Annual Report
2019 Aquatic Management Program
Foster's Pond
Andover, MA

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Submitted on: December 27, 2019

Introduction

Invasive aquatic vegetation control, cyanobacteria management, and water quality monitoring were again the focus of this year's lake management efforts at Foster's Pond. This year's treatments included spot-treatments of fanwort (*Cabomba caroliana*), and one half-pond cyanobacteria treatment. This season marked four years since a whole-pond Sonar herbicide treatment program was conducted (2015) to control invasive fanwort (*Cabomba caroliana*), and some areas of regrowth were targeted for treatment with Sonar again this season. The purpose of the 2019 survey was to document the level of control from this year's treatments, track the biodiversity of aquatic vegetation, and assess water quality. Again this season, hydro-raking was conducted in some areas of private shoreline to remove nuisance aquatic vegetation and accumulated organic matter. The treatments, survey, and monitoring described in this report were performed by SŌLitude Lake Management under contract with the Foster's Pond Corporation. Hydro-raking, which was also performed by SŌLitude Lake Management, was coordinated by the Foster's Pond Corporation (FPC) but contracted by individual homeowners.

All work performed at Foster's Pond this season was conducted in accordance with the current Order of Conditions (OOC) issued by the Andover Conservation Commission (DEP #090-535) and the MA DEP – Office of Watershed Management issued License to Apply Chemicals (#19068).

A chronology of this year's management and brief description of events is as follows:

2019 Program Chronology

- Hydro-raking of shoreline areas commenced 04/22/19
- Hydro-raking completed 04/29/19
- Pre-treatment inspection 04/29/19
- MA DEP License to Apply Chemicals issued 05/06/19
- Initial Sonar treatment 05/20/19
- Sonar booster treatment 06/20/19
- Spiny naiad pre-treatment survey 07/11/19
- Sonar booster treatment 07/17/19
- Algaecide treatment 07/17/19
- Algaecide treatment and algae sample collection 08/08/19
- Late-season vegetation survey 08/19/19
- Collection of water quality samples 08/19/19

Hydro-raking

Private shoreline hydro-raking services were provided for various residents of Foster's Pond to remove nuisance aquatic vegetation as well as accumulated organic matter. Approximately thirty-four and a half (34.5) hours of hydro-raking services were provided between April 22 and April 29. All removed material was placed on the respective residents' shoreline. Pursuant to the OOC, property owners were responsible for proper upland disposal.

This was the third consecutive year when hydro-raking operations were scheduled for the spring. In years prior to 2017, hydro-raking was performed in the fall. However, planned fall hydro-raking was rendered impossible in 2016 due to drought conditions as many coves were too shallow for effective rake operation.

The 2019 spring operations proved highly effective, as higher water made shorelines more accessible. As a result, it appears that spring hydro-raking will continue as a feasible option for Foster's Pond in future years.

Algae Monitoring

Nuisance algae blooms and corresponding poor water clarity have exhibited themselves periodically through the years at Foster's Pond. The blooms are commonly dominated by cyanobacteria, or blue-green algae, due to elevated phosphorus concentrations within the various basins. The Foster's Pond Corporation diligently monitors water clarity, conducts periodic algae sampling, and requests formally reported laboratory analyses and algaecide treatments as necessary to avoid potential toxic blooms of cyanobacteria.

This season, FPC volunteers conducted multiple rounds of Secchi disk readings in different basins and, when water clarity dropped noticeably in July, brought water samples to the Andover Water Treatment Plant for informal analysis. In addition, the FPC relied on non-quantitative visual cues, such as shoreline scums, to guide their decision to conduct an algaecide treatment. SŌLitude collected one round of algae samples from the Main Basin and Outlet Cove, based on suspected cyanobacteria presence. Sample results are summarized in the table below:

Table 1. Algae sample results, 08/08/19

Location	Total natural unit count (/mL)	Cyanobacteria cell count (/mL)
Main Basin	1100	5600
Outlet Cove	1500	0

Algaecide Treatment

Two copper sulfate treatments were necessary and conducted in 2019. Prior to each application, the treatment date was determined in consultation with the Foster's Pond Corporation, based on examination of samples, and prior / contemporaneous Secchi disk readings. Prior notification of treatment was submitted to the Conservation Commission, email notifications were provided to shoreline property owners and local residents on the FPC's email list, notice was posted on the FPC's website of treatment areas and water-use restrictions, and posters warning of the water-use restrictions following treatment were posted at key access points along the shoreline of the pond.

The treatments were conducted on July 17 and August 8 by SŌLitude's licensed aquatic applicators in accordance with conditions of the DEP License to Apply Chemicals, the copper sulfate product label, and the OOC.

Approximately 60 acres of the total surface area of Foster's Pond were treated on each occasion. Both treatments were conducted in the Main Pond, Outlet Cove and the channel to Main Pond. In addition, the July 17 treatment included the Mill Reservoir. The copper sulfate dose was calculated based on the upper five feet of the water column and resulted in 300-acre feet of water to be treated. A dose of 0.25 ppm or 150 pounds of copper sulfate was applied. The copper sulfate was dissolved in 50-gallon mixing tanks onboard an 18-foot jonboat and applied subsurface using a calibrated pump system. A hand-held GPS unit was used on the boat to ensure the designated treatment area received an even application of the diluted copper sulfate solution. Treatments took approximately an hour and a half. Water clarity improved almost immediately after the July 17 treatment, and continued to improve for the remainder of July notwithstanding hot weather. Thereafter, during the first week of August, water clarity began to decline again, and blue-green scum was observed in the Main Pond, triggering the August 8 treatment. Following that treatment, water clarity was slower to rebound but improved over the ensuing weeks.

Fanwort Herbicide Treatment

Based on the late season 2018 survey results, seven and a half (7.5) acres of fanwort growth were targeted for treatment with Sonar (fluridone) herbicide in 2019. Granular Sonar One pellets were the only formulation utilized during the treatment program to better apply the herbicide directly to the fanwort plants.

On April 29, a SŌLitude biologist conducted the cursory, pre-treatment survey to assess the fanwort growth stage for timing of the initial Sonar application. At this time, fanwort plants were not yet growing within the water column, but other native species had begun to grow. Based on last year's Sonar One treatment program at Foster's Pond, it is imperative to apply the Sonar pellets early to allow the plants to "grow into" the fluridone concentration within the water. This treatment approach allows for lower concentrations of Sonar to be used as there is less plant biomass to impact. Following the pre-treatment survey, the initial treatment was scheduled for May 20. This date was slightly later than the initial treatment in 2018 due to the cold and rainy spring experienced in 2019.

All treatment dates for the Sonar treatment applications were coordinated with the FPC. Notification of treatment was submitted to the Conservation Commission, email notifications of the treatment areas and water-use restrictions were provided to shoreline property owners and local residents on the FPC's email list, notice was posted on the FPC's website, and warning posters were posted along the shoreline at key access points of the pond prior to treatment by

FPC members. The initial treatment was completed on May 20, with follow-up booster treatments completed on June 20, and July 17; all treatments were applied to the same pre-determined seven and a half acres by SŌLitude's licensed aquatic applicators in accordance with conditions of the DEP License to Apply Chemicals, the Sonar One herbicide label, and the OOC. The Sonar pellets were applied via backpack blower. The pre-determined treatment areas were preloaded into a GPS unit which was used for navigation during the treatment to ensure even application of the herbicide within those areas.

A map of the Sonar treatment areas is attached.

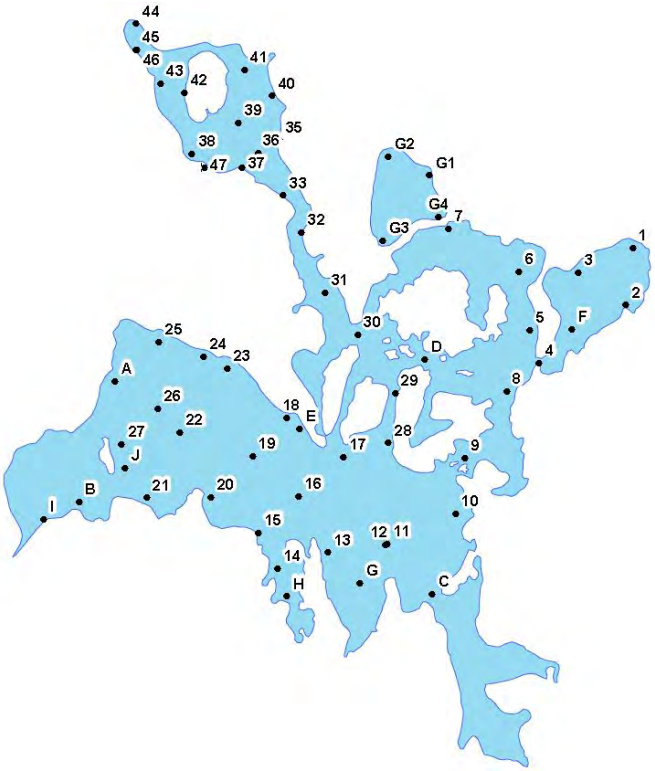
Spiny Naiad Survey

Spiny naiad growth has been observed in various areas of Foster's Pond over the last few seasons. In anticipation of this again in 2019, the FPC sought approval from the Conservation Commission for a treatment, with the precise locations determined on the basis of pre-treatment observations. A locative pre-treatment survey was conducted on July 11 to assess the spiny naiad growth and further determine areas requiring treatment. A very minimal amount of spiny naiad was observed within extremely shallow areas of Foster's Pond during the survey; as a result, no treatment of spiny naiad was conducted in 2019.

Annual Late-Season Vegetation Survey

On August 19th, a SŌLitude biologist conducted the annual aquatic vegetation survey of Foster's Pond, including the Main Pond, Outlet Cove, Azalea Drive, Mill Reservoir, the channels connecting these basins, and Dug Pond. This annual survey documents the aquatic plant composition and distribution utilizing consistent survey methodology, transects and data points established at the time of the first survey in 2004. Supplementary survey points have been added into the survey based on client recommendation and request: ten data points including G1-G4 in Dug Pond in 2008 A-E in 2016, and F-J in 2018. A total of 61 data points were surveyed. A map illustrating the transect and data point locations follows; the raw data collected is attached.

Figure 1. Aquatic plant survey data point locations



Overall, the basins supported similar levels of vegetation to those observed over the last few years, with regard to Total Percent Cover, Biomass, and Species Richness (Table 2). White waterlilies, creeping bladderwort (*Utricularia gibba*) and filamentous algae were the dominant species within the lake. Other plant species in the lake are fairly sporadic across the basins – most notably purple bladderwort (*Utricularia purpurea*), floating bladderwort (*Utricularia radiata*), common bladderwort (*Utricularia vulgaris*), muskgrass (*Chara sp.*), and yellow waterlily (*Nuphar variegata*).

Table 2. Aquatic vegetation analysis summary

Year	Estimated % Total Plant Cover	Estimated % Fanwort Cover	Biomass Index	Species Richness Index
2004	78.9	54.5	2.9	3.6
2005[1]	25.5	0.1	1.4	1.7
2008	15.9	0.9	1.6	1.7
2009	34.2	6.1	1.6	5.5
2011[1]	19.0	0	1.2	1.4
2012	21.2	0.1	1.3	1.6
2014	53.6	10.9	2.4	2.7
2015[1]	41.7	0	1.6	0.8
2016	70.3	0.2	2.4	1.3
2017[2]	67.6	17.7	2.2	1.8
2018[2]	59.3	11.7	2.0	1.4
2019[2]	41.5	1.5	1.8	3.0

[1]Whole-lake Sonar (fluridone) treatment performed
[2]Excludes additional points A-J, compares to 2016 data points

Percent fanwort cover decreased significantly from 11.7% in 2018 to 1.5% in 2019 comparing only the 2016 point locations. The additional points A-J should not be used for past comparison, but rather documentation for future efforts. Consequently, the frequency of fanwort documentation across all points increased regardless of the point additions – from 5% to 13% frequency. Of the 2019 F-J points, none supported fanwort growth. Additional growth of fanwort was noted between point locations, and as such the point survey should not be used to determine the specific locations of fanwort, rather for just the whole-lake percentage. Brittle naiad was documented at the historical survey points 4, 5, and 31 only, while no newer survey points supported brittle naiad growth.

Notably, the fanwort infestation in Dug Pond (G1-G4) has expanded as it was observed at three of the four survey points within that basin. This is an increase from the one point observation in 2018.

The shallow and cove areas support the majority of white waterlilies. Other species encountered, including but not limited to pondweeds (*Potamogeton* spp.), coontail (*Ceratophyllum demersum*), grassy bulrush (*Schoenoplectus subterminalis*), and other bladderwort species had generally low-density scattered growth. Two locations of native low watermilfoil (*Myriophyllum humile*) were noted in Dug Pond, points G1 and G2.

A list of the aquatic plant species observed in 2018 with historical comparison of presence and absence is as follows:

Table 3. Aquatic species list (2005-2018)

Type	Macrophyte Species	Common Name	2005	2008	2009	2011	2012	2014	2015	2016	2017	2018	2019
Submersed	*Bidens beckii*	Water marigold			X								
	Cabomba caroliniana	Fanwort	X	X	X		X	X		X	X	X	X
	Callitriche sp.	Water starwort			X					X		X	
	Ceratophyllum demersum	Coontail	X	X	X	X	X	X	X	X	X	X	X
	Chara sp.	Muskgrass			X	X						X	X
	Chlorophyta	Filamentous algae	X	X	X	X	X	X	X	X	X	X	X
	Egeria densa	Brazilian elodea	X	X	X								
	Elodea canadensis	Common waterweed			X							X	
	Hypericum boreale	Northern St. John's wort			X								
	Isoetes sp.	Quillwort	X	X	X	X	X						
	Ludwigia palustris	Water purslane			X	X	X						
	Musci/Fontinalis	Water moss	X	X	X		X	X	X		X	X	
	Myriophyllum humile	Low watermilfoil	X	X	X	X		X			X	X	X
	Najas flexilis	Slender naiad	X	X	X		X	X					
	Najas guadalupensis	Southern naiad										X	
	Najas minor	Spiny naiad			X			X		X	X	X	X
	Nitella sp.	Stonewort	X	X	X	X	X	X	X	X	X		
	Potamogeton amplifolius	Largeleaf pondweed										X	X
	Potamogeton epihydrus	Ribbonleaf pondweed		X	X	X	X	X	X	X	X	X	X
	Potamogeton gramineus	Variable-leaf pondweed			X		X				X	X	
	Potamogeton natans	Floating leaf pondweed		X	X			X			X		X
	Potamogeton pusillus	Thin-leaf Pondweed						X		X		X	X
	Potamogeton robbinsii	Robbins' Pondweed								X	X		X
	Sagittaria sp.	Arrowhead		X	X		X						
	Schoenoplectus subterminalis	Grassy bulrush										X	X
	Utricularia spp.	Bladderwort	X	X	X	X	X	X	X	X	X	X	X
	Vallisneria americana	Wild celery			X						X		
Floating Leaf	*Brasenia schreberi*	Watershield		X	X		X	X	X		X		X
	Lemna minor	Lesser duckweed			X								
	Nuphar variegata	Yellow waterlily	X	X	X	X	X	X	X	X	X	X	X
	Nymphaea odorata	White waterlily	X	X	X	X	X	X	X	X	X	X	X
	Nymphoides cordata	Floating heart										X	
	Spirodela polyrhiza	Big duckweed			X								
Emergent	*Decodon verticillatus*	Water willow	X	X	X	X	X		X*	X*	X*	X*	X*
	Eleocharis sp.	Spikerush			X								
	Eriocaulon sp	Pipewort	X	X									
	Lythrum salicaria	Purple loosestrife	X	X	X	X	X	X	X*	X*	X*	X*	X*
	Peltandra virginica	Arrow arum			X							X*	X*
	Pontederia cordata	Pickerelweed	X	X	X	X	X				X*	X*	X*
	Scirpus sp.	Rushes	X	X								X*	X*
	Sparganium sp.	Burreed		X	X	X	X	X	X*	X*	X*	X*	X*
	Typha sp.	Cattail	X	X	X	X	X		X*	X*	X*	X*	X*

* Observed in the pond, but not at data point locations. Red font indicates species considered invasive.

Water Quality Monitoring

Water quality sampling was performed at Foster's Pond in 2019 consistent with prior year's efforts and locations, in addition to Azalea Drive that was added in 2017. Surface grab water samples were collected from five locations, shown on below map, on August 19th. Laboratory analysis was performed for the following parameters: pH, alkalinity, total phosphorus, turbidity, true and apparent color, fecal and total coliform.

Figure 2. Water quality sample locations

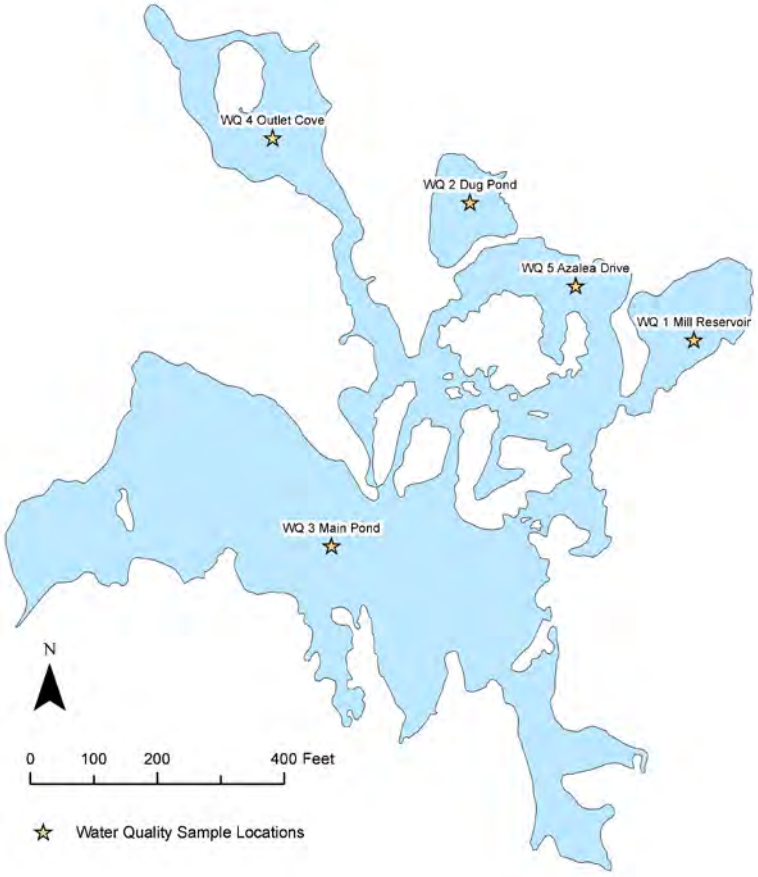


Table 4. Water quality results

Parameter	Units	Desirable Thresholds	Mill Reservoir (WQ1)	Dug Pond (WQ2)	Main Pond (WQ3)	Outlet Cove (WQ4)	Azalea Drive (WQ5)
pH	S.U.	5.5 – 8.5	7.2	7.0	7.2	7.1	7.1
Alkalinity, total	mg/L CaC03	>20	29.7	14.6	24.5	28	21.2
Phosphorus, total	mg/L	<0.03	0.033	ND	0.037	0.023	0.020
Turbidity	NTU	<5	1.5	0.49	2.5	0.82	0.64
True Color	Pt-Co	<100	45	5.0	34	32	28
Apparent Color	Pt-Co	<100	46	7.0	40	40	33
Fecal Coliform	col/100mL	<200	150	ND	16	2.0	2.0
Total Coliform	MPN/100mL	-	9,918	920.84	61,518	5,002	25,480

In general, the water quality results were similar to those reported in previous years. The pH values of all locations were close to neutral and within normal ranges for northeast freshwater systems. If the pH is between 5.0-9.0, adverse impacts to fish and other aquatic biota are generally not observed. Alkalinity values varied between locations, as some values were slightly lower than desirable, but are characteristic for waterbodies in the region. Total phosphorus levels in the Mill Reservoir and the Main Pond locations were elevated at the time of the sampling, whereas all other sample locations fell within the desirable threshold, although still relatively close to the desirable threshold limit. Total phosphorus was not detected in Dug Pond. Based on the measured phosphorus levels, three of the basins were capable of supporting some level of algal blooms at >0.02 mg/L. Turbidity values were all lower than 5 NTU. True color is a measure of filtered water, whereas apparent color is the measure of the raw water. Color results were similar to prior years, with dissolved material and suspended particles both likely contributing to the relative clarity of the basins.

Coliform bacteria can be understood as a series of concentric circles: the outermost ring of total coliform bacteria encompasses all forms; the next ring is fecal coliform which is a sub-group of total coliform and is composed of many strains of bacteria commonly found in the intestines and feces of people and animals; the innermost ring is that of *E.* coli which is a specific strain of fecal coliform linked to causing illness in humans. Measuring fecal coliform allows for an indicator to the presence of human or animal waste inputs. Acceptable values for "swimmable waters" for fecal coliform bacteria is less than 200 organisms per 100 mL. All basins fell below concerning thresholds.

Conclusions and Recommendations

In Foster's Pond, and other managed waterbodies throughout Massachusetts, in years following Sonar treatments, native aquatic vegetation rebounds quickly and a more diverse plant composition is observed. Most native and desirable aquatic plant species reproduce via seed each year, so continued recovery is possible as seeds remain in the pond sediment. Although waterlilies and other floating leaf species are initially impacted by Sonar treatments, they show a continual increase in abundance and distribution throughout the pond in years following Sonar treatments.

Based on the history of conditions and management at Foster's Pond, as well as the presence of invasive aquatic species, specifically fanwort, it is likely that problematic aquatic plant growth will continue in the future. Future, timely management will be required to maintain control of non-native species, fanwort and spiny naiad. It is highly recommended that the Foster's Pond Corporation continue annual monitoring efforts to assess fanwort distribution and watch for potential pioneer infestations of other invasive species.

Fanwort control: We continue to recommend a balanced approach to managing fanwort: experimenting with non-chemical controls where economically and logistically feasible and targeting with spot treatments specific infestations that are too large or too dense to be effectively controlled by other means. Eradicating small infestations, as they emerge and are identified, is the best way to minimize the need for whole-lake treatments. Based on the success of this season's Sonar herbicide spot-treatment and minimal fanwort growth observed during the annual survey, the acreage of potential target areas for herbicide treatment of fanwort in 2020 is significantly less than the 7.5 acres treated in 2019. One challenging infestation at the mouth of the Mill Reservoir has seen mixed results from both a Sonar spot-treatment in 2018 and suction-harvesting/hand-pulling in 2019. In this area, we recommend expanding the treatment area to encompass all of the fanwort growth and any potential expansion area and targeting it again with granular Sonar; additionally, we may also recommend adding an additional booster treatment to this area to ensure the Sonar concentration remains high enough or conducting

the booster applications closer to each other for the same reason. We are also recommending management of the other areas of fanwort growth via hand-pulling, benthic barriers or treatment as shown on the attached map. Based on the Foster's Pond Corporation's experience in 2018 and 2019 with small benthic barriers (see the alternatives analysis below), we are recommending continued experimentation with the use of these barriers along those residential shorelines which can most easily be accessed, but recognize that their effectiveness in Foster's Pond is anticipated to be quite limited. Finally, based on the Foster's Pond Corporation's experience with suction harvesting and hand-pulling in 2019 (see alternatives analysis below), we recommend that experimentation with hand-pulling be continued in 2020, focusing on infestations that are too small for herbicidal spot treatments.

Based on the expanded growth of fanwort observed this season in Dug Pond, we recommend targeting those areas for hand-pulling or suction harvesting understanding that the infestation is still relatively new and may be able to be successfully managed this way. However, if manual removal proves to be inefficient or ineffective in Dug Pond, we recommend conducting a whole-pond Sonar herbicide treatment in a future year.

Fanwort alternatives analysis: The Massachusetts Department of Conservation and Recreation (MA DCR) has provided guidance that considers alternative methods of controlling fanwort. MA DCR reviewed eradication and control options, including hand harvesting, suction harvesting, benthic barriers, water level drawdown, and herbicides. The Foster's Pond Corporation has varying degrees of experience with all of these methods, most recently experimenting with the use of hand harvesting, suction harvesting, and benthic barriers. The Corporation's experience to date is consistent with the MA DCR alternatives analysis.

The Corporation has long used winter drawdowns, primarily to protect the Foster's Pond Dam from overtopping in potential spring-time flood events but secondarily to control nuisance vegetation. Due to the physical limitations of the 160-year-old dam, the Pond can only be lowered about 18 inches below the lip of the spillway. As a consequence, only the shallowest coves are exposed to freezing temperatures over the winter. While nuisance vegetation appears to be controlled in these coves, the geographic reach of the drawdown, as a weed management technique, is limited.

In 2019, the Corporation experimented for the first time with both diver-assisted suction harvesting (DASH) and hand harvesting by divers. DASH proved to be impractical in the conditions presented by Foster's Pond. There are no launch points to accommodate the large craft typically used for the necessary equipment. Even a small, jury-rigged raft proved difficult to maneuver into position through the Pond's shallow channels. Moreover, as predicted by the MA DCR analysis, the Pond's thick and silty sediments instantly turned the water opaque, blinding the diver and making it impossible to see the target plants. The operation also resulted in a great deal of fragmentation, which could not be effectively controlled as the fragments interspersed with non-target vegetation. The DASH experiment was terminated, and divers were instead deployed to engage in hand-pulling.

Hand-pulling yielded mixed results. In the primary target area – the mouth of the Mill Reservoir – hand-pulling proved no more effective than DASH. Hand-pulling, like DASH, increased the turbidity of the water, making it impossible for the diver to distinguish between target and non-target plants. Moreover, in the target area, dense fanwort was interspersed with lilies, and the delicate fanwort stems entwined around the sturdier lily stems. As a result, it proved impossible for divers to remove the fanwort without extensive fragmentation, and the fanwort root balls could not be removed at all. The divers spent days working in a relatively small area; a few weeks after they finished, the target area had robust fanwort growth virtually indistinguishable in extent and density from its condition before the experiment began. This experience was

consistent with the MA DCR alternatives analysis, which indicated that areas of more than a few hundred square feet, with more than 10 fanwort stems per 100 square feet, are not susceptible to effective control through hand-pulling.

On the other hand, hand-pulling proved somewhat more effective in Dug Pond, where a target fanwort infestation was not intertwined with lilies and the bottom is not silty. The target infestation in Dug Pond was largely eliminated, with only a few fanwort plants visible several weeks after the divers had finished. While the eradication was not as thorough as in areas spot-treated with Sonar, the experiment proved more promising than hand-pulling at the mouth of the Mill Reservoir. The 2019 survey, as well as observations by the Foster's Pond Corporation, indicated another fanwort infestation in Dug Pond approximately equivalent to the infestation targeted for hand-pulling in 2019, as well as several other small, scattered colonies.

Based on the MA DCR analysis, the Foster's Pond Corporation has determined not to attempt the use of large benthic barriers. Large barriers require significant time and effort to install, relocate and remove over the course of a season and have additional, negative impacts to other aquatic species present within the immediate area. The use of large barriers is not permitted under the current OOC.

The Foster's Pond Corporation has experimented recently with smaller scale benthic barriers, which are authorized by the OOC. During the 2018 season, the FPC and SŌLitude coordinated the use of nine (9), small scale (5' x 5') benthic barriers within Foster's Pond on individual and/or small areas of fanwort growth that were observed later in the season outside of any treatment areas. The barriers proved difficult for the volunteers to install, as fanwort was detected in locations that were too deep and heavily silted for the volunteers to stand. The installation caused some fragmentation. The barriers were likewise difficult to remove, clean, and store in the fall. The results of this experiment could not conclusively be evaluated in 2019, as the barriers had been emplaced in areas that were treated in 2019 with Sonar (based on the 2018 vegetation survey) before fanwort emerged anywhere in the Pond. However, because it was evident when the barriers were positioned that they did not completely cover the infested areas, it was obvious that fanwort control would be unsatisfactory.

In 2019, an effort was made to continue experimenting with the small barriers. It was time-consuming and difficult to locate suitable locations at which to deploy the barriers. Based on the 2018 experience, the infestation needed to (1) be accessible from the shoreline, so that the barrier could be assembled on dry ground; (2) consist of just one or two plants that could be completely covered by the barrier; (3) be growing in water shallow enough for a volunteer to stand while carefully guiding the barrier into position; and (4) not be interspersed with lilies or other plants which would interfere with proper placement. Only two such locations were identified, and barriers were placed on plants in both locations. The two sites will be monitored in 2020 to see if fanwort emerges at these locations.

With respect to chemical alternatives, only two herbicides are currently approved for use in Massachusetts to manage fanwort infestations. Fluridone and Clipper (flumioxazin) are both registered by the Massachusetts Department of Agricultural Resources and authorized by the current OOC for Foster's Pond. Clipper has proven effective in spot-treating fanwort growth in Massachusetts lakes and ponds; however, the Department of Environmental Protection limits treatment to less than 25% of the total waterbody's acreage in one year, and a treated area may not be retreated for 3 years. Since Clipper is a contact herbicide, regrowth can be expected in the year after treatment. Experience in other jurisdictions indicates that at least several years of consecutive treatment followed by periodic re-treatment are usually required to manage an infestation with Clipper. Given the current restrictions on the use of Clipper in Massachusetts and the past success of treatments with fluridone in Foster's Pond, addressing the

re-growth using Clipper is not likely to provide a substantial benefit to Foster's Pond. We will continue to evaluate new technologies as they become available or re-visit options should regulatory restrictions change.

In the meantime, spot-treatment with granular Sonar remains the best alternative for controlling regrowth in 2020 and beyond. Based on this year's and past experience in Foster's Pond, it is anticipated that, if necessary, treating a limited number of acres in 2020 will minimize the need for a whole-lake treatment in the immediate future.

Spiny naiad control: Spiny naiad is a late germinating species which spreads via seed production. Plants typically emerge in mid to late July from seeds dropped by plants in the previous year or two. A mid-July survey is necessary to assess growth and determine the extent requiring a spot-treatment. Multiple years of successful treatment can effectively reduce the viable seed bank.

We again recommend that in 2020 the FPC conduct a survey focusing on the presence of spiny naiad and, to the extent treatable infestations are observed, proceed with a spot-treatment of those areas with diquat. Timely application would require securing Conservation Commission approval, and a DEP license, in advance for this contingency, as was done in 2017 and 2018. Based on the 2019 annual survey, it is preliminarily estimated that about one acre might require treatment in 2020, though actual observations in 2020 could vary considerably from this estimate as no treatment was necessary in 2019.

Spiny naiad alternatives analysis: According to NOAA's Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS), use of aquatic herbicides is the most effective method of controlling spiny naiad growth, especially as it relates to the infestation within Foster's Pond. Diquat and fluridone herbicides are two of the recommended aquatic herbicides that provide control of spiny naiad and are also included in the current OOC for Foster's Pond. Mechanical removal of spiny naiad is also possible (but not recommended), using a mechanical harvester or hydro-rake. However, spiny naiad is an incredibly brittle plant which spreads via fragmentation and thus mechanical removal may provide short-term relief but would likely increase the infestation within the pond overall. Benthic barriers are also a viable option, but as mentioned previously in regard to fanwort control, these are time consuming to manage while having non-target impacts. However, a smaller scale option may be more feasible within isolated areas of growth. The FPC and SŌLitude will assess the feasibility during 2019 of utilizing smaller barriers where appropriate for spiny naiad growth and do so accordingly, if possible.

Algae control: Continued algal composition and density monitoring through the summer months is recommended as it allows for appropriately timed algaecide treatment(s) when necessary.

Based on the Watershed-Based Plan developed by Geosyntec for the FPC, we understand that overall phosphorus remains an extensive challenge within the surrounding watershed. To better understand the phosphorus loading, we recommend conducting in-pond sediment sampling to be analyzed for available phosphorus. By gaining this information, and utilizing the Watershed-Based Plan, we can develop the most effective in-water nutrient management plan to correlate with the watershed plan.

Based on the in-lake sediment phosphorus analysis, SŌLitude can work with the FPC to align nutrient management techniques with their goals. Management of phosphorus within the pond, among other nutrients, will likely limit algal growth. Using various management techniques together can prevent excessive algae growth, potential health hazards and associated waterbody closures from state agencies.

Copper-based algaecides effectively manage an active algae bloom; however an algaecide treatment is merely controlling the symptom of excessive nutrients present within Foster's Pond. Low-dose aluminum treatments have proven to be effective in reduction of nutrients, specifically phosphorus, while limiting the need for conducting copper-algaecide treatments. Ultimately, by reducing the phosphorus readily available for uptake by algae, the frequency and severity of algal blooms is also reduced. Annual, low-dose alum treatments have been found to have cumulative effects on reducing iron-bound phosphorus released from sediments during anoxic times. Prior to any alum treatment implementation, a detailed plan would need to be established. Higher dose alum treatments are also available as an option for Foster's Pond; however, we recommend conducting more in-lake phosphorus sampling before proceeding with any alum treatments.

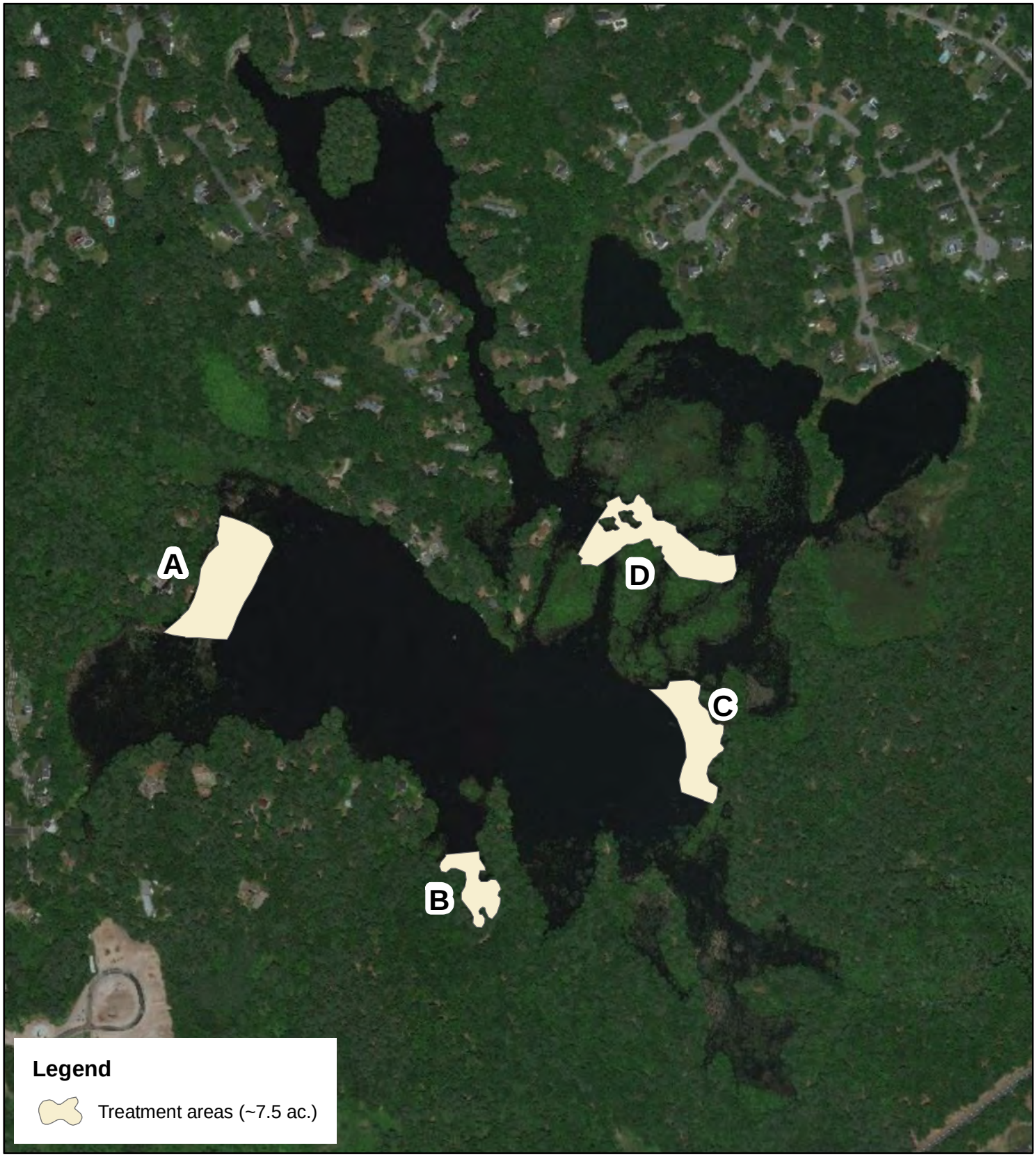
SeClear is another available product that combines algaecidal properties with a phosphorus reducing agent. SeClear will not reduce the available phosphorus levels as significantly as alum would, but it could be a viable alternative to conducting copper sulfate treatments. A SeClear treatment would carry a cost in between that of traditional copper sulfate treatments and a low-dose alum treatment, while potentially reducing phosphorus levels enough to minimize the potential for subsequent blooms later in the season.

Attachments

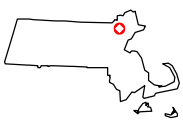
- 2019 Sonar Treatment Areas Map
- Fanwort and Spiny Naiad Distribution Map
- Potential 2020 Fanwort Management Areas Map
- Aquatic Plant Survey Field Data Table
- Water Quality Laboratory Reports

2019 Sonar Treatment Areas

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Foster's Pond
Andover, MA
Essex County
42.6060° N, 71.1382° W



Foster's Pond

0 575 1,150 Feet

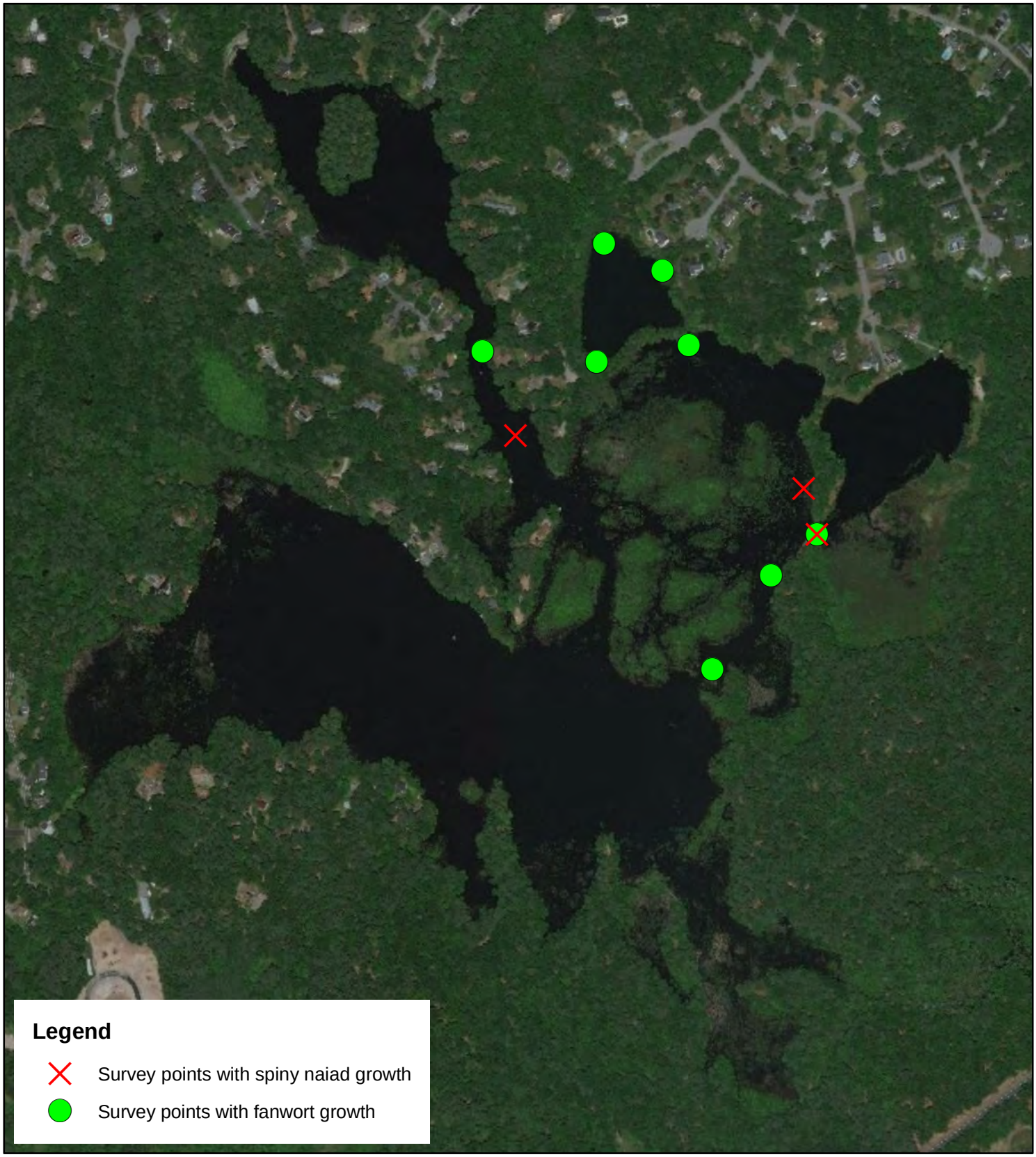
N

1:6,845

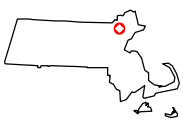
Map Date: 05/12/19
Prepared by: KS
Office: Shrewsbury, MA

Fanwort and Spiny Naiad Locations 2019

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Foster's Pond
Andover, MA
Essex County
42.6060° N, 71.1382° W



Foster's Pond

0 590 1,180 Feet

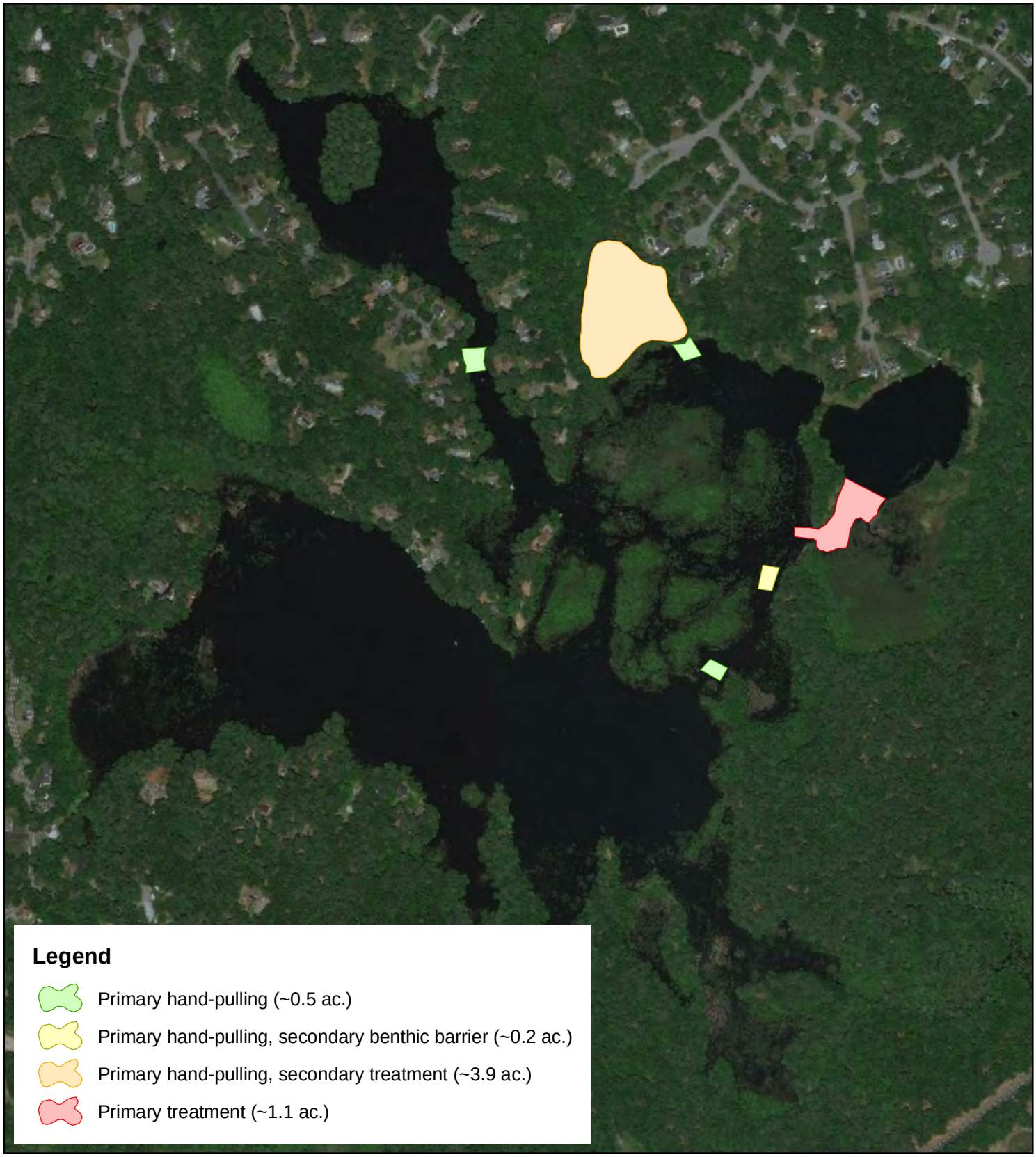
N

1:6,800

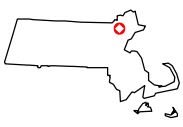
Map Date: 12/24/19
Prepared by: KS
Office: SHREWSBURY, MA

Potential 2020 Management Areas

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Foster's Pond
Andover, MA
Essex County
42.6060° N, 71.1382° W



Foster's Pond

0 600 1,200 Feet

1:6,840

N

Map Date: 12/24/19
Prepared by: KS
Office: SHREWSBURY, MA

Data Point	Water Depth (ft.)	Bs	Cc	Cd	Ch	Fa	Gb	Mu	Nm	Pa	Pe	Pn	Pp	Pr	Ug	Ui	Um	Up	Ur	Uv	WL	YL	% Total Plant Cover	%Fanwort Cover	Biomass index	Species Richness index
1	2			X											X						D		10	0	1	3
2	13.2																						0	0	0	0
3	12.5																						0	0	0	0
4	2.5		X	X	D				X	X			X								X	X	100	10	4	8
5	0.6	X			D				X						X			X	X		X	X	100	0	4	7
6	9.4																	X			D		35	0	3	2
7	2.1		X	X		X	X									X		D		X	X		90	15	3	8
8	3.6		X		D										X			X	X	X	X	X	100	5	3	8
9	1.1		X		D	X									X			X			X	X	100	5	4	7
10	4.3					X															D		15	0	1	2
11	8.4																						0	0	0	0
12	8.4																						0	0	0	0
13	6.7																						0	0	0	0
14	2.3					D															X	X	50	0	3	3
15	6					D																	20	0	1	1
16	10.3																						0	0	0	0
17	6.9					D																	20	0	1	1
18	6.7					D																	40	0	2	1
19	10.6																						0	0	0	0
20	8.3																						0	0	0	0
21	3.3																				D	X	10	0	4	2
22	9.2																						0	0	0	0
23	4.9					D																	80	0	2	1
24	2.9					D															X		45	0	1	2
25	2.2																				D		50	0	4	1
26	6.8																						0	0	0	0
27	4.7																						0	0	0	0
28	2.2																				D	X	50	0	4	2
29	1.9					X															D		10	0	1	2
30	3.2				D												X		X	X	X		100	0	3	5
31	1.4				D	X			X						X			X	X	X	X		95	0	3	8
32	3.2		X		X													X	X	X			50	1	2	5
33	3.6				X	X									X			D	X				40	0	2	5
34	4.4									X					X					D	X		40	0	2	4
35	4.1																				D		5	0	4	1
36	4.6				X					X					X				X	D	X		80	0	2	6
37	2				X	X					X				X			D	X		X		90	0	3	7
38	4.8														X			D	X	X	X		80	0	3	5
39	6.2																						0	0	0	0
40	5.6																				D		5	0	4	1
41	3.7									X					X				X	D	X		50	0	2	5
42	4.4						X			X									X	D			50	0	2	4
43	7.2																						0	0	0	0
44	6.3																			D			10	0	2	1
45	6.3																						0	0	0	0
46																										0
47	4.1					X				X			X		X			X	X	D	X		55	0	2	8
G1	5.5		X					X			X		X		X			D			X		100	20	4	7
G2	6.8		X					X			X	X	X		X			D					100	5	3	7
G3	7.7		X				X				X				X			D			X		100	10	4	6
G4	7.2				X						X		X		X			D		X	X		100	0	2	7
A	1.1				X																D		50	0	3	2
B	2.3										X			X							D	X	75	0	1	4
C	3.3										X				X						D	X	30	0	3	4
D	1.5	X			D	X									X				X	X	X	X	100	0	4	7
E	8					X																	0	0	0	1
F	10.4																						0	0	0	0
G	5.9																						0	0	0	0
H	2.3																				D	X	35	0	4	2
I	1.9			X	X						X										D	X	50	0	2	5
J	4.2																				X	D	10	0	4	2
61																						includes A-J	40.4	1.2	1.9	3.0
																						excludes A-J	41.5	1.4	1.9	3.0

#X	2	8	4	7	10	3	2	3	6	8	1	5	1	18	1	1	7	13	8	20	12
#D	0	0	0	7	6	0	0	0	0	0	0	0	0	0	0	0	8	0	6	14	1
total #	2	8	4	14	16	3	2	3	6	8	1	5	1	18	1	1	15	13	14	34	13
% FOC	3.3%	13.1%	6.6%	23.0%	26.2%	4.9%	3.3%	4.9%	9.8%	13.1%	1.6%	8.2%	1.6%	29.5%	1.6%	1.6%	24.6%	21.3%	23.0%	55.7%	21.3%

Bs	Watershield
Cc	Fanwort
Cd	Coontail
Ch	Muskgrass
Fa	Filamentous algae
Gb	Grassy bulrush
Mu	Low watermilfoil
Nm	Spiny naiad
Pa	Largeleaf pondweed
Pe	Ribbonleaf pondweed
Pn	Floatingleaf pondweed
Pp	Thinleaf pondweed
Pr	Robbins pondweed
Ug	Bladderwort
Ui	Bladderwort
Um	Bladderwort
Up	Bladderwort
Ur	Bladderwort
Uv	Bladderwort
WL	White waterlily
YL	Yellow waterlily

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC5183 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name SOLitude Lake Management	Contact Person: Kara Sliwoski
Address: 1320 Brookwood Drive, Ste. H Little Rock, AR 72202	E-mail Address: ksliwoski@solitudelake.com
	Phone: 508.885.0101

Waterbody Information

Waterbody:	Fosters Pond - MA
Waterbody size:	120
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM15588-1	1E	Sonar/fluridone (ug/L)	FAST 10	1.0	06/04/2019
CTM15589-1	2C	Sonar/fluridone (ug/L)	FAST 10	1.0	06/04/2019

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 06/05/19 11:00 AM
Date Results Sent: Thursday, June 6, 2019

Disclaimer: The results listed within this Laboratory Report relate only to the samples tested in the laboratory. The analyses contained in this report were performed in

accordance with the applicable certifications as noted. All soil samples are reported on a dry weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the exclusive use of SRTC Laboratory and its client. This report shall not be reproduced, except in full, without written permission from SRTC Laboratory. The Chain of Custody is included and is an essential component of this report.

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SOLitude Lake Management
590 Lake Street
Shrewsbury, MA 01545

EMAIL ADDRESS: BArvidson@solitudelake.com

Report Date:	**8/13/2019**	Date Sampled:	**8/08/2019**
Laboratory ID#:	**1978490 - 01**	Date Received:	**8/09/2019**
		Date Tested:	**8/12/2019**

Sample Site: SURFACE WATER FOSTERS POND, MAIN POND

MICROSCOPIC EXAMINATION == Natural Units Count & Blue/Green Cell Counts

ORGANISM	#/ml
Diatomaceae	
Amphora	
Asterionella*	550
Amphiprora	
Cocinodiscus	
Cyclotella*	
Cymbella	
Diatoma*	
Frustulia	
Fragilaria	
Gyrosigma	
Gomphonema	
Melosira	
Meridion*	
Navicula	
Nitzschia	
Pleurosigma	
Stephanodiscus	
Surirella	
Synedra	
Tabellaria*	
Rotifera	
Anuraea	
Asplanchna	
Brachionus	
Conochilus	
Euchlanis	
Keratella	
Notholca	
Polyarthra	
Rotifer	
Synchaeta	
Kellicottia	

ORGANISM	#/ml
Chlorophyceae	
Actinastrum	
Arthrodesmus	
Ankistrodesmus	
Chlorella	
Closterium	
Coelastrum	
Cosmarium	
Dictyosphaerium*	
Eudorina*	
Elakatothrix	
Gleocystis	
Micrasterias	
Mougeotia	
Pandorina*	
Pediastrum	
Protococcus	
Quadrigula	
Scenedesmus	20
Sphaerocystis	210
Sphaerozosma	
Spirogyra	
Staurastrum	76
Tetraspora	
Westella	
Ulothrix	
Volvox*	
Xanthidium	
Zygnema	
Actubashom	
Actinastrum	

ORGANISM	Cell #/ml	#/ml
Cyanophyceae		
Anabaena*	2700	20
Anabaenopsis		
Aphanocapsa		
Aphanizomenon*		
Aphanothece		
Aulosira		
Arthrospira		
Chroococcus	380	20
Clathrocystis*		
Coelosphaerium*		
Cylindrospermum		
Cuspidothrix		
Dactylococcopsis		
Eucapsis		
Gleocapsa		
Galucocystis		
Gloeothece		
Gomphosphaeria		
Hydrocoleum		
Microcystis		
Merismopedia		
Nostoc	2500	20
Nodularia		
Oscillaria		
Pseudanabaena		
Spirulina		
Rivularia*		
Xenococcus		
Miscellaneous		
Acarina		
Anguillula		
Bosmina		
Canthocamptus		
Cyclops		
Daphnia		
Diaptomus		

ORGANISM	#/ml
Protozoa	
Actinophrys	
Amoeba	
Arcella	
Bursaria*	
Ceratium	
Cercomonas	
Chilomonas	
Chlamydomonas	
Codonella	
Cryptomonas*	
Difflugia	
Dinobryon*	150
Euglena	
Glenodinium*	
Gonium	
Halteria	
Mallomonas*	
Monas	
Peridinium*	
Synura*	
Trachelomonas	
Uroglenopsis*	
Vorticella	

TOTAL NATURAL UNIT COUNT: 1100 / ml

BLUE GREEN CELL COUNT: 5600 / ml

Comments: Results are based on sample, as submitted to Northeast Laboratories, Inc. on: 8/09/2019

Approved by:
Alan C. Johnson, Lab Director

SOLitude Lake Management
590 Lake Street
Shrewsbury, MA 01545

EMAIL ADDRESS: BArvidson@solitudelake.com

Report Date:	**8/13/2019**	Date Sampled:	**8/08/2019**
Laboratory ID#:	**1978490 - 02**	Date Received:	**8/09/2019**
		Date Tested:	**8/12/2019**

Sample Site: SURFACE WATER FOSTERS POND, OUTLET COVE

MICROSCOPIC EXAMINATION == Natural Units Count & Blue/Green Cell Counts

ORGANISM	#/ml
Diatomaceae	
Amphora	
Asterionella*	270
Amphiprora	
Cocinodiscus	
Cyclotella*	
Cymbella	
Diatoma*	300
Frustulia	
Fragilaria	
Gyrosigma	
Gomphonema	
Melosira	
Meridion*	
Navicula	
Nitzschia	
Pleurosigma	
Stephanodiscus	
Surirella	
Synedra	230
Tabellaria*	360
Rotifera	
Anuraea	
Asplanchna	
Brachionus	
Conochilus	
Euchlanis	
Keratella	
Notholca	
Polyarthra	
Rotifer	
Synchaeta	
Kellicottia	

ORGANISM	#/ml
Chlorophyceae	
Actinastrum	
Arthrodesmus	
Ankistrodesmus	
Chlorella	
Closterium	
Coelastrum	
Cosmarium	
Dictyosphaerium*	
Eudorina*	
Elakatothrix	
Gleocystis	
Micrasterias	
Mougeotia	
Pandorina*	
Pediastrum	190
Protococcus	
Quadrigula	
Scenedesmus	57
Sphaerocystis	76
Sphaerozosma	
Spirogyra	
Staurastrum	57
Tetraspora	
Westella	
Ulothrix	
Volvox*	
Xanthidium	
Zygnema	
Actubashom	
Actinastrum	

ORGANISM	Cell #/ml	#/ml
Cyanophyceae		
Anabaena*		
Anabaenopsis		
Aphanocapsa		
Aphanizomenon*		
Aphanothece		
Aulosira		
Arthrospira		
Chroococcus		
Clathrocystis*		
Coelosphaerium*		
Cylindrospermum		
Cuspidothrix		
Dactylococcopsis		
Eucapsis		
Gleocapsa		
Galucocystis		
Gloeothece		
Gomphosphaeria		
Hydrocoleum		
Microcystis		
Merismopedia		
Nostoc		
Nodularia		
Oscillaria		
Pseudanabaena		
Spirulina		
Rivularia*		
Xenococcus		
Miscellaneous		
Acarina		
Anguillula		
Bosmina		
Canthocamptus		
Cyclops		
Daphnia		
Diaptomus		

ORGANISM	#/ml
Protozoa	
Actinophrys	
Amoeba	
Arcella	
Bursaria*	
Ceratium	
Cercomonas	
Chilomonas	
Chlamydomonas	
Codonella	
Cryptomonas*	
Difflugia	
Dinobryon*	
Euglena	
Glenodinium*	
Gonium	
Halteria	
Mallomonas*	
Monas	
Peridinium*	
Synura*	
Trachelomonas	
Uroglenopsis*	
Vorticella	

TOTAL NATURAL UNIT COUNT: 1500 / ml

BLUE GREEN CELL COUNT: 0 / ml

Comments: Results are based on sample, as submitted to Northeast Laboratories, Inc. on: 8/09/2019

Approved by:
Alan C. Johnson, Lab Director

ANALYTICAL REPORT

Lab Number:	L1937357
Client:	Solitude Lake Management LLC 590 Lake Street Shrewsbury, MA 01545
ATTN:	Brea Arvidson
Phone:	(508) 865-1000
Project Name:	FOSTERS POND
Project Number:	Not Specified
Report Date:	08/29/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1937357-01	OUTLET COVE	WATER	ANDOVER, MA	08/19/19 11:40	08/19/19
L1937357-02	MILL RESERVOIR	WATER	ANDOVER, MA	08/19/19 12:10	08/19/19
L1937357-03	AZALEA DRIVE	WATER	ANDOVER, MA	08/19/19 12:30	08/19/19
L1937357-04	DUG POND	WATER	ANDOVER, MA	08/19/19 12:50	08/19/19
L1937357-05	MAIN POND	WATER	ANDOVER, MA	08/19/19 13:50	08/19/19

Project Name:	FOSTERS POND	**Lab Number:**	L1937357
Project Number:	Not Specified	**Report Date:**	08/29/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: FOSTERS POND
Project Number: Not Specified
Lab Number: L1937357
Report Date: 08/29/19

Case Narrative (continued)

Sample Receipt

The samples were received at the laboratory above the required temperature range. The samples were transported to the laboratory in a cooler with ice packs and delivered directly from the sampling site.

Coliform, Fecal (MF)

L1937357-04: The sample has an elevated detection limit due to the dilution required by the method.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Amita Naik

Title: Technical Director/Representative Date: 08/29/19

INORGANICS
&
MISCELLANEOUS

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

SAMPLE RESULTS

Lab ID: L1937357-01
Client ID: OUTLET COVE
Sample Location: ANDOVER, MA

Date Collected: 08/19/19 11:40
Date Received: 08/19/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Total (MPN)	5002		MPN/100ml	200	NA	200	-	08/19/19 18:00	121,9223B	DP
Coliform, Fecal (MF)	2.0		col/100ml	2.0	NA	2	-	08/19/19 18:00	121,9222D	DP
General Chemistry - Westborough Lab										
Turbidity	0.82		NTU	0.20	--	1	-	08/20/19 06:04	121,2130B	JW
Color, True	32		A.P.C.U.	5.0	--	1	-	08/19/19 22:15	121,2120B	AS
Color, Apparent	40		A.P.C.U.	5.0	--	1	-	08/19/19 22:03	121,2120B	AS
Alkalinity, Total	28.0		mg CaCO3/L	2.00	NA	1	-	08/20/19 03:03	121,2320B	MA
pH (H)	7.1		SU	-	NA	1	-	08/19/19 19:39	1,9040C	AS
Phosphorus, Total	0.023		mg/l	0.010	--	1	08/22/19 12:35	08/23/19 11:28	121,4500P-E	SD

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

SAMPLE RESULTS

Lab ID: L1937357-02
Client ID: MILL RESERVOIR
Sample Location: ANDOVER, MA

Date Collected: 08/19/19 12:10
Date Received: 08/19/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Total (MPN)	9918		MPN/100ml	200	NA	200	-	08/19/19 18:00	121,9223B	DP
Coliform, Fecal (MF)	150		col/100ml	2.0	NA	2	-	08/19/19 18:00	121,9222D	DP
General Chemistry - Westborough Lab										
Turbidity	1.5		NTU	0.20	--	1	-	08/20/19 06:04	121,2130B	JW
Color, True	45		A.P.C.U.	5.0	--	1	-	08/19/19 22:15	121,2120B	AS
Color, Apparent	46		A.P.C.U.	5.0	--	1	-	08/19/19 22:03	121,2120B	AS
Alkalinity, Total	29.7		mg CaCO3/L	2.00	NA	1	-	08/20/19 03:03	121,2320B	MA
pH (H)	7.2		SU	-	NA	1	-	08/19/19 19:39	1,9040C	AS
Phosphorus, Total	0.033		mg/l	0.010	--	1	08/22/19 12:35	08/23/19 11:28	121,4500P-E	SD

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

SAMPLE RESULTS

Lab ID: L1937357-03
Client ID: AZALEA DRIVE
Sample Location: ANDOVER, MA

Date Collected: 08/19/19 12:30
Date Received: 08/19/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Total (MPN)	25480		MPN/100ml	200	NA	200	-	08/19/19 18:00	121,9223B	DP
Coliform, Fecal (MF)	2.0		col/100ml	2.0	NA	2	-	08/19/19 18:00	121,9222D	DP
General Chemistry - Westborough Lab										
Turbidity	0.64		NTU	0.20	--	1	-	08/20/19 06:04	121,2130B	JW
Color, True	28		A.P.C.U.	5.0	--	1	-	08/19/19 22:15	121,2120B	AS
Color, Apparent	33		A.P.C.U.	5.0	--	1	-	08/19/19 22:03	121,2120B	AS
Alkalinity, Total	21.2		mg CaCO3/L	2.00	NA	1	-	08/20/19 03:03	121,2320B	MA
pH (H)	7.1		SU	-	NA	1	-	08/19/19 19:39	1,9040C	AS
Phosphorus, Total	0.020		mg/l	0.010	--	1	08/22/19 12:35	08/23/19 11:29	121,4500P-E	SD

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

SAMPLE RESULTS

Lab ID: L1937357-04
Client ID: DUG POND
Sample Location: ANDOVER, MA

Date Collected: 08/19/19 12:50
Date Received: 08/19/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Total (MPN)	920.84		MPN/100ml	1	NA	1	-	08/19/19 18:00	121,9223B	DP
Coliform, Fecal (MF)	ND		col/100ml	2.0	NA	2	-	08/19/19 18:00	121,9222D	DP
General Chemistry - Westborough Lab										
Turbidity	0.49		NTU	0.20	--	1	-	08/20/19 06:04	121,2130B	JW
Color, True	5.0		A.P.C.U.	5.0	--	1	-	08/19/19 22:15	121,2120B	AS
Color, Apparent	7.0		A.P.C.U.	5.0	--	1	-	08/19/19 22:03	121,2120B	AS
Alkalinity, Total	14.6		mg CaCO3/L	2.00	NA	1	-	08/20/19 03:03	121,2320B	MA
pH (H)	7.0		SU	-	NA	1	-	08/19/19 19:39	1,9040C	AS
Phosphorus, Total	ND		mg/l	0.010	--	1	08/22/19 12:35	08/23/19 11:30	121,4500P-E	SD

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

SAMPLE RESULTS

Lab ID: L1937357-05
Client ID: MAIN POND
Sample Location: ANDOVER, MA

Date Collected: 08/19/19 13:50
Date Received: 08/19/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Total (MPN)	61518		MPN/100ml	200	NA	200	-	08/19/19 18:00	121,9223B	DP
Coliform, Fecal (MF)	16		col/100ml	2.0	NA	2	-	08/19/19 18:00	121,9222D	DP
General Chemistry - Westborough Lab										
Turbidity	2.5		NTU	0.20	--	1	-	08/20/19 06:04	121,2130B	JW
Color, True	34		A.P.C.U.	5.0	--	1	-	08/19/19 22:15	121,2120B	AS
Color, Apparent	40		A.P.C.U.	5.0	--	1	-	08/19/19 22:03	121,2120B	AS
Alkalinity, Total	24.5		mg CaCO3/L	2.00	NA	1	-	08/20/19 03:03	121,2320B	MA
pH (H)	7.2		SU	-	NA	1	-	08/19/19 19:39	1,9040C	AS
Phosphorus, Total	0.037		mg/l	0.010	--	1	08/22/19 12:35	08/23/19 11:33	121,4500P-E	SD

Project Name: FOSTERS POND
Project Number: Not Specified
Lab Number: L1937357
Report Date: 08/29/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab for sample(s): 01-05 Batch: WG1274191-1										
Coliform, Total (MPN)	<1		MPN/100ml	1	NA	1	-	08/19/19 18:00	121,9223B	DP
Microbiological Analysis - Westborough Lab for sample(s): 01-05 Batch: WG1274193-1										
Coliform, Fecal (MF)	ND		col/100ml	1.0	NA	1	-	08/19/19 18:00	121,9222D	DP
General Chemistry - Westborough Lab for sample(s): 01-05 Batch: WG1274266-1										
Turbidity	ND		NTU	0.20	--	1	-	08/20/19 06:04	121,2130B	JW
General Chemistry - Westborough Lab for sample(s): 01-05 Batch: WG1274376-1										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	08/20/19 03:03	121,2320B	MA
General Chemistry - Westborough Lab for sample(s): 01-05 Batch: WG1275478-1										
Phosphorus, Total	ND		mg/l	0.010	--	1	08/22/19 12:35	08/23/19 11:02	121,4500P-E	SD

Lab Control Sample Analysis

Batch Quality Control

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-05 Batch: WG1274227-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-05 Batch: WG1274266-2								
Turbidity	97		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-05 Batch: WG1274376-2								
Alkalinity, Total	103		-		90-110	-		10
General Chemistry - Westborough Lab Associated sample(s): 01-05 Batch: WG1275478-2								
Phosphorus, Total	91		-		80-120	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1274376-4 QC Sample: L1937357-01 Client ID: OUTLET COVE												
Alkalinity, Total	28.0	100	127	99		-	-		86-116	-		10
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1275478-3 QC Sample: L1936809-01 Client ID: MS Sample												
Phosphorus, Total	0.032	0.5	0.507	95		-	-		75-125	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1274227-2 QC Sample: L1937357-01 Client ID: OUTLET COVE						
pH (H)	7.1	6.9	SU	3		5
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1274249-1 QC Sample: L1937357-05 Client ID: MAIN POND						
Color, Apparent	40	42	A.P.C.U.	5		
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1274250-1 QC Sample: L1937357-05 Client ID: MAIN POND						
Color, True	34	34	A.P.C.U.	0		
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1274266-3 QC Sample: L1937357-01 Client ID: OUTLET COVE						
Turbidity	0.82	0.73	NTU	12		13
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1274376-3 QC Sample: L1937357-01 Client ID: OUTLET COVE						
Alkalinity, Total	28.0	27.3	mg CaCO3/L	3		10
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1275478-4 QC Sample: L1936809-01 Client ID: DUP Sample						
Phosphorus, Total	0.032	0.033	mg/l	3		20

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1937357-01A	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-01A1	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-01A2	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-01A3	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-01B	Plastic 250ml unpreserved/No Headspace	A	NA		23.8	Y	Absent		ALK-T-2320(14)
L1937357-01C	Plastic 250ml unpreserved	A	7	7	23.8	Y	Absent		TURB-2130(2),PH-9040(1)
L1937357-01D	Plastic 250ml H2SO4 preserved	A	<2	<2	23.8	Y	Absent		TPHOS-4500(28)
L1937357-01E	Amber 500ml unpreserved	A	7	7	23.8	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2)
L1937357-02A	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-02A1	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-02A2	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-02A3	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-02B	Plastic 250ml unpreserved/No Headspace	A	NA		23.8	Y	Absent		ALK-T-2320(14)
L1937357-02C	Plastic 250ml unpreserved	A	7	7	23.8	Y	Absent		TURB-2130(2),PH-9040(1)
L1937357-02D	Plastic 250ml H2SO4 preserved	A	<2	<2	23.8	Y	Absent		TPHOS-4500(28)
L1937357-02E	Amber 500ml unpreserved	A	7	7	23.8	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2)
L1937357-03A	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-03A1	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-03A2	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-03A3	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-03B	Plastic 250ml unpreserved/No Headspace	A	NA		23.8	Y	Absent		ALK-T-2320(14)
L1937357-03C	Plastic 250ml unpreserved	A	7	7	23.8	Y	Absent		TURB-2130(2),PH-9040(1)
L1937357-03D	Plastic 250ml H2SO4 preserved	A	<2	<2	23.8	Y	Absent		TPHOS-4500(28)

*Values in parentheses indicate holding time in days

Project Name: FOSTERS POND
Project Number: Not Specified

Lab Number: L1937357
Report Date: 08/29/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1937357-03E	Amber 500ml unpreserved	A	7	7	23.8	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2)
L1937357-04A	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-04A1	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-04A2	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-04A3	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-04B	Plastic 250ml unpreserved/No Headspace	A	NA		23.8	Y	Absent		ALK-T-2320(14)
L1937357-04C	Plastic 250ml unpreserved	A	7	7	23.8	Y	Absent		TURB-2130(2),PH-9040(1)
L1937357-04D	Plastic 250ml H2SO4 preserved	A	<2	<2	23.8	Y	Absent		TPHOS-4500(28)
L1937357-04E	Amber 500ml unpreserved	A	7	7	23.8	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2)
L1937357-05A	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-05A1	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-05A2	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-05A3	Bacteria Cup Na2S2O3 preserved	A	NA		23.8	Y	Absent		F-COLI-MF(.33),T-COLI-QT(.33)
L1937357-05B	Plastic 250ml unpreserved/No Headspace	A	NA		23.8	Y	Absent		ALK-T-2320(14)
L1937357-05C	Plastic 250ml unpreserved	A	7	7	23.8	Y	Absent		TURB-2130(2),PH-9040(1)
L1937357-05D	Plastic 250ml H2SO4 preserved	A	<2	<2	23.8	Y	Absent		TPHOS-4500(28)
L1937357-05E	Amber 500ml unpreserved	A	7	7	23.8	Y	Absent		COLOR-T-2120(2),COLOR-A-2120(2)

*Values in parentheses indicate holding time in days

Project Name:	FOSTERS POND	**Lab Number:**	L1937357
Project Number:	Not Specified	**Report Date:**	08/29/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	FOSTERS POND	**Lab Number:**	L1937357
Project Number:	Not Specified	**Report Date:**	08/29/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name: FOSTERS POND
Project Number: Not Specified
Lab Number: L1937357
Report Date: 08/29/19

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE ____ OF ____

ALPHA
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 8/19/19

ALPHA Job #: L1937357

Project Information

Project Name: Fosters Pond
Project Location: Andover, MA
Project #:
Project Manager: Kara Sliwoski
ALPHA Quote #:

Report Information - Data Deliverables

☐ ADEx ☒ EMAIL

Billing Information

☐ Same as Client info PO #:

Client Information

Client: SOLitude Lake Mgmt
Address: 590 Lake St
Shrewsbury MA
Phone:
Email: bardsen@solitudelake.com

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program ________ Criteria ________

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due:

Additional Project Information:

Right from field - out of temp - please run

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint

SAMPLE INFO — Filtration: ☐ Field ☐ Lab to do; Preservation: ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Time	Collection Date	Sample Matrix	Sampler Initials	pH	Turb	TALK	TP	App Color	True Color	Total Coliform	Fecal Coliform	Sample Comments	Total # Bottles
37357-01	Outlet Cove	1140	8/19/19	SW	BA	X	X	X	X	X	X				
-02	Mill Reservoir	1210	8/19/19	SW	BA	X	X	X	X	X	X				
-03	Azalea Drive	1230	8/19/19	SW	BA	X	X	X	X	X	X				
-04	Dug Pond	1250	8/19/19	SW	BA	X	X	X	X	X	X				
-05	Main Pond	1350	8/19/19	SW	BA	X	X	X	X	X	X				

Container Type
Preservative

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
Bregitta [signature]	8/19/19 1643	[signature]	8/19/19 1643

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)