

INVOICE



Town of Ayer
1 Main Street
Ayer, MA 01432
(978) 772-8249

Water & Wetland, LLC

115 South Street
Upton, MA 01568

Phone: (888) 493-8526

Email: joe@waterandwetland.com

Web: www.waterandwetland.com

Payment Terms 30 Days

Invoice # 000094

Date 12/09/2021

Business / Tax ID: 85-1677147, CT
Tax # Bus Reg #: B-3620

Description

Total

Permitting/Surveys/Reporting (All Ponds)	\$4,350.00
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Water & Wetland, LLC will provide the following permitting, survey and reporting tasks for Flannagan Pond, Sandy Pond and Pine Meadow Pond, all work will be performed in accordance with the specifications found in Attachment A:

- Attend "Town Hall Meeting" via Zoom with Conservation Commission and pond abutters, if requested. (April/Early-May) - No Cost
- Prepare and file MA-DEP License to Apply Chemicals Permits (April) - \$350
- Perform Pre-Treatment Survey (Note: Sonar will be applied to Flannagan Pond prior to official pre-treatment survey) (Early-June) - \$1,500
- Post-Treatment Survey (September) - \$1,500
- Year End Reporting (November) - \$1,000

Treatment Tasks (Sandy Pond)	\$2,000.00
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Water & Wetland, LLC will provide the following treatment services at Sandy Pond inclusive of all product and labor. All work will be performed in accordance with the specifications found in Attachment A:

- Diquat treatment of any milfoil and/or curly leaf pondweed found during the pre-treatment survey (June) - \$1,250
- Treatment of nuisance waterlilies and scattered patches of phragmites (September) - \$750

Treatment Tasks (Flannagan Pond)	\$29,200.00
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Water & Wetland, LLC will provide the following treatment services at Flannagan Pond inclusive of all product and labor. All work will be performed in accordance with the specifications found in Attachment A:

- Initial Sonar application (Early-Mid May) - \$16,670
- Perform Sonar "bump" application (Early-June) - \$8,500
- Perform 2nd Sonar "bump" application (Mid-June) - \$3,280
- Treatment of nuisance waterlilies (September) - \$750

* Diquat will be utilized as necessary at no additional cost, but is not anticipated as Sonar has excellent efficacy on fanwort, milfoil and curly leaf pondweed. Costs above include FasTEST residue sampling as specified in Attachment A.

Treatment Tasks (Pine Meadow Pond)

\$3,500.00

Water & Wetland, LLC will provide the following treatment services at Pine Meadow Pond inclusive of all product and labor. All work will be performed in accordance with the specifications found in Attachment A:

- Diquat treatment of any milfoil and/or curly leaf pondweed found during the pre-treatment survey (June) - \$2,500
- Treatment of nuisance waterlilies, scattered patches of phragmites/accessible phragmites at northern wetland area of the Pond (September) - \$1,000

Subtotal	\$39,050.00
Total	\$39,050.00
Due Upon Delivery of YER (November)	\$1,000.00

Payments Summary

06/01/2021 - Check #092343	\$17,020.00
07/17/2021 - Check #93007	\$17,030.00
10/05/2021 - Check #94026	\$4,000.00
Paid Total	\$38,050.00
Remaining Amount	\$1,000.00

Payment Schedule

Due upon completion of initial sonar treatment and dep permitting (may) (44%)	\$17,020.00
Due upon completion of pre-survey, diquat applications, sonar bump applications (june) (44%)	\$17,030.00
Due now: upon completion of post-survey, lily and phragmites treatments (september) (10%)	\$4,000.00
Due upon delivery of yer (november) (3%)	\$1,000.00

Notes:

DEP Permitting Completed - April/May 2021

Initial Sonar Treatment of Flannagan Pond Completed May 17, 2021

Contact Treatments (Pine Meadow, Sandy)/Sonar Bump (Flannagan) Completed June 28, 2021

Post-Treatment Survey & Waterlily/Phragmites Treatments Completed September 7, 2021

Year-End Report delivered December 9, 2021

2022 Recommended Budgets – Ayer Ponds

Permitting / Surveys / Reporting (All Ponds)		
Pond	Task	Cost
All Ponds	<ul style="list-style-type: none"> Attend meeting with Conservation Commission and abutters (if needed) 	No Cost
All Ponds	<ul style="list-style-type: none"> Prepare and file MA-DEP License to Apply Chemicals Permit 	\$350
All Ponds	<ul style="list-style-type: none"> Pre-Treatment Survey 	\$1,500
All Ponds	<ul style="list-style-type: none"> Post-Treatment Survey 	\$1,500
All Ponds	<ul style="list-style-type: none"> Delivery of Year-End Report 	\$1,000
Total Cost: Permitting / Surveys / Reporting (All Ponds)		\$4,350

Treatment Tasks (Sandy Pond)		
Pond	Task	Cost
Sandy Pond	<ul style="list-style-type: none"> Initial Sonar ONE Application at Inlets 	\$3,700
Sandy Pond	<ul style="list-style-type: none"> Sonar ONE “Bump” Treatment at Inlet 	\$1,580
Sandy Pond	<ul style="list-style-type: none"> Diquat Treatment 	\$1,250
Sandy Pond	<ul style="list-style-type: none"> Phragmites/Waterlily Treatment 	\$750
Total Cost: Treatment Tasks (Sandy Pond)		\$7,280

Treatment Tasks (Flannagan Pond)		
Pond	Task	Cost
Flannagan Pond	<ul style="list-style-type: none"> Initial Sonar ONE application at inlet 	\$2,900
Flannagan Pond	<ul style="list-style-type: none"> Sonar ONE “Bump” Treatment 	\$1,285
Flannagan Pond	<ul style="list-style-type: none"> Diquat Treatment 	\$3,250
Flannagan Pond	<ul style="list-style-type: none"> Waterlily Treatment 	\$750
Total Cost: Treatment Tasks (Flannagan Pond)		\$8,185

Treatment Tasks (Pine Meadow Pond)		
Pond	Task	Cost
Pine Meadow Pond	<ul style="list-style-type: none"> Diquat Treatment 	\$2,750
Pine Meadow Pond	<ul style="list-style-type: none"> Waterlily Treatment 	\$850
Total Cost: Treatment Tasks (Pine Meadow Pond)		\$3,600



November 29, 2021

Ayer Conservation Commission
 Ayer Town Hall – 1 Main Street
 Ayer, MA 01432
 Sent via email: concom@ayer.ma.us

Re: Ayer Ponds – 2021 Year End Report

Dear Commission Members:

It is our pleasure to present a year end summary report regarding the 2021 aquatic management program at Flannagan, Sandy, and Pine Meadow Ponds. The Town’s objective of the aquatic management program is to manage invasive species and nuisance waterlilies within the three waterbodies. The purpose of the program is to restore and maintain habitat, public enjoyment, and recreation. These goals were met during the 2021 season through monitoring, reporting, communication, and treatments. Prior to the start of the program, a plan was developed for each individual pond, based on its unique needs.

All permitting, treatment and survey tasks were completed in accordance with the 2021 work plans and Orders of Conditions. The table below provides the specific dates of each task. Below the table, each visit/task performed is described in additional detail.

Summary Of 2021 Management Activities

Date	Task/Description
May 2, 2021	WM04 Herbicide License issued for Flannagan Pond
May 12, 2021	WM04 Herbicide Licenses issued for Sandy and Pine Meadow Ponds
May 17, 2021	Initial Sonar (fluridone) application at Flannagan Pond
June 7, 2021	Flannagan Pond Sonar booster treatment and FastEST herbicide residue sampling
June 14, 2021	Sandy and Pine Meadow Ponds pre-treatment survey
June 28, 2021	Flannagan Pond Sonar booster treatment; Sandy and Pine Meadow Ponds diquat treatment
September 7, 2021	Flannagan Pond waterlily treatment; Sandy Pond waterlily and phragmites treatment; Pine Meadow Pond waterlily treatment; Post-treatment survey at all ponds

Flannagan Pond Initial Sonar Treatment – May 17, 2021

On May 17th, Co-Owner/Aquatic Biologist, Colin Gosselin, and James Lacasse, Environmental Scientist visited Flannagan Pond to apply the initial Sonar (fluridone) treatment. Brightly colored neon posters were hung on telephone poles the Friday prior to treatment, noting the treatment,



Figure 1 Invasive fanwort emerging through leaf debris

Water & Wetland contact information, and the affiliated water-use restrictions. Prior to treatment, the Biologists checked on the swan nesting at 6 Old Sandy Pond Road and kept a buffer zone around the area during treatment (although herbicide will not affect the swans). The treatment was conducted to manage the invasive species population, in particular fanwort which has taken over Flannagan Pond in recent years. Fanwort was observed throughout Flannagan Pond in varying densities, also noted was invasive curly leaf pondweed and native ribbon-leaf pondweed, waterlilies, and

watershield. We anticipate the Sonar will brown the waterlilies and possibly provide some thinning, but a treatment specific to nuisance lilies is scheduled for later on this summer. Conditions were calm and sunny. The liquid Sonar was applied using a subsurface injection system while the pelletized sonar formulation was applied using a calibrated blower.

While on-site, temperature and dissolved oxygen readings were collected using a calibrated YSI meter. The temperature reading was where we'd expect to see a typical New England pond during this time of Spring. The dissolved oxygen reading was within a good range, sufficient enough to support fish and wildlife.

Sonar works through maintaining the desired concentration for a period of 60+ days until target plant mortality. For this reason, a series of two "bump "applications" were planned to boost fluridone concentrations.

Flannagan Pond Sonar Booster Treatment – June 7, 2021

On June 7th, On June 7th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse, completed the second Sonar (fluridone) treatment at Flannagan Pond. This "bump" application was designed to boost fluridone concentrations in the Pond as Sonar works by maintaining the desired concentration until target plant mortality. Prior to the treatment, interim monitoring was conducted through visual observation paired with the use of a throw-rake. The interim monitoring is to document plant impacts from the initial Sonar treatment performed in May. Observed



Figure 2 Chlorotic white tips on fanwort



throughout the shoreline was fanwort (invasive), waterlilies, watershield, and ribbon-leaf pondweed. Noted throughout was chlorotic white tips forming from the new growth of the fanwort, which indicates that the Sonar has begun to penetrate the plant and is starting to work. Also noted was scattered filamentous algae at the surface of the Pond, mixed within the waterlilies. Conditions during the treatment were sunny and very hot.

The treatment consisted of using the pelletized time-released (Sonar ONE) and liquid (Genesis) Sonar formulations. The pelletized formulation was applied using a calibrated blower while the liquid formulation was distributed using a subsurface injection system. The pelletized formulation assisted with combating any rains through its slow release directly onto the target plant beds, while the liquid helped build concentrations more quickly lake-wide. Several days prior to the treatment, the shoreline was posted with neon green posters noting the treatment, affiliated restrictions, and Water & Wetland contact information.

While on-site, surface temperature and dissolved oxygen readings were collected using a calibrated YSI meter. FastEST samples were also collected from several locations to analyze fluridone concentrations within Flannagan Pond. The surface temperature was consistent with what we've been seeing at other shallow lakes in the area and the dissolved oxygen was sufficient to support fish and wildlife.

Sandy Pond/Pine Meadow Pond Pre-Treatment Survey – June 7, 2021

On June 14th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse, conducted the pre-treatment surveys at both Sandy Pond and Pine Meadow Pond.

Given that contact herbicide, diquat, will be used at both Sandy and Pine Meadow Ponds, the pre-treatment survey was conducted to document the distribution and densities of invasive species in both waterbodies. Visual observation was paired with the use of a throw-rake. Rakes were thrown approximately every 10' throughout both waterbodies (within the littoral zone). This approach was paired with GPS to document the locations of the invasive species in both waterbodies.

In Sandy Pond, the only invasive species found was variable milfoil, which was consistent with locations from previous years. The variable milfoil was still at a fairly low density during the time of the survey. Due to budgets, the Conservation Commission decided to forego the use of Sonar (fluridone) in Sandy Pond in 2021, to control invasive fanwort. No instances of fanwort were observed in Sandy Pond during the pre-treatment survey. Fanwort was however found in two small locations later on during the post-treatment survey. Diquat is extremely effective on variable milfoil and is therefore the perfect fit to spot manage the instances of variable milfoil.

Pine Meadow Pond has historically contained two invasive species, these being variable milfoil and curly-leaf pondweed. The 2021 pre-treatment survey showed significantly more variable

milfoil growth than the 2020 pre-treatment survey. The 2020 pre-treatment survey did not show any curly-leaf pondweed, however curly-leaf pondweed was also observed in Pine Meadow Pond. Both species were observed in moderate densities. No instances of fanwort were observed. Diquat is extremely effective at spot treating both variable milfoil and curly-leaf pondweed.

Flannagan Pond Sonar Booster Treatment / Pine Meadow Pond & Sandy Pond Diquat Treatment – June 28, 2021

Flannagan Pond



Figure 3 Chlorotic fanwort - June 28th

On June 28th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse, conducted the third and final (second booster) treatment at Flannagan Pond. As noted previously, Sonar is a systemic herbicide that works much more slowly than contact herbicides such as diquat. It does however provide systemic control of both fanwort and milfoil. Prior to the booster treatment, the Pond was inspected to document conditions. Fanwort has certainly outcompeted variable milfoil in Flannagan Pond over the years and has become the dominant target species. All fanwort in the Pond appeared

to have dropped out of the water column or appeared chlorotic, which indicates the Sonar herbicide is actively working throughout the plants. Also documented during the treatment were waterlilies, some populations were heavily affected by the Sonar, while other areas appeared healthy, especially around the buffer area created for the swan's nest. Impacts to lilies from the Sonar were expected, but the rates applied were intended for fanwort and curly-leaf pondweed control rather than waterlilies. Given that, we felt the follow-up waterlily treatment was still very much necessary. Scattered sparse densities of ribbon-leaf pondweed were noted throughout the Pond.



Figure 4 Fanwort dropped from water column, overall pond photo

The liquid Sonar herbicide (Sonar Genesis) was applied throughout the Pond to "boost" concentrations to give the program one-final push. The liquid was applied using a jon-boat equipped with a sub-surface calibrated pumping system. FasTEST data from June 7th showed an average fluridone concentration of 13.16ppb throughout the Pond, which is right in line with the

target concentration of >10+ppb. Posters noting the treatment, affiliated water-use restrictions, and Water & Wetland contact information were posted around the shoreline several days in advance. Water clarity was moderate, and conditions were sunny and hot.

While on-site, surface temperature and dissolved oxygen readings were collected using a calibrated YSI meter. The water temperature was consistent with other shallow nearby ponds we've visited, and the dissolved oxygen was sufficient to support fish and wildlife.

Pine Meadow Pond



Figure 5 Variable milfoil in Pine Meadow Pond

On June 28th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse conducted a treatment at Pine Meadow Pond. Prior to the treatment, a pre-treatment survey had been conducted to determine the distribution and density of invasive species in the Pond. The shoreline was also posted several days in advance, noting the treatment, affiliated water-use restrictions, and Water & Wetland contact information. Another inspection was also performed immediately prior to the treatment. In addition to the target invasive species, curly-leaf pondweed, and variable watermilfoil, several

native species were observed. Moderate to dense populations of waterlilies were noted throughout the majority of the Pond. Sparse to moderate densities of watershield were mixed with the lilies. Sparse densities of native bladderwort, ribbon-leaf pondweed, and coontail were also noted. Dense stands of cattails line most of the northern shoreline. Conservation Administrator, Jo-Anne Crystoff accompanied Colin on a pre-treatment tour of the Pond.

The treatment was performed to control growth of invasive variable milfoil and curly-leaf pondweed throughout Pine Meadow Pond. These two species were found primarily in the middle to northern section of the Pond in moderate densities. Diquat herbicide, which is effective on both the milfoil and curly-leaf pondweed, was applied to the treatment areas using a treatment boat equipped with a calibrated sub-surface injection system. Water clarity was moderate and conditions during the treatment were warm and sunny.

While on-site surface temperature and dissolved oxygen readings were collected using a calibrated YSI meter. The temperature was consistent with other nearby shallow ponds and the dissolved oxygen was sufficient to support fish and wildlife.

Sandy Pond

On June 28th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse conducted a treatment at Sandy Pond. A pre-treatment survey had previously been conducted to determine the distribution and density of invasive species in the Pond. The shoreline was also posted several days in advance, noting the treatment, affiliated water-use restrictions, and Water & Wetland contact information. The Town was also notified in advance to coordinate any beach closures. Another inspection was also performed immediately prior to the treatment. In addition to the target variable watermilfoil, three small areas of fanwort were found. The fanwort was extremely immature and was not growing during the pre-treatment survey. The small fanwort locations included: 1) By the bridge between Sandy Pond and Flannagan Pond, 2) The northwest corner, 3) the southwestern corner. While fanwort was not within the 2021 scope of services, this continued to be closely monitored during the post-treatment survey and all fanwort areas are included in the post-treatment survey maps. Also noted were sparse to moderate densities of waterlilies scattered throughout the shoreline, sparse densities of bladderwort, and moderate densities of ribbon-leaf pondweed throughout the majority of the shoreline. Lilies, bladderwort, and ribbon-leaf pondweed are all native plants.



Figure 6 Variable milfoil growth in Sandy Pond

The treatment was performed to control growth of invasive variable milfoil, which was growing in the southeast corner, as documented in the pre-treatment maps. Diquat herbicide was applied to the treatment area using a treatment boat equipped with a calibrated sub-surface injection system. Water clarity was excellent and conditions during the treatment were warm and sunny.

While on-site surface temperature and dissolved oxygen readings were collected using a calibrated YSI meter. The temperature was consistent with other nearby shallow ponds and the dissolved oxygen was sufficient to support fish and wildlife.

Post-Treatment Surveys / Flannagan Pond & Pine Meadow Pond Waterlily Treatment / Sandy Pond Phragmites & Waterlily Treatment – September 7, 2021

Flannagan Pond

On September 7th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse, conducted a visit to Flannagan Pond. The visit was dual purposed as it combined the post-treatment survey with a treatment of nuisance lilies and watershield.



Figure 7 Wildlife enjoying a floating island

The survey was conducted using visual observation and a standard throw-rake and many points throughout the pond were surveyed throughout. The densest areas of waterlilies were in the northwestern portion of the pond, the northeastern cove/along the inlet, and along the southeastern shoreline of the pond. These areas coincide with the shallowest areas of Flannagan Pond. Waterlilies were found in sparse to dense patches throughout the remainder of the pond, covering most of the shoreline and throughout the middle of the pond (given the shallow depths

of Flannagan Pond throughout). Watershield was often mixed in with the lilies. Also noted throughout the pond was bladderwort and ribbon-leaf pondweed, both native. Ribbon-leaf was found in sparse densities throughout the pond. Excellent control of fanwort was achieved through the extensive Sonar treatment program performed throughout the Spring and into the Summer. There was a sparse amount of fanwort observed by the inlet, this could be due to the high volume of rain that occurred all summer long, thus increasing the flow. There were 2-3 mats of dense filamentous algae floating from the bottom to the surface of the pond. Documented throughout the pond were several "floating islands. These islands are essentially lily rhizomes and "bottom muck" made buoyant by trapped gasses produced by the microbial breakdown of the root material following treatment. These floating islands will typically sink on their own during the winter but may stay present and could be removed mechanically or manually, if elected. No phragmites were noted around the shoreline of the Pond. Pickerel weed (native) was noted in sparse to moderate densities around the majority of the shoreline. Conditions during the visit were calm, sunny, and perfect for a foliar treatment.

Several days before treatment, neon green posters were hung around the shoreline of Flannagan Pond, noting the treatment, affiliated water-use restrictions, and Water & Wetland contact information. The treatment was performed from a motored boat equipped with a calibrated spray system. This allows for the systemic herbicide paired with a methylated seed oil (MSO) surfactant, which aids in uptake of the herbicide into the rhizomes of the lilies and acts as a sticking agent, to be applied to the target lilies evenly. Lilies are a native plant that provide valuable habitat and cover, they have however reached a nuisance level in Flannagan Pond which decreases biodiversity and limits oxygen exchange. The goal of the treatment was to open up access for shoreline owners and to thin lilies throughout the pond. Overall, the treatment will bring the lilies down to a more desirable level. We insured excellent coverage in any areas where homeowners reached out, such as the area at the intersection of Groton Harvard Road and Oakridge Drive.

While on-site, surface temperature and dissolved oxygen readings were collected using calibrated meters. The water temperature was consistent with other similar ponds we manage in the area and was starting to get cooler due to the weather and rain. The dissolved oxygen was sufficient to support fish and wildlife and has increased since the previous treatment performed in June.

Pine Meadow Pond

On September 7th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse, conducted a visit to Pine Meadow Pond. The visit was dual purposed as it combined the post-treatment survey with a treatment of nuisance waterlilies.



Figure 8 Native cattails and waterlilies

The survey was conducted using visual observation and a standard throw-rake and many points throughout the pond were surveyed throughout. Dense waterlilies lined the northern portion towards the middle of the Pond. Sparse to dense watershield was mixed throughout this portion of the Pond as well. Throughout the remainder of the Pond, sparse to dense patches of waterlilies were observed lining the shoreline and throughout the middle portions. Watershield was also mix throughout these lilies at sparse to moderate densities. Also documented throughout the waterlilies were ribbon-leaf and bladderwort (both native). No milfoil or curly-leaf pondweed (both invasive and targeted during the June treatment) were observed during the survey. Water clarity was slightly below average. No phragmites were observed, as the entire northern portion of the pond includes dense cattails (native). Conditions during the visit were calm, sunny, and perfect for the foliar treatment.

Several days before treatment, neon green posters were hung around the shoreline, noting the treatment, affiliated water-use restrictions, and Water & Wetland contact information. The treatment was performed from a motored boat equipped with a calibrated spray system which allows for even distribution of the herbicide mixture. The systemic herbicide was paired with a methylated seed oil (MSO) surfactant, which aids in uptake of the herbicide into the rhizomes of the lilies and acts as a sticking agent. The nuisance lilies were scaled back to a more desirable level. While we treated with a systemic herbicide, the density of the lilies will require several years of treatment to fully achieve the "scaling back" to a more desirable level.

While on-site, surface temperature and dissolved oxygen readings were collected using calibrated meters. The water temperature was consistent with other similar ponds we manage

in the area and is starting to get cooler due to the weather and rain. The dissolved oxygen was sufficient to support fish and wildlife and has increased since the previous treatment performed at the end of June.

Sandy Pond



Figure 9 Phragmites in Sandy Pond

On September 7th, Co-Owner/Aquatic Biologist, Colin Gosselin, and Environmental Scientist, James Lacasse, conducted a visit to Sandy Pond. The visit was dual purposed as it combined the post-treatment survey with a treatment of nuisance waterlilies and invasive phragmites.

The survey was conducted using visual observation and a standard throw-rake and many points throughout the pond were surveyed throughout. Waterlilies were observed in sparse to moderate scattered patches throughout the

shoreline of the pond. Three dense phragmites stands were observed throughout the shoreline of the pond. These stands were targeted during treatment. Also documented was sparse to moderate ribbon-leaf pondweed and sparse large-leaf pondweed (both native), scattered throughout the pond, with sparse watershield mixed throughout the waterlilies. No living milfoil was observed throughout the pond. Several dead milfoil plants covered with epithetic algae were noted in the northwestern corner. Two small stalks of fanwort were also observed in the northwestern corner, fanwort was not targeted in Sandy Pond during the 2021 treatments. Water clarity was above average. Conditions during the visit were calm, sunny, and perfect for the foliar treatment.

Several days before treatment, neon green posters were hung around the shoreline, noting the treatment, affiliated water-use restrictions, and Water & Wetland contact information. The treatment was performed from a motored boat equipped with a calibrated spray system which allows for even distribution of the herbicide mixture. The systemic herbicide was paired with a methylated seed oil (MSO) surfactant, which aids in uptake of the herbicide into the rhizomes of the lilies and phragmites and acts as a sticking agent. All observed phragmites was treated and



Figure 10 Overall photo of Sandy Pond



we anticipate excellent carry over control. The nuisance lilies were scaled back to a more desirable level.

While on-site, surface temperature and dissolved oxygen readings were collected using calibrated meters. The water temperature was consistent with other similar ponds we manage in the area and was starting to get cooler due to the weather and rain. The dissolved oxygen was sufficient to support fish and wildlife and has increased since the previous treatment performed at the end of June.

Temperature / Dissolved Oxygen Readings

Temperature and dissolved oxygen readings were collected throughout the season at all three Ayer Ponds using a calibrated YSI meter. Flannagan Pond required the most visits in 2021 due to the Sonar treatment program, which is why it has additional dates. Analysis is provided within the detailed summary of each visit.

Date	Flannagan Pond		Sandy Pond		Pine Meadow Pond	
	Surface Temp (°C)	Surface D.O. (mg/l)	Surface Temp (°C)	Surface D.O. (mg/l)	Surface Temp (°C)	Surface D.O. (mg/l)
5/17/2021	21.7	11.52				
6/7/2021	27.7	10.48				
6/28/2021	26.8	7.84	26.0	7.7	26.8	7.14
9/7/2021	21.4	8.67	20.2	9.83	21.4	9.03

Summary / 2022 Recommendations

Flannagan Pond

The conditions observed throughout the 2021 season at Flannagan Pond were generally desirable. Spot-treating the dense fanwort throughout the Pond would simply be unachievable, especially given that Sonar is the product approved for use in Flannagan Pond which has efficacy on fanwort. The challenge with spot-treating with Sonar is due to the fact that this systemic product works by maintaining a desired concentration for a lengthy period of time. Given dilution, flow, etc. treatment of small areas will simply not provide systemic control. The Ayer Conservation Commission made a significant investment in gaining systemic control of the fanwort through the 2021 Pond-wide Sonar treatment program.

By starting much earlier in the season than previous years, we were also able to target the fanwort at a very immature growth stage. In addition to this, we were able to treat the curly-leaf pondweed (CLP) at the appropriate time, as the CLP should be treated much earlier than July as it has in previous years. This is because CLP is a colder water plant that starts growing very early in the season and typically dies off as the water warms. The Sonar was in the water at the ideal timeframe to target the immature growth, which is most susceptible to lower concentrations of fluridone. Interim monitoring was conducted throughout the season, and the impacts of the Sonar were apparent very early on in the treatment program. By the post-treatment survey,



much of the fanwort was controlled, short of a small area by the inlet. 2021 was one of the wettest years on record, with heavy rainfall throughout the season. While we planned for some outflow, the excessive outflow observed during 2021 was less than ideal. Based on this, we are pleased with the outcome of the 2021 Sonar program in Flannagan Pond. To combat rain, Sonar One was incorporated into the treatment program as it is less susceptible to flushing. Additionally, weather was closely monitored prior to treatments, and the dates were adjusted to avoid treatment just prior to significant rainfall events. The minimal live fanwort growth at the inlet was almost impossible to avoid given the excessive flow in this area, control was achieved throughout the rest of the Pond. We expect multiple years of nuisance level fanwort control throughout much of Flannagan Pond.

Curly leaf pondweed is a perennial plant that reproduces through turions. The turions typically germinate in the fall and the curly leaf pondweed plants typically grow extensively shortly after ice-out in the Spring. Given that CLP turions can survive at least five years of dormancy in ponds, annual control is recommended to gain extensive control over time.

Excessive waterlily growth has taken over much of Flannagan Pond, which is what the majority of abutters asked us about during on-site conversations. We expect that the 2021 waterlily treatment scaled back the lilies but based on the cover and density observed in 2021, several years of lily treatment will likely be needed to get them to a healthier level.

Based on the above analysis we recommend a 2022 program that consists of diquat treatment for the control of curly leaf pondweed, Sonar spot treatment at the inlet for fanwort control in this small area, and continued waterlily management through foliar treatment.

Pine Meadow Pond

Documented in Pine Meadow Pond were two invasive species, curly leaf pondweed and variable watermilfoil. These conditions are consistent with previous years, although no curly leaf pondweed was found in 2020. This could be attributed to the timing of the 2020 pre-treatment survey. These invasives were found throughout the majority of the Pond. The good news is that fanwort is not present in Pine Meadow Pond. Fanwort has limited treatment options and one of them, Clipper, is not permitted in the Ayer Ponds. Luckily, both curly leaf pondweed and variable milfoil can be controlled through treatment with diquat herbicide. The 2021 diquat herbicide treatment in Pine Meadow Pond was successful, and neither invasive was found during the post-treatment survey.

Unfortunately, diquat is a contact herbicide which only provides season long control of these invasive species. For this reason, diquat application should be repeated annually, based on the pre-treatment survey. The benefits to diquat are that it is fast acting, which makes it great for spot treatment. It is also much less costly verses other herbicides such as Sonar. We considered other herbicide options, such as Procellacor, which is a newer herbicide that is widely considered



the ultimate milfoil control tool. One of the benefits to Procellacor is that it is highly selective to milfoil. In the case of Pine Meadow Pond, a second target invasive species is curly leaf pondweed, which will not be controlled through Procellacor treatment. Based on this we recommend continuing with diquat during the 2022 season for the control of the two target invasive species.

Similar to Flannagan Pond, excessive waterlily cover and density has taken over much of Pine Meadow Pond. We anticipate a definite improvement from the 2021 effort but recommend multiple additional seasons of foliar waterlily treatment to fully create the open water habitat we are striving for.

Sandy Pond

Sandy Pond is the deepest of the three managed Ayer waterbodies which has likely kept the milfoil and fanwort confined to similar locations each year. The diquat treatment of the milfoil was extremely effective during the 2021 season. Due to the needs of Flannagan Pond, fanwort control in Sandy Pond was left out of the program in 2021. Fanwort was found in three small areas throughout the 2021 season. As the case in Flannagan Pond, fanwort spreads rapidly and typically outcompetes other invasive species such as variable milfoil. Given the systemic control of fanwort achieved in 2021 throughout much of Flannagan Pond, we recommend the focus for 2022 be on fanwort control in Sandy Pond. Luckily, the density and cover of fanwort in Sandy Pond does not warrant a whole pond approach, as taken in Flannagan Pond in 2021. Clipper (flumioxazin) would be the ideal herbicide for fanwort control in Sandy Pond, but we understand this is prohibited.

Aside from Clipper, the only other Massachusetts approved herbicide with efficacy on fanwort is Sonar. Sonar is an aquatic herbicide that was initially registered with the Environmental Protection Agency (EPA) in 1986 and has been used throughout Massachusetts and the United States for decades. The herbicide inhibits the photosynthesis process by stopping plants from making a protective pigment that keeps chlorophyll from breaking down in the sunlight. Fluridone moves quickly throughout a waterbody and is therefore usually applied as a whole lake/basin treatment. Because of the way Sonar works, it is less than ideal for spot-treatment, which is what's needed in Sandy Pond. Luckily, Sonar ONE came onto the market several years ago. Sonar ONE is the time-released granular formulation and allows for applications directly on the target weed beds. By emitting the active ingredient, fluridone, much more slowly, Sonar ONE leads to a slower build in concentration and assists with maintaining the desired concentration. The recommendation, and ultimately the only real option, for fanwort control in Sandy Pond is to spot-treat by loading Sonar ONE directly on the plant beds. While it will be difficult to maintain the desired concentration within the treatment areas until plant mortality, an initial Sonar ONE treatment and a follow-up booster application should be sufficient to provide season long fanwort control and likely some carry over control into 2023. This approach has been used at Sandy Pond in previous years. We recommend continuing with diquat herbicide for control of variable milfoil and curly-leaf pondweed, if applicable.



Sandy Pond was the only pond of the three where invasive phragmites were documented. We anticipate density reduction in regrowth of both the phragmites and nuisance waterlilies. Despite this, phragmites typically require several seasons of treatment to gain full control. Maintenance is always recommended even after that. As densities decrease, selective herbicide application techniques, such as hand-wiping of individual plants will start to increase. This approach will help limit/negate any non-target impacts of beneficial natives in the treatment areas. Waterlilies can be treated simultaneously with the phragmites, so spot-treatment of nuisance lilies can be incorporated into this treatment for little to no additional cost.

Conclusion

Much was accomplished in 2021 despite the excessive rainfall which provided less than ideal Sonar treatment conditions. 2021 also marked the first season of Water & Wetland managing the three Ayer Ponds. As described above, there's still work to be done. For 2022, we recommend the work described above, paired with the same approach to pre-treatment and post-treatment surveys.

We hope that this year-end report has provided the Commission with valuable information regarding the details of the work performed at Ayer Ponds during the 2021 season. All work performed was consistent with the Orders of Conditions, and the scope of services provided to the Commission. We look forward to working closely with Ayer Conservation Commission to continue to improve the health of the Ayer Ponds for many years to come.

Sincerely,

A handwritten signature in black ink, appearing to read "James Lacasse", with a long horizontal flourish extending to the right.

James Lacasse

Project Manager

Senior Environmental Scientist

c: 774-276-6098

o: 888-4WETLAN(D)

james@waterandwetland.com

www.waterandwetland.com



Attachments Include

- **Notarized Control Statement**
- **Pre-Treatment Invasive Species Maps**
- **Post-Treatment Maps Invasive Species Maps**
- **Post-Treatment Native Plant Assemblage Maps**


December 6, 2021

Ayer Conservation Commission
c/o Office of the Board of Selectmen
Town Hall, One Main Street
Ayer, MA 01432

Dear Ms. Crystoff and Commission Members:

I, Colin Gosselin, certify that 90% minimum control of fanwort, milfoil, and curly-leaf pondweed was achieved during the 2021 season. It is difficult to assess the control of the 2021 phragmites treatment at this time. Control will be assessed based on the 2022 regrowth observed, however far greater than 50% reduction in phragmites regrowth density is anticipated during the 2022 season.

Sincerely,



Colin Gosselin – Water & Wetland, LLC

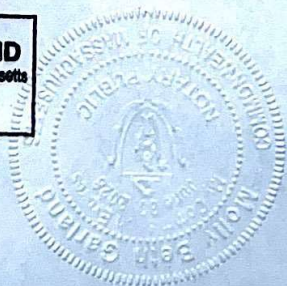
12/6/21

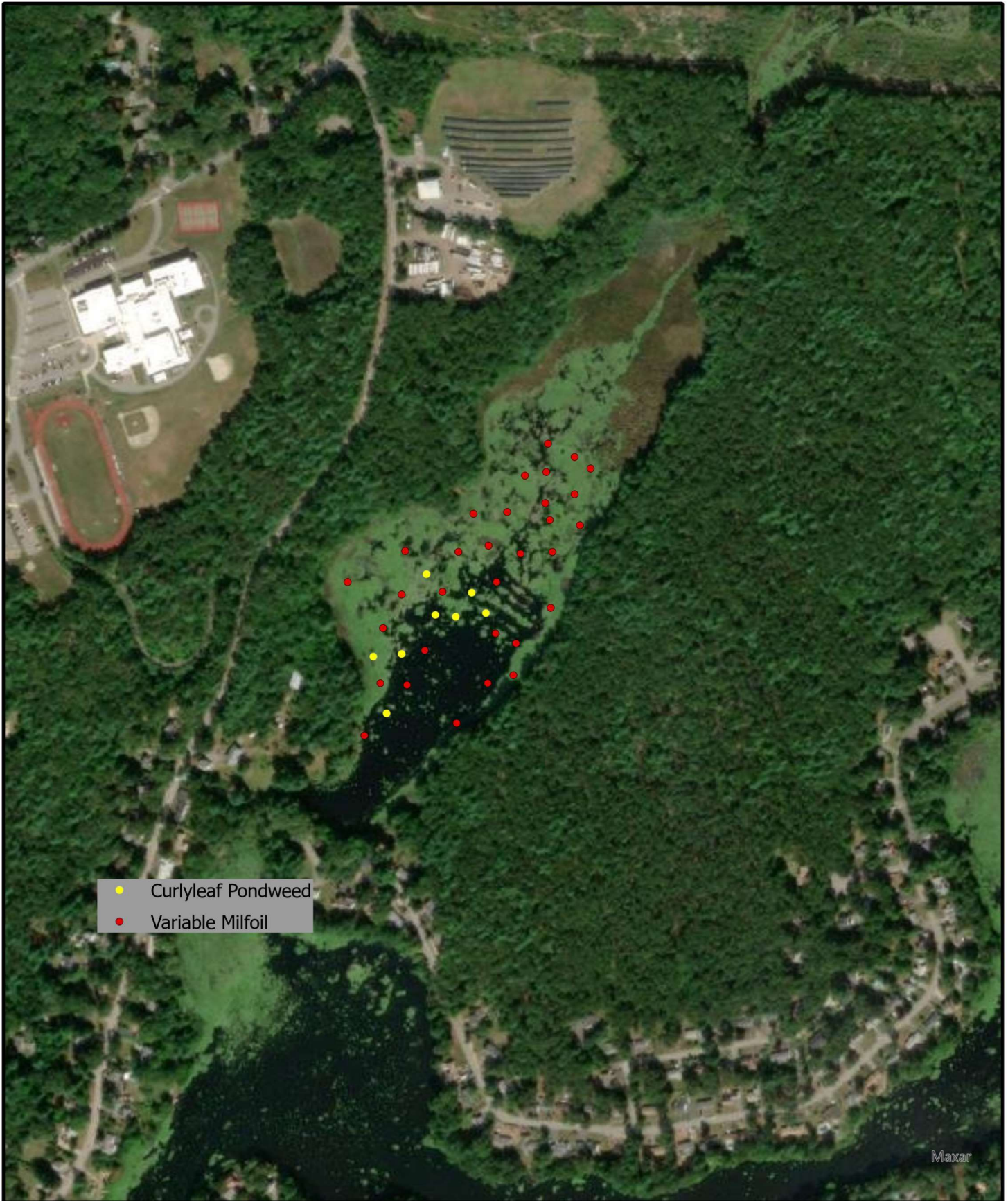
Date

I, Molly Garland (NOTARY) as a notary public certify that I witnessed the signature of the aforementioned signatory above and I verified the individual's identity on this date:
December 6, 20 21.

My commission expires on:

AFFIX NOTARY SEAL





Maxar



Pine Meadow Pond
Pre-Treatment Invasive Vegetation Map
Ayer, MA

Survey Date
6/7/21
Map Date
6/14/21





Sandy Pond

Pre-Treatment Invasive Vegetation Map
Ayer, MA

Survey Date
6/7/21
Map Date
6/14/21





Maxar



Pine Meadow Pond

Post Treatment Invasive Species Map

Ayer, MA

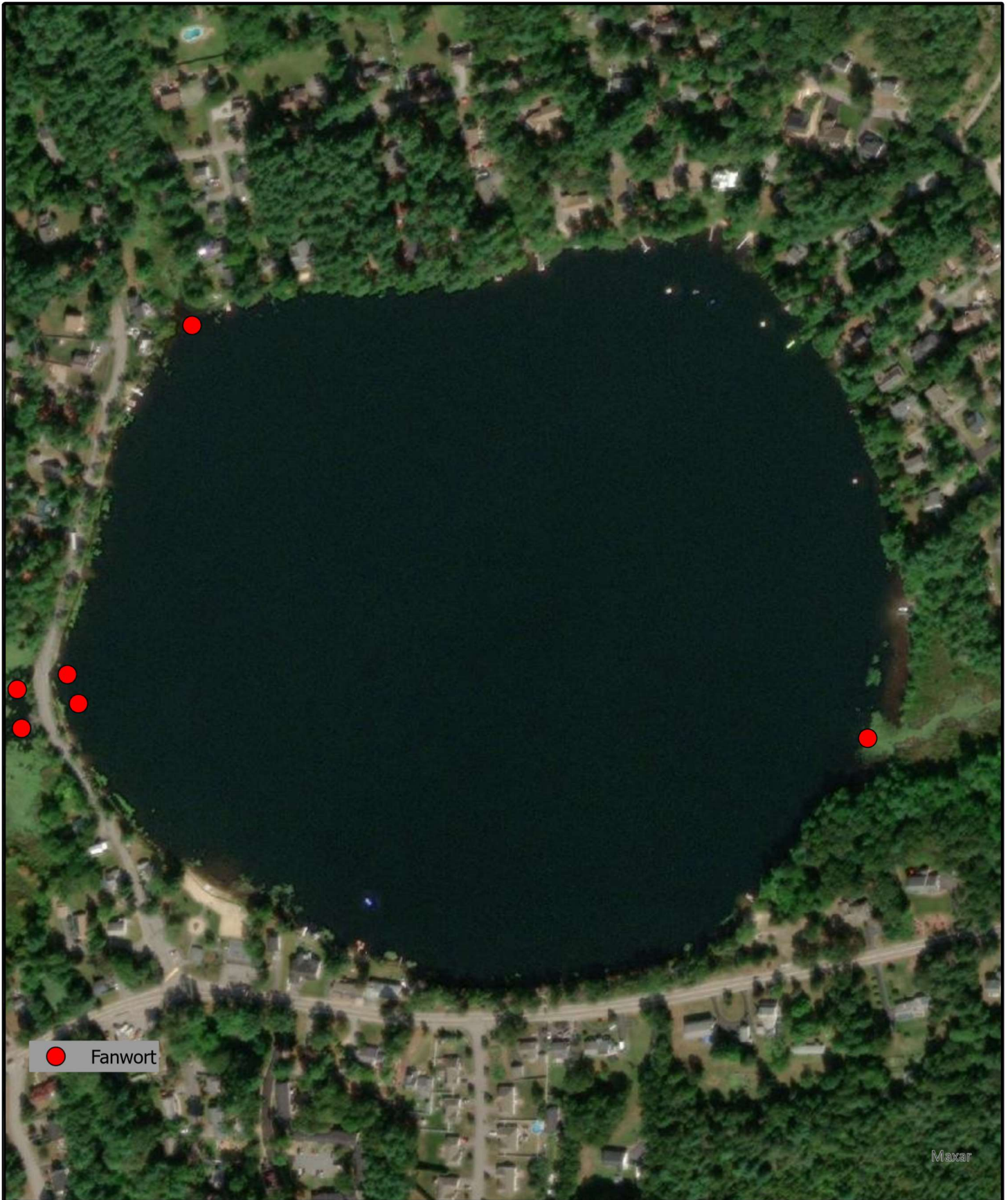
Survey Date

9/7/21

Map Date

12/2/21



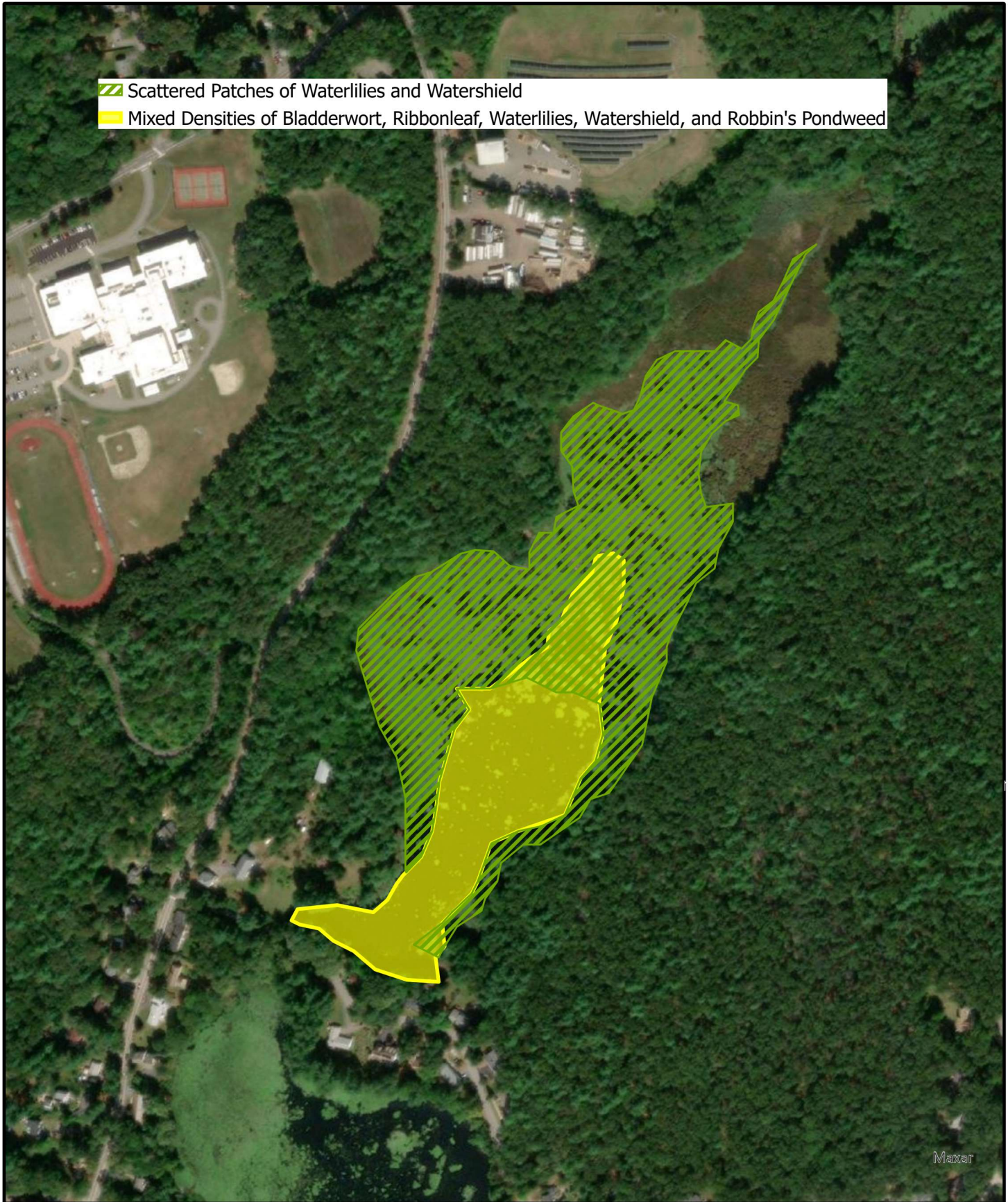




Flannagan Pond
Post Treatment Invasive Species Map
Ayer, MA

Survey Date
9/7/21
Map Date
12/2/21

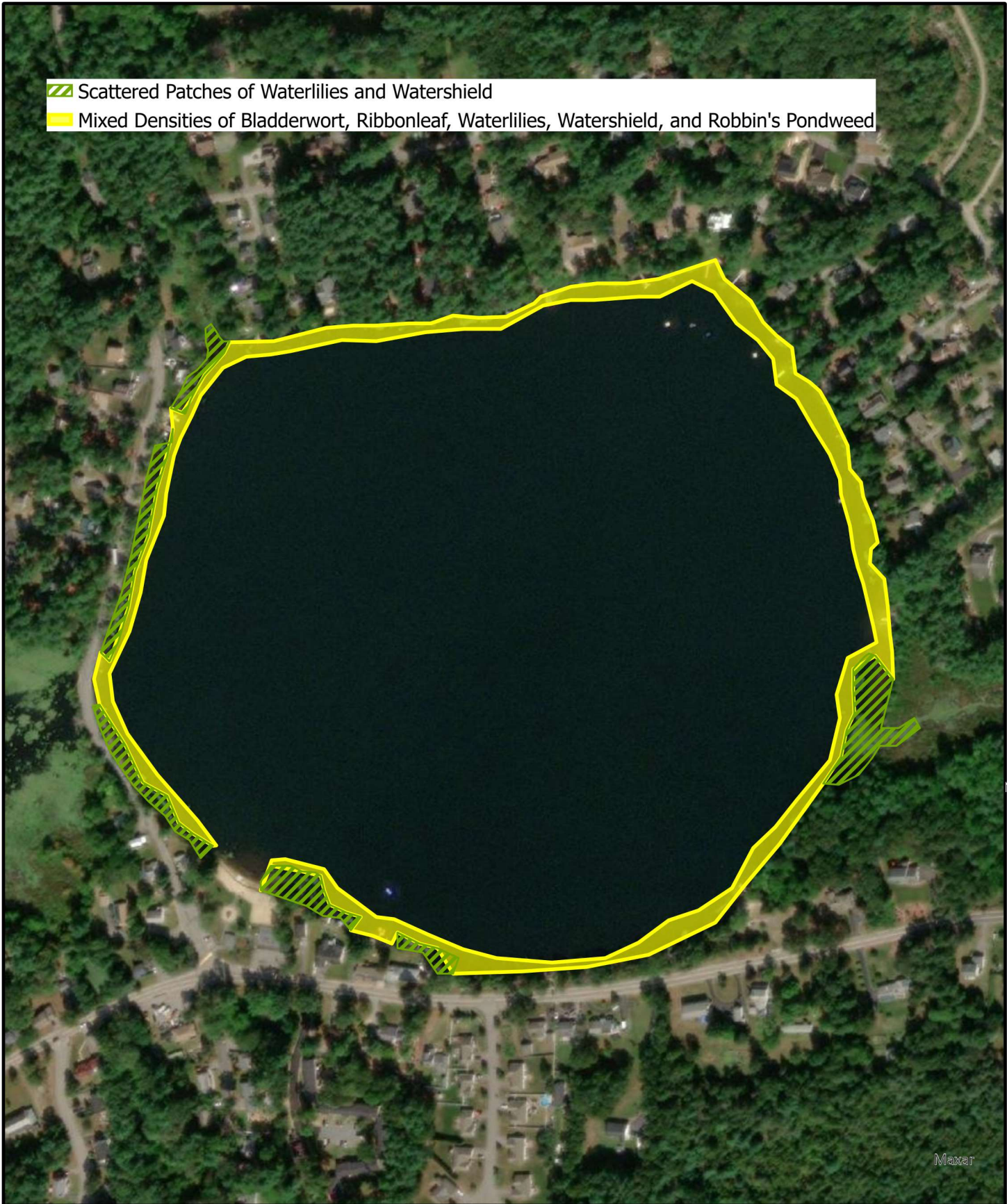




Scattered Patches of Waterlilies and Watershield
Mixed Densities of Bladderwort, Ribbonleaf, Waterlilies, Watershield, and Robbin's Pondweed

Maxar





Scattered Patches of Waterlilies and Watershield
Mixed Densities of Bladderwort, Ribbonleaf, Waterlilies, Watershield, and Robbin's Pondweed

Maxar





Flannagan Pond Post-Treatment Native Species Map Ayer, MA	Survey Date
	9/7/2021
	Map Date
	12/3/2021

