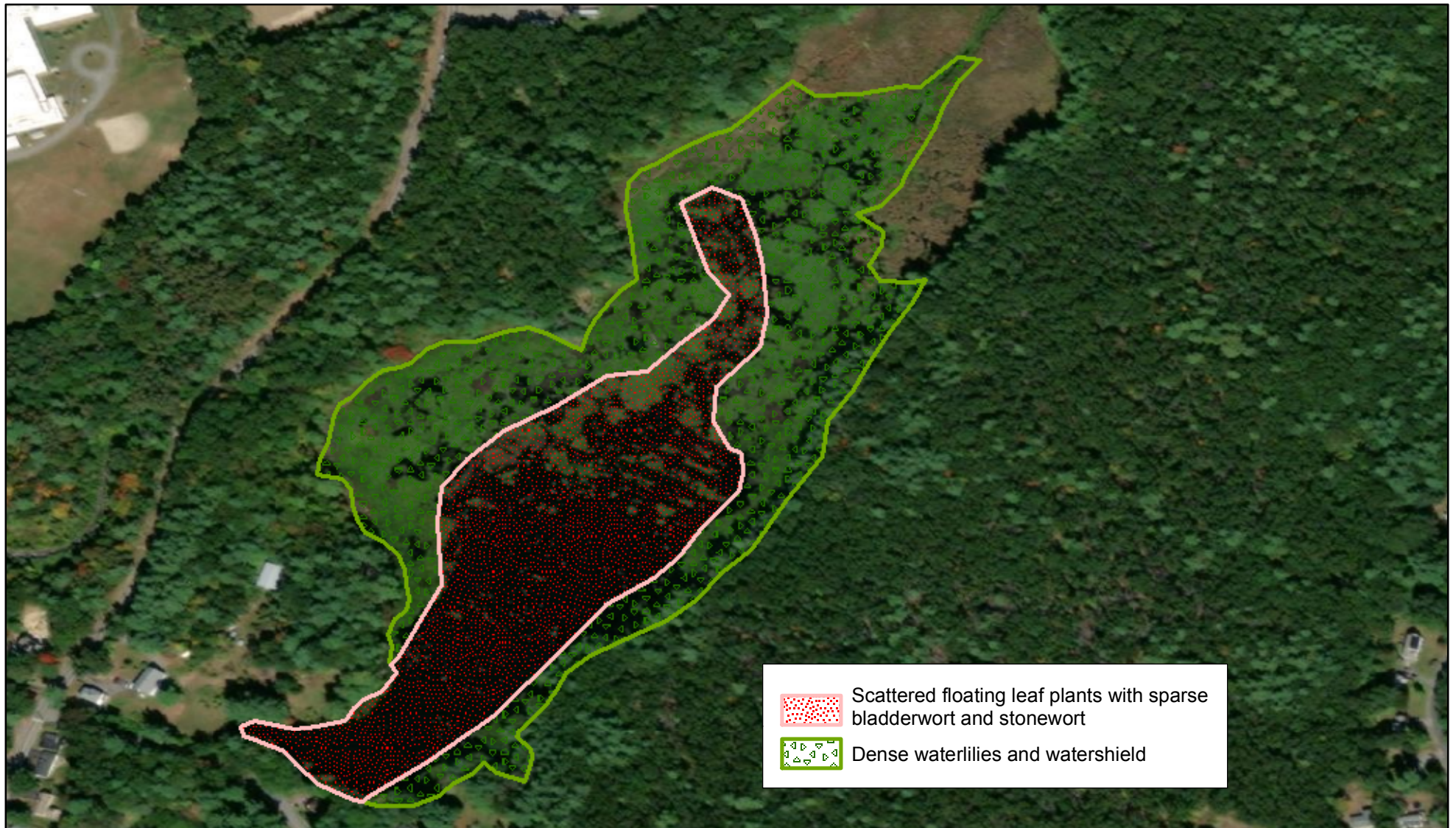
0 405 810 1,620 Feet

1:10,751

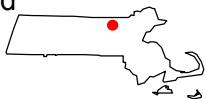
Map Date: 11/24/2020  
Prepared by: DM  
Office: Shrewsbury, MA



**FIGURE 3: Pine Meadow Pond 2020 Post-treatment Native Aquatic Vegetation**



Pine Meadow Pond  
Ayer,  
Massachusetts



**Pine Meadow Pond**

0 250 500 1,000  
Feet



1:4,463

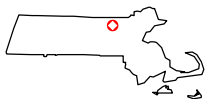
Map Date: 12/10/2019  
Prepared by: JM  
Office: Shrewsbury, MA



**FIGURE 4: Flannagan Pond 2020 Post-treatment Native Aquatic Vegetation**



Flannagan Pond  
Ayer,  
Massachusetts



**Flannagan Pond**

0 400 800 1,600  
Feet

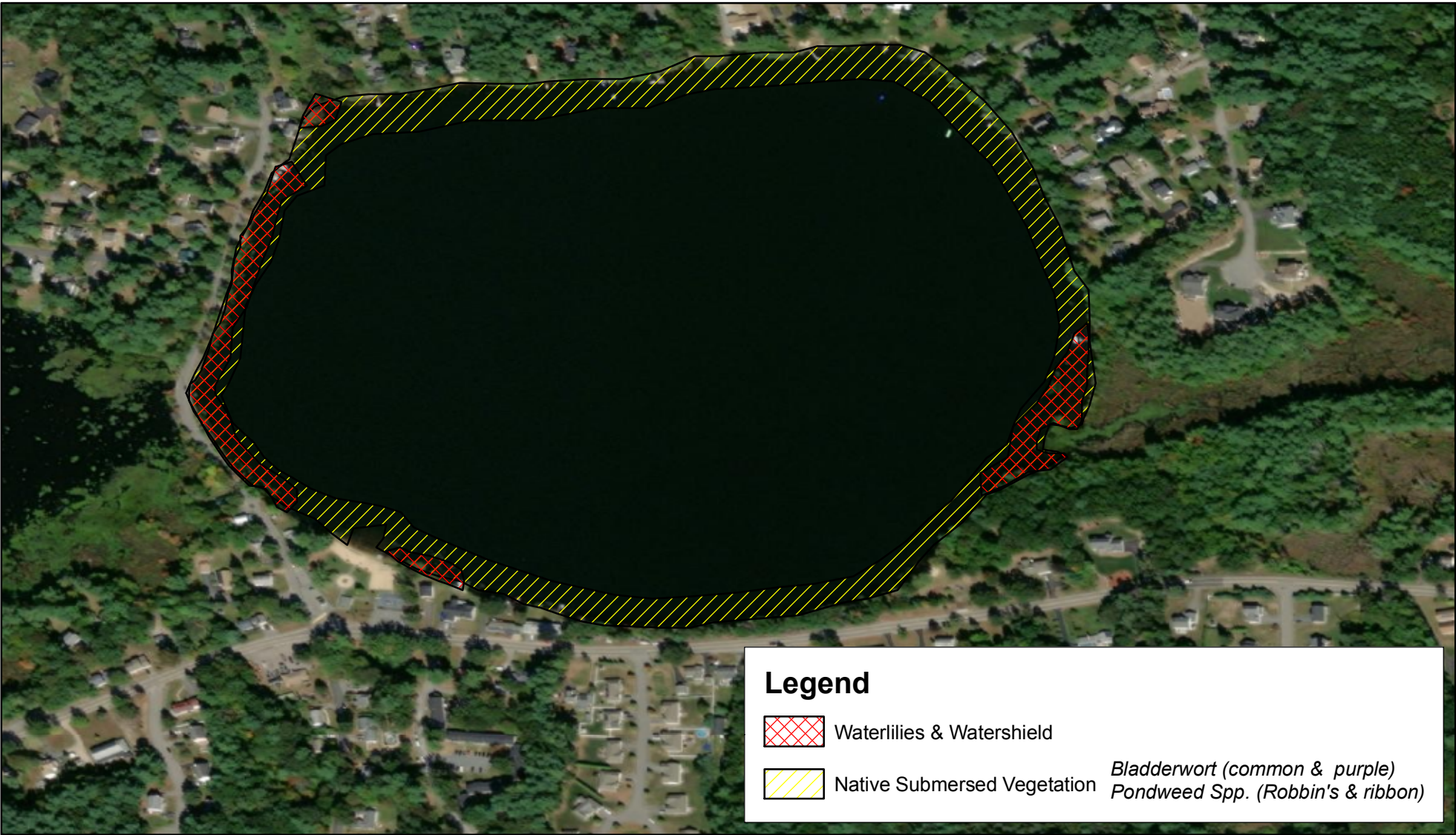
1:7,303



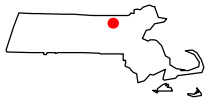
Map Date: 11/23/2020  
Prepared by: DM  
Office: Shrewsbury, MA



FIGURE 5: Sandy Pond 2020 Post-treatment Native Aquatic Vegetation



Sandy Pond  
Ayer,  
Massachusetts



**Sandy Pond**

0 305 610 1,220 Feet

1:5,411



Map Date: 11/23/2020  
Prepared by: DM  
Office: Shrewsbury, MA