WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

November 29, 2022

US Fish and Wildlife Service
Attention: Ms. Stephanie Koch
73 Weir Hill Road
Sudbury, MA 01776
Sent via email: stephanie_koch@fws.gov

Re: Great Meadows (Sudbury River), Sudbury/Wayland, MA – 2022 Year End Summary Report

Dear Ms. Koch:

It is our pleasure to present a year end summary report to US Fish and Wildlife Service regarding the 2022 aquatic management program at Great Meadows (pictured in Figure 1 to the right). Great Meadows is a portion of the Sudbury River that extends from Sherman's Bridge Road (to the north of the area) and Route 27 (at the southern point of Great Meadows). This portion of the River is located both Sudbury and Wayland, MA. Great Meadows is primarily surrounded by dense woodlands and wetlands with very little developed property abutting the Wildlife Refuge. Access to Great Meadows is gained from a boat launch at Sherman's Bridge Landing, which consists of a pull-off along Sherman's Bridge Road. Several families of waterfowl were noted during each site visit during the 2022 season. Great Meadows is a popular recreational are for activities such as fishing, bird watching, and boating (primarily kayaking and canoeing).

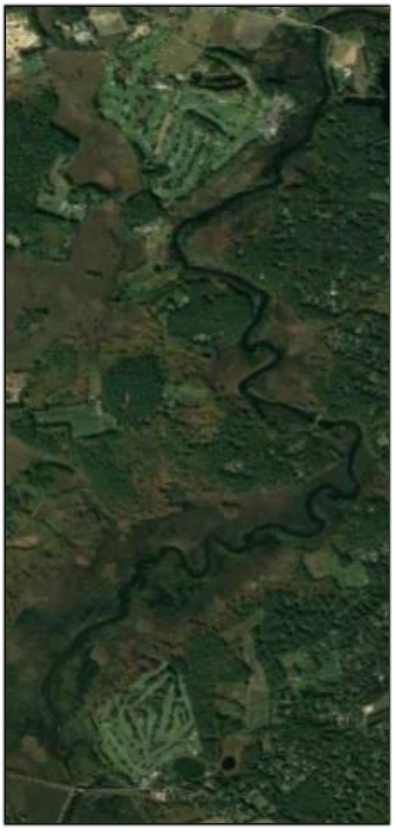

Figure 1: Great Meadows (Sudbury River) - Sudbury, MA

Based on our 2022 data collection, Great Meadows battles several invasive species includes fanwort *(Cabomba)*, Eurasian milfoil *(Myriophyllum spicatum)*, curly-leaf pondweed *(Potamogeton crispus)*, and water chestnut *(Trapa natans)*. The goal and focus of the 2022 program was to manage the invasive water chestnut while monitoring basic water quality through a proactive monitoring schedule. This would be accomplished by implementing an aquatic management program that focused around performing all applicable tasks, including planning, permitting, surveys, treatments, and reporting.

All permitting, special conditions within the Orders of Conditions, treatment, and survey tasks were completed without issue and at the proper times. The table below provides the specific dates of each task. Below the table, each visit/task performed is described in additional detail.

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Summary Of 2022 Management Activities

Date	Task/Description
June 14th, 2022	A pre-treatment survey was conducted to document baseline conditions, note the current vegetation species/densities present, and to guide upcoming 2022 management; water samples were collected
July 13th, 2022	A brief survey was completed to confirm treatment areas; The initial herbicide treatment was conducted targeting water chestnut
August 3rd, 2022	An interim survey was conducted to evaluate the effectiveness of the initial treatment; water chestnut was hand-pulled; The follow-up herbicide treatment was conducted targeting water chestnut
September 8th, 2022	A post-treatment survey was completed to evaluate 2022 management and to guide recommendations for 2023; Water samples were collected

Pre-Treatment Survey – June 14, 2022

On June 14th, Senior Environmental Scientist, James Lacasse, and Field Assistant Grace Adams, completed a site visit to the designated portion of the Sudbury River. The visit consisted of conducting a survey, collecting basic water quality data in addition to collecting required water samples (see Figure 3). Conditions during the visit were sunny with a slight breeze.

Figure 2: Water chestnut and various pondweeds within Great Meadows

Upon arrival, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. The survey consisted of covering the portion of the Sudbury River that is located between Sherman's Bridge Road and Route 27 (pictured in Figure 1). The boat was launched at Sherman's Bridge Landing. There were several invasive species documented throughout the survey, which include water chestnut (noted in Figure 2), curly-leaf pondweed, fanwort, and Eurasian milfoil. The most prominent invasive species was Eurasian milfoil, as it was noted in moderate to dense densities (pictured in the background of Figures 2, 3, and 5). It was found in the majority of the management area, primarily noted close to both shorelines. Half of the population appeared dead/decaying while the other half appeared actively growing, close to forming "mats" at the surface. Curly-leaf pondweed, fanwort, and water chestnut were observed scattered throughout the survey area, and specifically throughout the Eurasian milfoil areas. These species were found in trace to moderate densities. The majority of the water chestnut had reached the surface, although portions of the water chestnut population was documented still growing within the water column. Water chestnut seeds (Figure 4) were also noted scattered, floating on the surface. Water chestnut became more dense/less scattered as we traveled south on the River towards Route 27. A handful of native species were documented throughout the survey including thin-leaf

Figure 3: Aquatic Biologist, James Lacasse, collecting water samples

Figure 4: A water chestnut seed found floating within the River

pondweed *(Potamogeton pusillus)*, duckweed *(Lemnoideae)*, watermeal *(Wolffia)*, waterlilies *(Nymphaeaceae)*, watershield *(Brasenia schreberi)*, ribbon leaf pondweed *(Potamogeton epihydrus)*, snailseed pondweed *(Potamogeton bicupulatus)*, and coontail *(Ceratophyllum demersum)*. Trace to moderate densities of filamentous algae were also noted along the bottom in addition to floating on the surface.

Figure 5: Dense pondweeds forming a mat of vegetation at the surface

While on-site, basic water quality was collected using calibrated meters. The pH was 7.2, which is within a standard range for freshwaters and is considered neutral. The water temperature was consistent with other similar waterbodies we manage in the area, and the dissolved oxygen was sufficient to support fish and aquatic organisms. Water clarity was also assessed using a Secchi disk. A Secchi disk is a disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the transparency of the water. The Secchi reading was 4'6". Water samples were also collected. Properly preserved, and transported to a lab for analysis. All data mentioned above was collected within a potential treatment area site.

Attached are a variety of maps. It is important to note, especially on the water chestnut map, that the points represent GPS points where the mapped plants were found, and do not specify the density. Please refer to the notes above in regard to density. Water chestnut specifically was much more scattered in varying densities, including trace densities where only a small number of plants were found.

Depth (Ft)	Temperature (℃)	Surface Dissolved Oxygen (mg/l)
Surface	23.1	7.82
1	23.1	7.53
2	23.0	7.29
3	23.0	7.12
4	22.8	6.97

Survey/Initial Water Chestnut Treatment – July 13, 2022

On July 13th, Co-Owner/Senior Aquatic Biologist, Colin Gosselin, and Field Assistant, Grace Adams, completed a site visit to Great Meadows. The visit consisted of performing a survey, collecting basic water quality data, and conducting a treatment. Conditions during the visit were warm and sunny.

Figure 6: Water and Wetland's airboat was utilized for the treatment

Upon arrival, an interim survey of the management area (consisting of the stretch of Sudbury River from Sherman's Bridge Landing to Route 27) was conducted using visual observation. The River was surveyed in

Figure 7: MA DEP and treatment posters hung on the bulletin board at the launch prior to treatment

advance of treatment, and conditions were similar to the previous survey; however, the water level had significantly dropped since the last survey (illustrated in Figure 8). As a result of lower water levels, some of the water chestnut was seen out of the water, drying out (water chestnut on the shoreline within Figure 8 below), but was still sprayed by the herbicide in an effort to stop any seed production. The water chestnut was also observed scattered throughout the River in similar densities to those observed during the pre-management survey.

While on-site, basic water quality was collected using calibrated meters. The water temperature was consistent with other similar waterbodies we manage in the area, and the dissolved oxygen was sufficient to support fish and aquatic organisms. Water clarity was also assessed using a using visual observation, and in a majority of the River, the water clarity was below average.

As planned, and based on the survey, a treatment was conducted for the control of water chestnut (see Figure 6). The liquid herbicide, Clearcast (imazamox), was paired with a non-ionic surfactant. The surfactant helps the herbicide stick to the target water chestnut plants and also increases penetration through the plant. The herbicide mixture was applied using an airboat equipped with a calibrated spray system (see Figure 6 above), which we utilized to spread the product by the foliar application method. This methodology ensures the herbicide is evenly spread in treatment areas and applied on the surface of the leaves. It also helps minimize/negate non-target impacts. Prior to treatment, two MA DEP signs were posted, one at Sherman's Bridge Launch, and one at the bridge on Route 27 (Figure 7). Neon orange signs noting the treatment and any affiliated water-use restrictions were also posted (pictured in Figure 7). The property owned by the town of Sudbury, as instructed, was not treated. Additional fulfilled requirements included providing MA-DEP permits, contact information, and pre-treatment survey data to both the Wayland and Sudbury Conservation Commissions. A newspaper as was also placed prior to treatment to fulfill the condition within the Wayland OOC. Lastly, weather was closely monitored prior to treatment to ensure a day without precipitation or high winds. Overall, the weather was ideal for the foliar treatment.

Figure 8: Very shallow conditions due to the drought; water chestnut noted on the shoreline

Surface Temp (°C)	Surface Dissolved Oxygen (mg/l)
28.2	6.7

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Survey/Follow-up Water Chestnut Treatment- August 3, 2022

On August 3rd, Co-Owner/Senior Aquatic Biologist, Colin Gosselin, and Field Assistant, Grace Adams, completed a site visit to Great Meadows. The visit consisted of performing a survey, collecting basic water quality data, and conducting a treatment. Conditions during the visit were warm and sunny, ideal for the foliar treatment. Weather was closely monitored prior to the treatment and the treatment had been rescheduled to accommodate appropriate conditions.

Figure 9: Areas of the River were very shallow due to the drought conditions

Upon arrival, a survey was conducted using visual observation paired with handheld GPS/ArcGIS Field Maps, as applicable. The initial treatment performed two weeks prior had a high success rate, as only small patches of live water chestnut remained. All remaining patches were treated, and excellent coverage was obtained. Prior to treatment, several water chestnut plants were hand-pulled and examined to ensure seeds had not yet dropped. All plants were producing seeds which had not dropped.

While on-site, basic water quality was collected using calibrated meters. The water temperature was consistent with other similar waterbodies we manage in the area, and the dissolved oxygen was sufficient to support fish and wildlife.

Figure 10: Navigating through the River during the site visit

As planned, and based on the survey, a treatment was conducted for the control of water chestnut. The liquid herbicide, Clearcast (imazamox), was applied using a treatment boat equipped with a calibrated pump, which is used to target the water chestnut plants via foliar application method. This method allows for even and precise coverage. The liquid herbicide was paired with a surfactant, methylated seed oil (MSO), which helps the herbicide penetrate the plants and acts as a sticking agent. Prior to treatment, the Sudbury and Wayland Conservation Commissions were notified, a newspaper ad was also placed. Signs noting the treatment and any affiliated water-use restrictions were posted at all access points. The MA-DEP signs were also re-hung.

Based on this treatment, a third treatment was not necessary as excellent control was achieved during the first treatment (great results illustrated in Figure 10), and all remaining water chestnut was covered during this follow-up application.

Surface Temp (°C)	Surface Dissolved Oxygen (mg/l)
28.6	6.82

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Post-Treatment Survey – September 8, 2022

On September 8th, Senior Environmental Scientist, James Lacasse, completed a site visit to Great Meadows (Sudbury River). The visit consisted of performing a survey, collecting basic water quality data in addition to collecting water samples. Conditions during the visit were sunny with a slight breeze.

Figure 11: Water chestnut plant found within Great Meadows

Upon arrival, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. The survey consisted of covering the portion of the Sudbury river located between Sherman's Boat Launch and Route 27. Overall, this portion of the River looked great as the treatment worked very well. Minimal water chestnut was documented as it was noted in trace densities (see Figure 11). When observed, the water chestnut was typically found as just one individual plant (shown in Figure 11). Other invasive species documented included Eurasian milfoil, curly-leaf pondweed, and fanwort. Eurasian milfoil was the most prevalent invasive species documented. Native species observed were duckweed, watermeal, ribbonleaf pondweed, waterlilies, watershield, coontail, snailseed, thin-leaf pondweed, and caliitriche *(Callitriche)*. The water level had significantly increased since the previous site visit (the northeast region of the US had recently experienced a heavy rain event days prior to the survey).

The water temperature was consistent with other similar waterbodies we manage in the area, and the dissolved oxygen was sufficient to support fish and wildlife. Water clarity was also assessed using a Secchi disk. The Secchi reading was 3'7". Water samples were collected and transported to the lab for further analysis.

Depth (Ft)	Temperature (℃)	Surface Dissolved Oxygen (mg/l)
Surface	22.3	5.5
1	22.2	4.9
2	22.2	4.5
3	22.0	4.4
4	21.8	3.7
5	21.7	3.4

Water Quality

During the June 14th and September 8th survey events, water samples were collected to analyze the water quality at Great Meadows. Samples were collected from a specifically designated area (within a treatment area) preserved, and immediately taken to a State certified laboratory where they were analyzed for the specific contracted parameters. All samples collected were "surface grabs." Dissolved oxygen and temperature were measured using a calibrated meter. pH measurements were also collected using a calibrated meter. Secchi disk readings were also collected.

Water quality in ponds and lakes is constantly changing and is altered by many environmental factors. The samples collected during the two site visits provide a baseline and the results depict a "snap-shot" of the

results specific to the sampling date. The results from the two sampling events, as well as a description of each parameter and analysis are included in the tables below.

Water Quality Parameter	Results	
	6/14/22	9/8/22
Turbidity (NTU)	4.0	6.7
Total Alkalinity (mg $CaCO_3$/L)	34.3	29.4
Ammonia Nitrogen (mg/l)	0.106	0.204
Nitrate Nitrogen (mg/l)	0.109	0.335
Total Kjeldahl Nitrogen (mg/l)	0.820	0.650
Total Phosphorus (mg/l)	0.042	0.069
Soluble Phosphorus (mg/l)	0.031	0.027
pH (SU)	7.2	6.8

Water Quality Parameter Table
Turbidity: Turbidity is either planktonic organisms or suspended solid particulates (algae, clay, silt, dead organic matter) in the water column that interfere with the penetration of light. The more suspended material throughout the water column, the higher the turbidity. *<10 NTU drinking water standards; 10-50 NTU is considered moderate; >50 NTU potentially impactful to aquatic life. The turbidity results during the 2022 sampling are considered moderate, but below a value which would potentially impact aquatic life. Turbidity during both sampling events was <10 NTU.*
Total Alkalinity: Measure of the buffering capacity of water, primarily consisting of carbonate, bicarbonate, and hydroxide in typical freshwater. Waters with lower levels are more susceptible to pH shifts *>20 mg/l is considered healthy; ~50 mg/l illustrates the water is resistant to change. Alkalinity results from both sampling events are considered healthy.*
Ammonia Nitrogen: Ammonia and organic nitrogen can enter water through sewage effluent and runoff from land where manure has been applied or stored. Ammonia in water is non-toxic to humans, but it is toxic to aquatic life. Unlike other forms of nitrogen, which can indirectly harm aquatic ecosystems by increasing nutrient levels and promoting algae growth in the process known as eutrophication, ammonia has direct toxic effects on aquatic ecosystems. High levels of ammonia in lakes and streams can promote the growth of algae, which in turn can choke out the growth of other aquatic plants. Bacteria can also convert ammonia in water to nitrate in a process known as nitrification. Nitrification is a beneficial process if it takes place in the soil — plants can use the produced nitrates as food. However, nitrification tends to lower the dissolved oxygen levels in water, making it harder for fish and other aquatic life to breathe. *>0.0 mg/l could be potentially dangerous; >1 mg/l could cause a fish kill. Ammonia nitrogen was above a detectable limit during both sampling events but was well below 1 mg/l. This should continue to be monitored in subsequent seasons.*
Nitrogen, Nitrate: Nitrate nitrogen is important to the growth of algae. Nitrate is the oxidized nitrogen and is often readily free for algae uptake.

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<1 mg/l typical for freshwater; 1-10 mg/l is potentially harmful; >10 mg/l possibly toxic. Nitrate was well below 1 mg/l during both sampling events.
Total Kjeldahl Nitrogen (TKN): Total Kjeldahl Nitrogen (TKN) is the organic and ammonia forms of nitrogen. Nitrogen is essential for living organisms to live in a pond. *TKN is elevated as generally concentrations below 1.0 mg/l are considered desirable. TKN was below 1 mg/l during both sampling events.*
Total Phosphorus: Total phosphorous is a nutrient that is essential for plants and algae to grow. Typically, a value of .03 mg/l, or 30 parts per billion, is sufficient enough to stimulate excessive plant and algae growth. This sample measures all forms of phosphorus in the water column. *<12 ppb is considered nutrient deficient or oligotrophic; 12-24 ppb is considered a moderate amount of nutrients, or mesotrophic; 25-96 ppb is nutrient rich, or eutrophic; >96 ppb is considered excessive nutrients, or hypereutrophic. Total phosphorus from both samplings was considered nutrient rich or eutrophic.*
Soluble Phosphorus: Soluble phosphorous is the measure of filterable soluble and inorganic phosphorus. This form of phosphorus is directly taken up by plant cells. *The soluble phosphorus during both 2022 sampling events is considered elevated.*
pH: the measure of how acidic or basic the water is *<6 notably acidic; 6-9 standard for freshwaters (7 is neutral); >9 notably basic. pH during both 2022 sampling events is within a standard range for freshwaters and is generally neutral.*
Temperature: the amount of dissolved oxygen a pond can hold is largely determined by water temperature. When the water temperature is cooler, it can hold more oxygen. Generally, water cannot hold oxygen at a level that supports fish and aquatic life when above 85 degrees Fahrenheit.
Dissolved Oxygen: amount of diatomic oxygen dissolved in the water. Dissolved oxygen can be affected by many outside factors, such as: temperature, time of day, and pollution. Fish and other aquatic organisms typically require a minimum of four to five milligrams per liter (mg/l) of oxygen. *< 2 mg/l likely toxic with sufficient exposure duration; <5 mg/l stressful to many aquatic organisms; >5 mg/l able to support most fish and invertebrates. The dissolved oxygen was sufficient to support fish and invertebrates during all sampling events throughout the season. The September dissolved oxygen readings are lower than we'd like to see. Continued monitoring of dissolved oxygen throughout the season is extremely important. Water temperatures were elevated throughout the Summer due to high air temperatures, low water levels, and limited flow/mixing. As noted above, the amount of dissolved oxygen which can be held is largely determined by temperature. These temperatures may have impacted the dissolved oxygen later in the season.*

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Algae Sampling

An additional sample was collected during the final survey (September 8th) and shipped on ice via FedEx Overnight to SePro Labs in North Carolina where it was analyzed for algae ID and enumeration. This algae sample was not required per the OOC special conditions or scope of work, as this was completed by Water and Wetland to further analyze water quality data.

The lab results below contain the full algae sampling results from the September 8th sampling event.

Algae ID Results
Great Meadows

Identification	Classification	Description	Density/Biomass (cells/mL)
***Aulacoseria* sp.**	Bacillariophyta-Diatoms	Filamentous, planktonic	< 40
***Dolichospermum* sp.**	Cyanophyta- Blue-green algae	Filamentous, scum-former, planktonic, taste/odor producer, toxin producer	< 40
***Synedra* sp.**	Bacillariophyta-Diatoms	Single-celled, planktonic	< 40
***Ceratium* sp.**	Dinophyta-Dinoflagellates	Single-celled, flagellated, planktonic	< 40

The algae sample resulted in great results as there was nothing concerning regarding the results. Blue-green algae / cyanobacteria occur in aquatic ecosystems and have the ability to produce toxins. These toxins can pose a risk to human and animal health. The Massachusetts Department of Public Health (MA DPH) recommends an advisory when cell counts exceed 70,000 per ml of water. Dense blooms and scums can contain millions of cells/ml and toxin levels in the parts per million. They can form near embankments and in areas suitable for swimming and other forms of recreation. They can also move around in the water

body and grow quickly, making management of them difficult. The sample resulted in well below both the 70,000 cell/ml threshold set by MA DPH, and the 20,000 cells/ml which would be a concerning threshold. The only potential toxin producing species documented in the algae sample resulted in less than 40 cells per ml.

Summary / Management Recommendations

2022 Marked the first season in which Water & Wetland managed invasive water chestnut within the target stretch of the Sudbury River. The 2022 effort was extremely successful as all work was completed at the most appropriate times under optimal weather conditions. The outcome of this success was that a third treatment was not necessary this year. All special conditions were fulfilled including proper notifications, deliverables, newspaper ads, and water quality collection.

Figure 12: A small number of water chestnut plants within the Great Meadows portion of the Sudbury River

Several things were learned this year through survey data collection. The most noticeable takeaway is that this stretch of River contains several invasive species, with a population dominated by Eurasian milfoil. This is best seen in our pre-treatment survey maps. Invasive species other than water chestnut were not a target for treatment, nor were they impacted by the 2022 management program. The post-treatment survey map of the water chestnut notes several points where water chestnut was present. It is important to note that these GPS points typically contained 1-2 plants, so overall 99%+ of the water chestnut was controlled through the 2022 effort. Other invasive species' cover and densities were similar to that in the pre-treatment maps. Please refer to the post-treatment survey dialogue.

Based on the notes above, the water chestnut management effort should continue for several years and at some point, will be best suited for hand-pulling. This transition should be based on survey data when applicable. As planned, treatment with Clearcast (Imazamox) will be the most appropriate approach for the 2023 season due to density/cover and access. Use of the airboat allows us to get into the shallow depths of the river. Water chestnut seeds are viable for 12+ years, therefore we anticipate significant regrowth of chestnut despite the excellent control achieved during the 2022 season. The overall goal of the multi-year water chestnut management program is to control and/or remove the water chestnut plants prior to setting seed (typically mid-August). By doing this, the existing seed bed will be depleted over-time and will allow for removal by hand-pulling.

Aside from water chestnut it is important to consider management of the other invasive species within this stretch of River. Any work pertaining to management of other invasive species is outside of the scope of the Order of Conditions and would require further permitting. While fanwort, and curly-leaf pondweed were present, the stretch of River was dominated by invasive Eurasian milfoil. Eurasian milfoil is an exotic invasive species that spreads rapidly and forms dense mats which inhibit recreation such as swimming, boating, and fishing. Perhaps more importantly, Eurasian milfoil has extensive negative ecological impacts. This species spreads rapidly through fragmentation, which then outcompetes beneficial native vegetation. This typically forms monocultures of dense milfoil in areas where milfoil is found. Native plants are necessary for a healthy eco-system by acting as a food source and habitat.

When conducting an alternatives analysis for the management of the invasive species at Great Meadows, specifically Eurasian milfoil, several options were considered. Manual removal through either hand-pulling or diver assisted suction harvesting (DASH) would be preferred but were ruled out due to cover and density. DASH is the process of lake weed removal in which a diver visually identifies the plant being targeted, removes it by the root system, and deposits it into a containment bag at the surface via a suction hose, allowing for bulk removal. By Removing the invasive or nuisance species that is causing the problem, the capability of native plants to repopulate the areas that they have been pushed out of increases, giving the system a chance to return to a natural balance. The extraction of each plant by its root system is important as it provides carry over control into subsequent years. As areas extend beyond smaller areas (>.25 acres) or greater than sparse to moderate density, DASH becomes not only difficult and time consuming but also extremely cost prohibitive. Typically, densities that exceed 100 stems per acre become difficult to manage through DASH. Ultimately at Great Meadows, Eurasian milfoil was dense throughout dozens of acres and well beyond what could be reasonably controlled through DASH or hand-pulling.

Mechanical harvesting is appropriate for certain types of vegetation and was considered as an alternative at Great Meadows. This methodology is not recommended because it is not species selective, provides only temporary control of plant growth. Both milfoil and fanwort can spread through fragmentation which can increase the extent and density of those species. Mechanical harvesting cuts and collects plants, while many plants are removed, cutting leads to fragments escaping and thus promoting the spread of these invasive species. Additionally, harvesting is costly and at best would only provide a season of relief from the vegetation growth with little likelihood of any long-term success. The disruption and non-target impacts would be more significant than with other alternatives.

There are no proven biological controls available or approved by the State of Massachusetts for the control of fanwort and/or Eurasian watermilfoil. The option of using triploid grass carp for vegetation control is not permitted in Massachusetts.

Based on the above alternatives analysis, we would recommend targeting Eurasian milfoil with ProcellaCOR herbicide. This herbicide has been used in Wayland in the past. ProcellaCOR is a highly selective systemic herbicide used for the management of freshwater aquatic vegetation. ProcellaCOR' selectivity allows for impacts milfoil with minimal impact to native pondweeds. While ProcellaCOR provides multiple year systemic control of milfoil, it also acts much like a contact herbicide in that it makes spot-treatment possible, yet also has a very short half-life in water (roughly 9 hours). Usage of ProcellaCOR allows for less product in the water. Due to its selective formulation, ProcellaCOR can be applied at very low concentrations. This effort would come at a fairly significant cost and may be best suited following another one to two seasons of water chestnut control. We are happy to discuss this approach more at any time.

Water quality should continue to be monitored to establish trends. By understanding the water quality over-time, we will be able to make more educated decisions regarding the management of this stretch of the Sudbury River.

We hope that this year-end report has provided US Fish and Wildlife Service, as well as Wayland and Sudbury Conservation Commissions with valuable information regarding the conditions and management performed at Great Meadows during the 2022 season. We look forward to working with you for many

years to come. Should you have any questions about the 2022 management or the 2023 recommendations, please do not hesitate to reach out to us.

Sincerely,

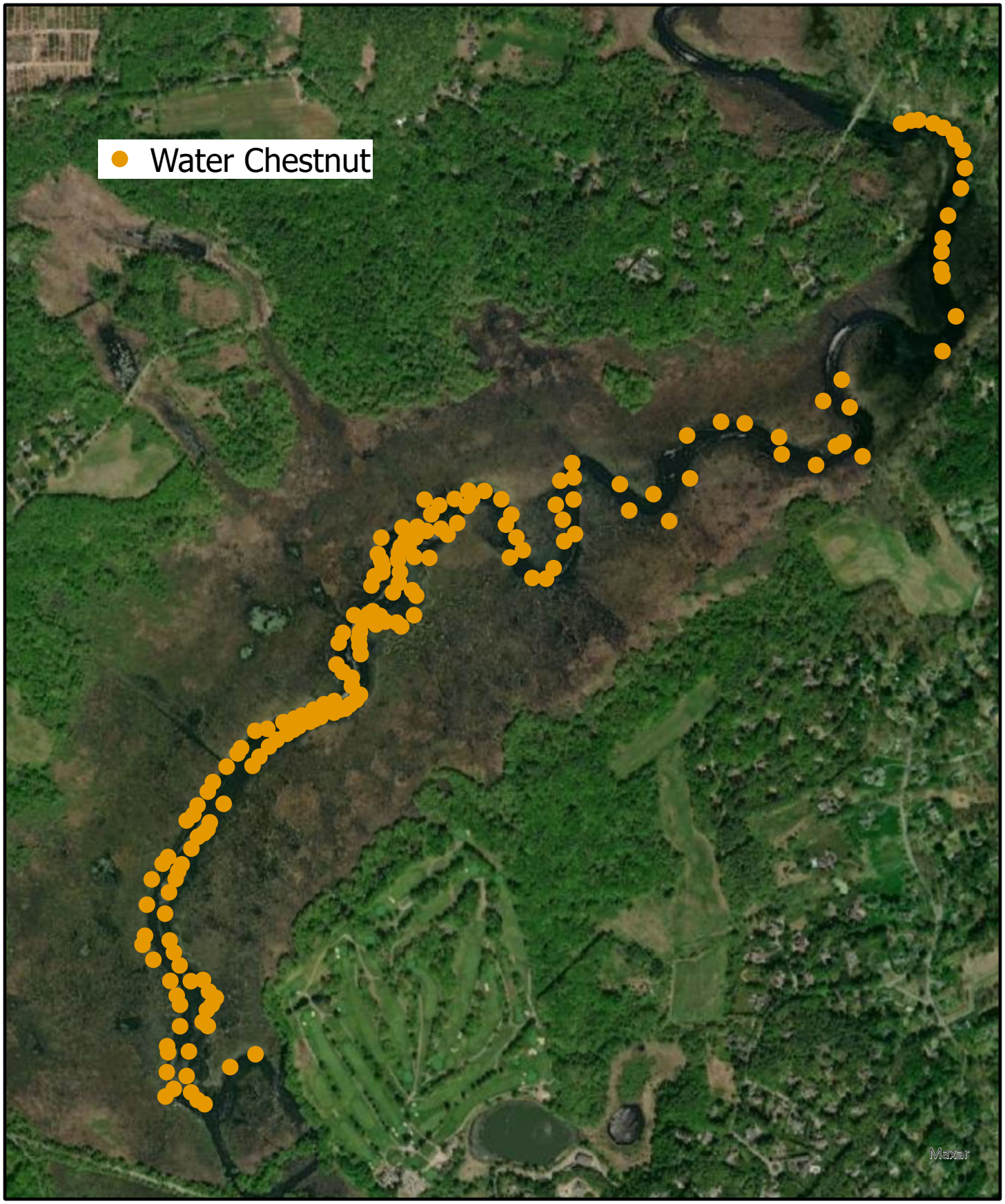
James Lacasse
Project Manager
Senior Environmental Scientist
c: 774-276-6098
o: 888-4WETLAN(D)
james@waterandwetland.com
www.waterandwetland.com

Attachments Include

- **Pre-Treatment Invasive Species Maps**
- **Post-Treatment Water Chestnut Map**

CC Sudbury Conservation Commission

Wayland Conservation Commission



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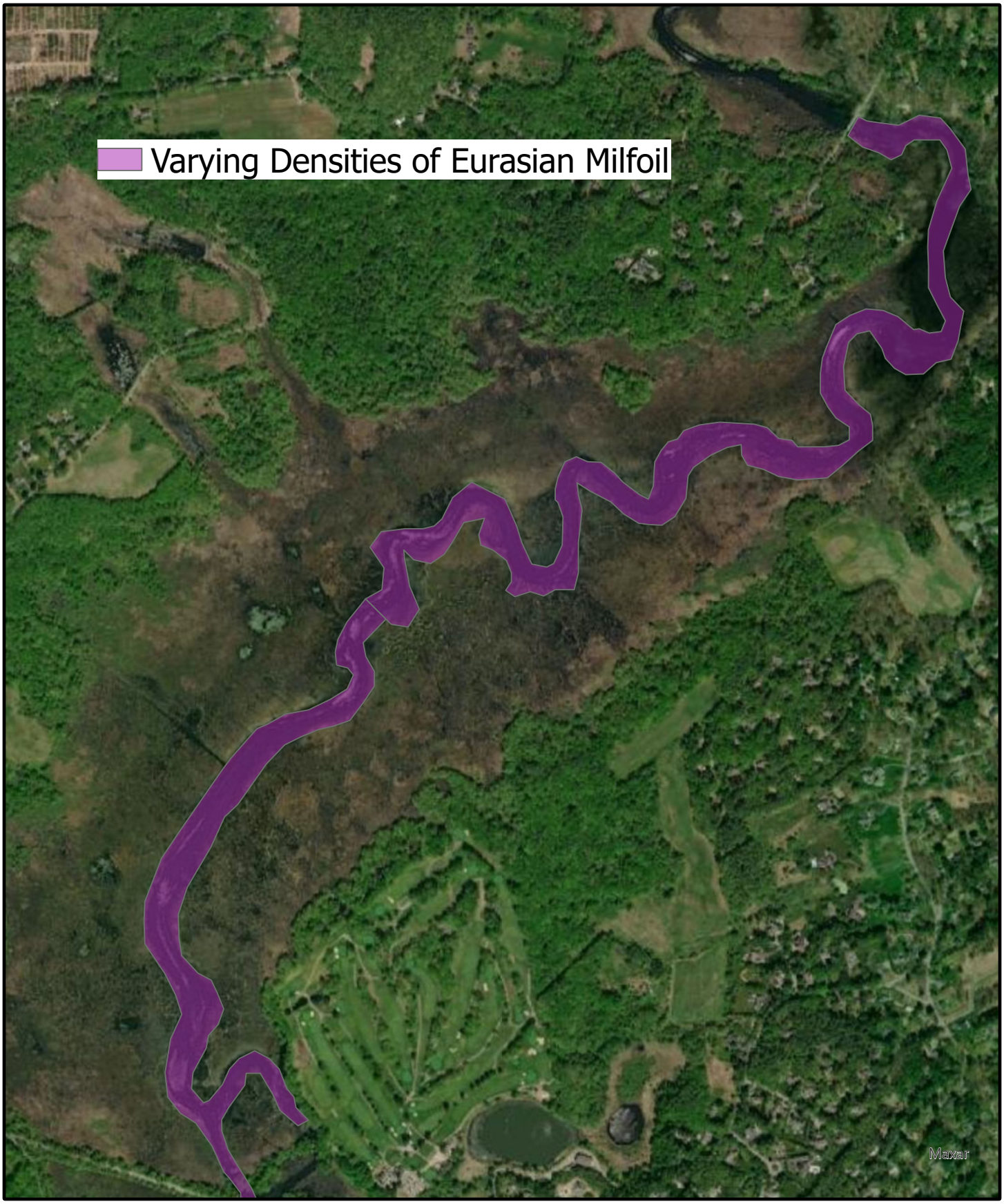
Great Meadows (Sudbury River)
Invasive Species Distribution
Wayland/Sudbury, MA

Survey Date
6/14/2022

Map Date
6/17/2022

N



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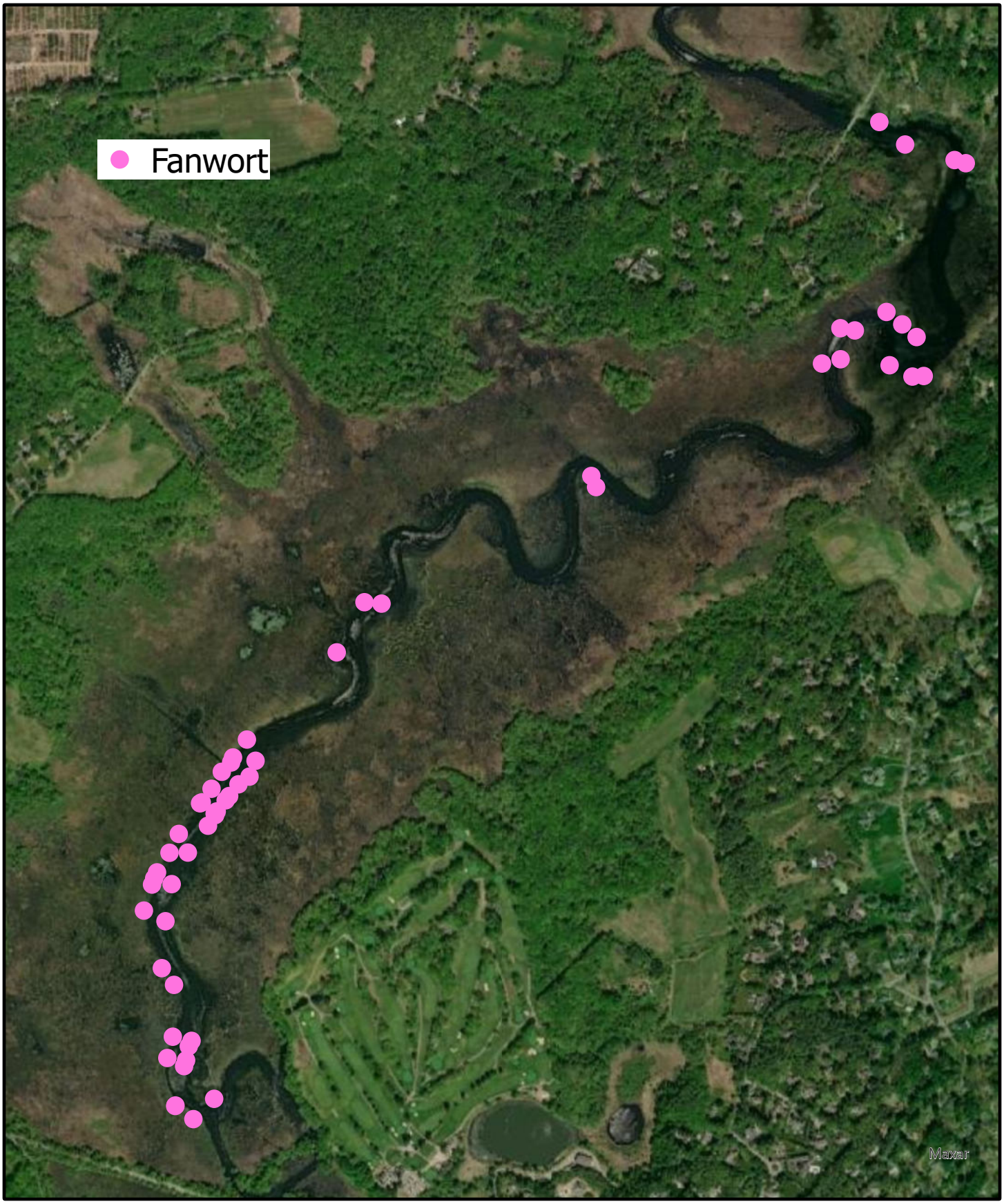
Great Meadows (Sudbury River)
Eurasian Milfoil Distribution
Wayland/Sudbury, MA

Survey Date
6/14/2022

Map Date
6/17/2022

N



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Great Meadows (Sudbury River)
Invasive Species Distribution
Wayland/Sudbury, MA

Survey Date
6/14/2022

Map Date
6/17/2022

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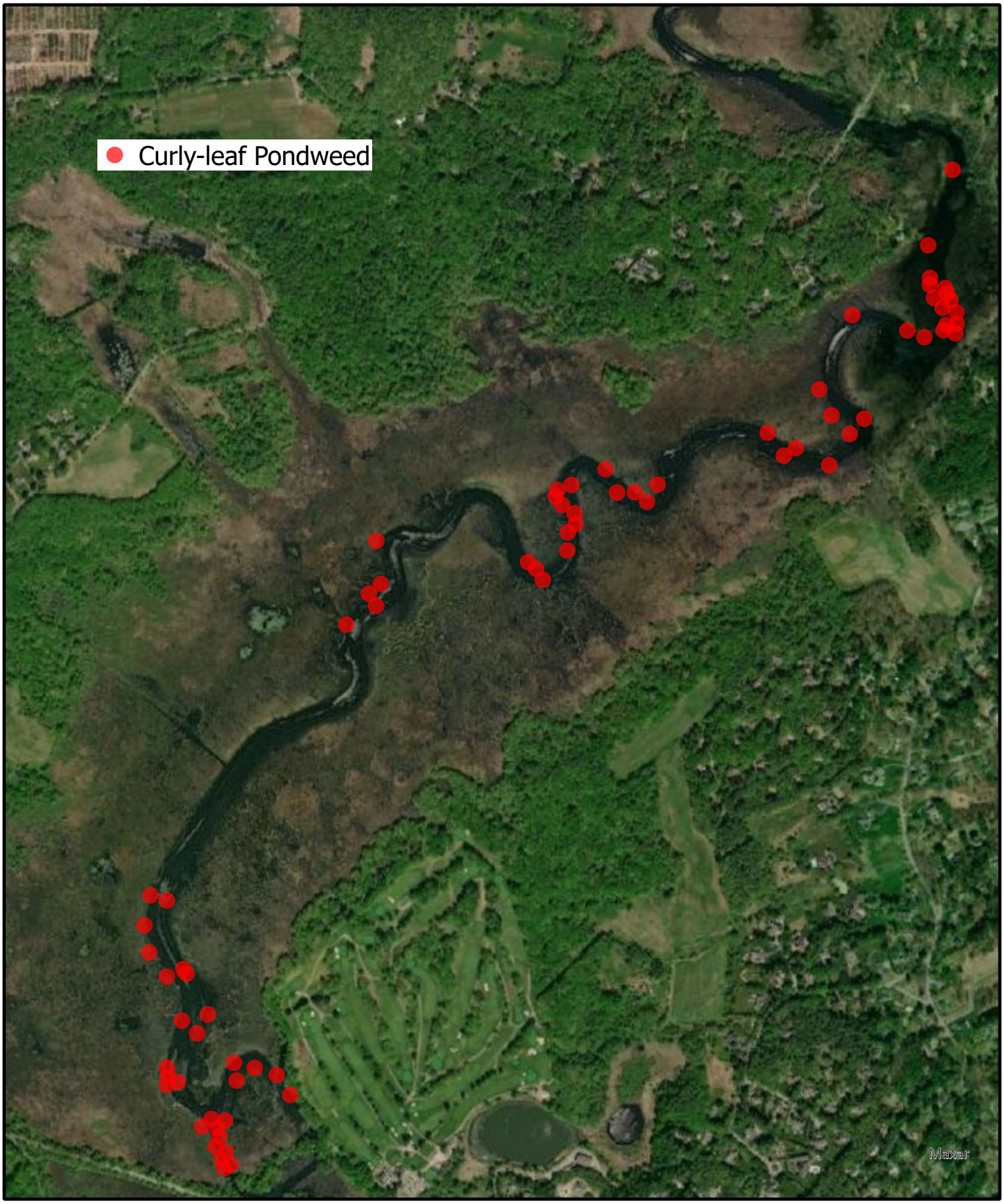

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Great Meadows (Sudbury River)
Invasive Species Distribution
Wayland/Sudbury, MA

Survey Date
6/14/2022

Map Date
6/17/2022

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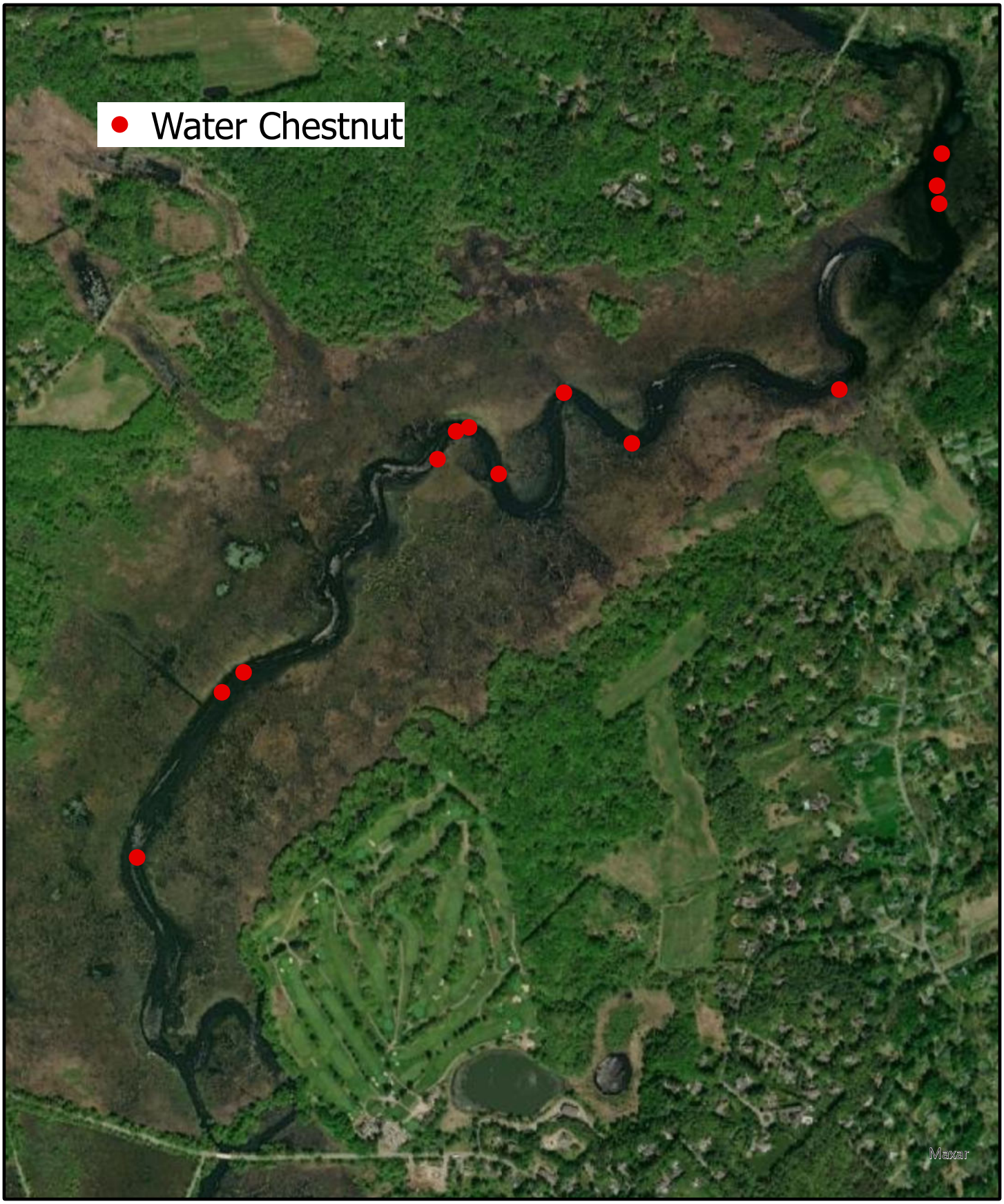

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Great Meadows - Sudbury River
Post-Treatment Survey
Sudbury, MA

Survey Date
9/8/2022

Map Date
9/9/2022

N