

2010 Hobomock Pond Management Program

Hobomock Pond Hydrilla (*Hydrilla verticillata*) Management Program



Project Completion Report for 2010 Hydrilla Management Performed at Hobomock Pond – Pembroke, MA

December 2010

Prepared for:



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TABLE OF CONTENTS

INTRODUCTION	1
PERMITTING.....	1
PRE-TREATMENT VEGETATION SURVEY.....	1
SONAR TREATMENT PROGRAM.....	3
POST-TREATMENT VEGETATION SURVEY	4
HYDRILLA TUBER SAMPLING	6
MANAGEMENT RECOMMENDATIONS.....	7

INTRODUCTION

The 2010 Hobomock Pond Hydrilla Management Program is the second year of what will likely be an ongoing multi-year effort to prevent the spread of and possibly eradicate, the state listed noxious/prohibited weed, *Hydrilla verticillata* first discovered in 2008. Understanding that the management of this hydrilla infestation was a long-term project, the Town of Pembroke funded the 2010 management effort. The program, similar to that which was performed in 2009, consisted of early and late season vegetation monitoring and a whole pond Sonar herbicide treatment program.

The various tasks of the management program are discussed in the following sections. Provided below is a chronology of the major elements of the 2010 program.

2010 Treatment Program Chronology

- Received executed program contract..... 5/20/10
- Pre-Treatment tuber sampling..... 5/24/10
- Received approved MA DEP *License to Apply Chemicals*..... 6/2/10
- Pre-Treatment vegetation survey..... 6/14/10
- Initial Sonar treatment and follow-up booster application..... 6/14/10; 8/9/10
- FasTEST sampling and interim plant surveys 7/1/10; 7/23/10¹;
8/5/10; 8/25/10; 9/14/10
- Post-Treatment vegetation survey of aquatic plants 9/14/10

PERMITTING

The approved Order of Conditions from the Pembroke Conservation Commission received in 2009 is valid for a period of three years from the date of issuance; therefore, no additional MA Wetlands Protection Act permitting was required in 2010. For the aquatic herbicide treatment component of the project, however, a site specific *License to Apply Chemicals* Permit was required from MA DEP Office of Watershed Management. The permit, approving the application of Sonar (fluridone) herbicide, was received prior to the initial treatment on 6/2/10.

PRE-TREATMENT VEGETATION SURVEY

It is desirable in multi-year management programs such as this, to collect data that not only provides a sufficient level of detail, but that can also be accurately compared to previous years results to track changes in the target and non-target vegetation. For this reason the exact pre and post-treatment survey methodology established in 2009 was replicated. The survey was again a point intercept (Madsen 1999) presence/absence type vegetation survey that was performed immediately prior to the initial herbicide treatment in mid June. The previously established and geo-referenced data collection points were revisited using a Trimble Pro XRS Differential GPS unit with sub-meter accuracy.

At each of the data collection sites the following information was recorded:

- Water depth
- Qualitative sediment type
- Soft sediment thickness
- Aquatic plant species present
- Dominant aquatic plant species
- Overall areal plant cover

The presence/absence of aquatic plant species at each data point was assessed from two throw-rake tosses, and through observations directly below the boat using an underwater camera system. Overall areal plant cover was recorded using a simple density index (1 = 1-25% cover; 2 = 26-50% cover; 3 = 51-76% cover; & 4 = 76-100% cover) in order to track possible variations in plant cover.

The pre and post-treatment vegetation field data along with full scale vegetation distribution maps are provided in Appendix A.

Active hydrilla growth in Hobomock Pond was observed in early June, which is later than in 2009. It is, however, not unusual for plants to emerge later in the growing season following a whole pond Sonar treatment. Based on this visual assessment, the pre-treatment survey and initial Sonar herbicide treatment were scheduled for 6/14/10. At the time of the survey the hydrilla growth was relatively immature with only 6-8 inches of vegetative growth observable.

- The hydrilla distribution was again most abundant in shallower water areas, as 12 of the 19 locations where hydrilla was observed were less than 4.0 ft. in depth.
- The average water depth of hydrilla occurrence was 4.1 ft.
- Hydrilla was much reduced from the 2009 pre-treatment survey results, as the percent occurrence fell from 52% in 2009 to only 7% pre-treatment in 2010.

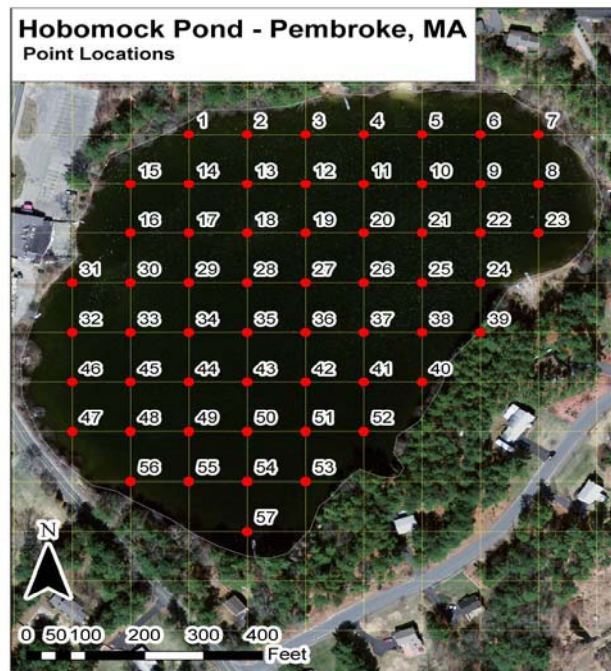


Figure 1 – 2010 Point Intercept Data Collection Point Locations

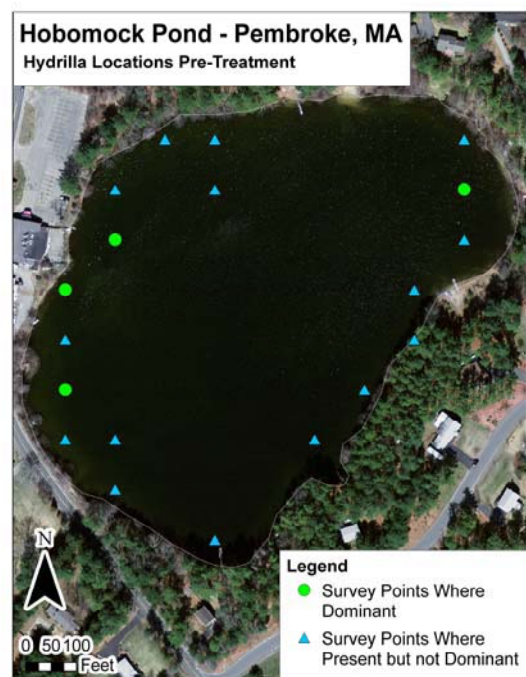


Figure 2 – 2010 Hydrilla Distribution Map

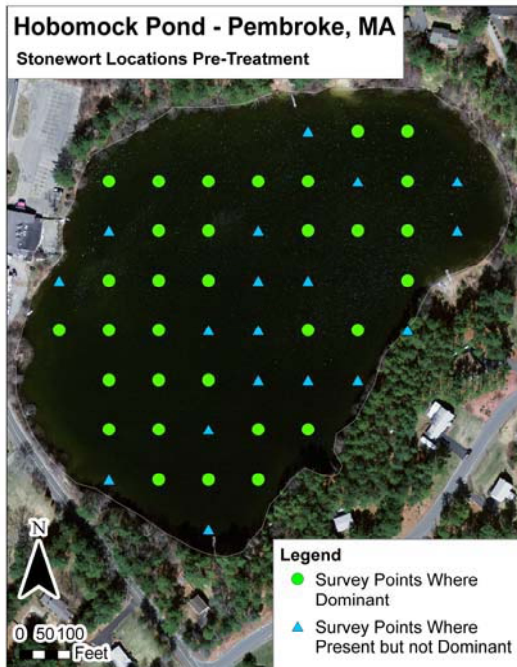


Figure 3 – 2010 Stonewort Distribution Map

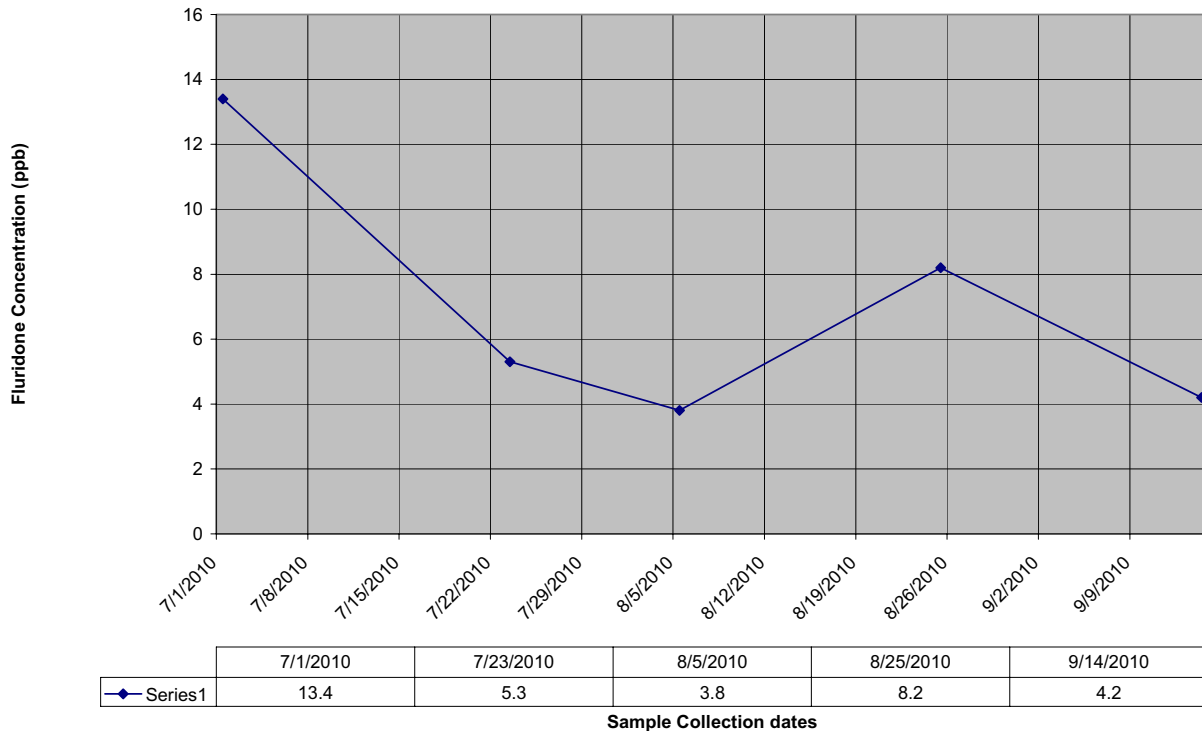
- At the time of the Pre-Treatment Survey the overall plant assemblage consisted of eight submersed species and two emergent species. Of the eight submersed species stonewort (*Nitella sp.*) was the most abundant, as it was present at 49 of the 57 data collection points (85%) and was dominant at 31.
- All of the plant species that were recorded during the survey include: slender spike rush (*Eleocharis sp.*), arrowhead (*Sagittaria sp.*), hydrilla (*Hydrilla verticillata*), aquatic moss (*Fontinalis sp.*), quillwort (*Isoetes sp.*), stonewort (*Nitella sp.*), common reed (*Phragmites australis*), bladderwort, (*Utricularia sp.*), water willow (*Decodon verticillatus*), and golden hedge hyssop (*Gratiola sp.*).
- Although some plant species were not observed following the 2009 treatment program, they were found during the pre-treatment survey, albeit at reduced distribution and density.

SONAR TREATMENT PROGRAM

Because of the efficacy of the current management program here at Hobomock Pond in 2009 and elsewhere in the Northeast, the primary directives of the program were unchanged in 2010. The specific tasks of the program and the observed results are outlined in the following section.

- In an effort prevent successful tuber production in the emerging hydrilla growth, the initial Sonar herbicide treatment was scheduled for mid June (6/14/10). This time frame coincided with observations made at our multiple vegetation inspections in late May and early June.
- Using Sonar AS (liquid) a fluridone dose of 10-15 ppb was applied from a shallow draft Jon boat. The Sonar AS was first diluted with pond water and then injected sub-surface evenly throughout the entire pond.
- A follow-up inspection and FasTEST sample collection performed approximately two weeks after the initial treatment showed chlorosis of the growing tips of the hydrilla and an in-water fluridone concentration within the targeted range.
- As in the previous year, the goal of the treatment program was to maintain a lethal concentration (>6ppb) in the pond until, at a minimum, viable vegetative hydrilla was gone (60+ days).
- A graph of the fluridone concentration, as determined through the FasTEST sampling performed, follows.

Figure 3 - 2010 Hobomock Pond FasTEST Results



- Based on the decline of fluridone concentrations, a low dose booster treatment was performed on 8/9/10, adding approximately 6-7 ppb of fluridone to the existing in-pond concentration.
- Based on the FasTEST sampling results it can be assumed that the in-pond fluridone concentration was maintained above 6 ppb for a period of about 67 days and above 4 ppb (lowest phototoxic concentration determined by SePro's PlanTEST using Long Pond - Barnstable, MA hydrilla samples) for 87 days.
- All interim vegetation inspections indicated positive impacts to the target hydrilla growth as a result of the herbicide treatment program. Chlorotic tissue increased down the meristem of the plants as the contact time of the herbicide increased during the program.

POST-TREATMENT VEGETATION SURVEY

Throughout the treatment program the aquatic vegetation was routinely monitored in conjunction with FasTEST and water quality sample collection. On 9/14/10, however, we performed our more comprehensive post-treatment survey by replicating the pre-treatment survey methodologies.

- No viable hydrilla growth was observed following the whole pond Sonar treatment program. Again excellent pond-wide control was achieved.

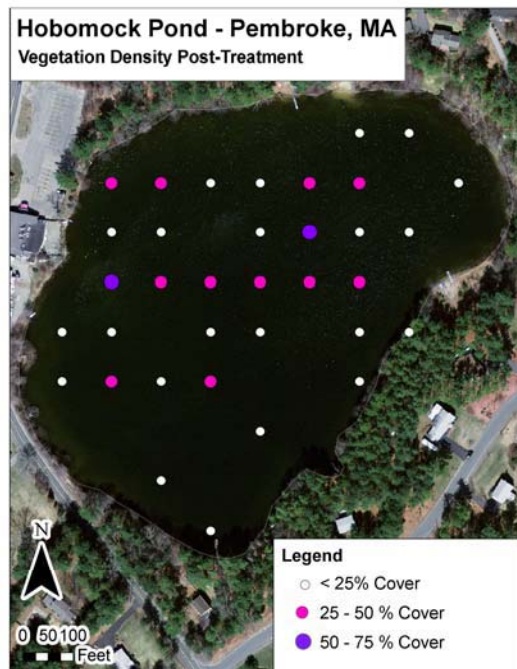


Figure 4 – 2010 Post-Treatment Vegetation Density Map

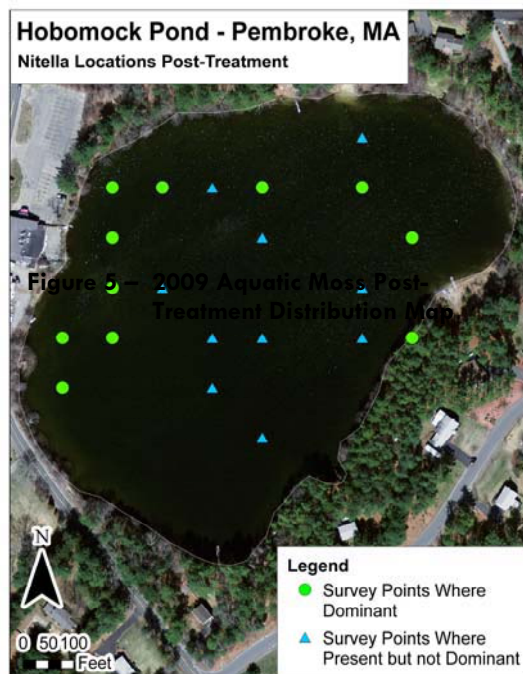


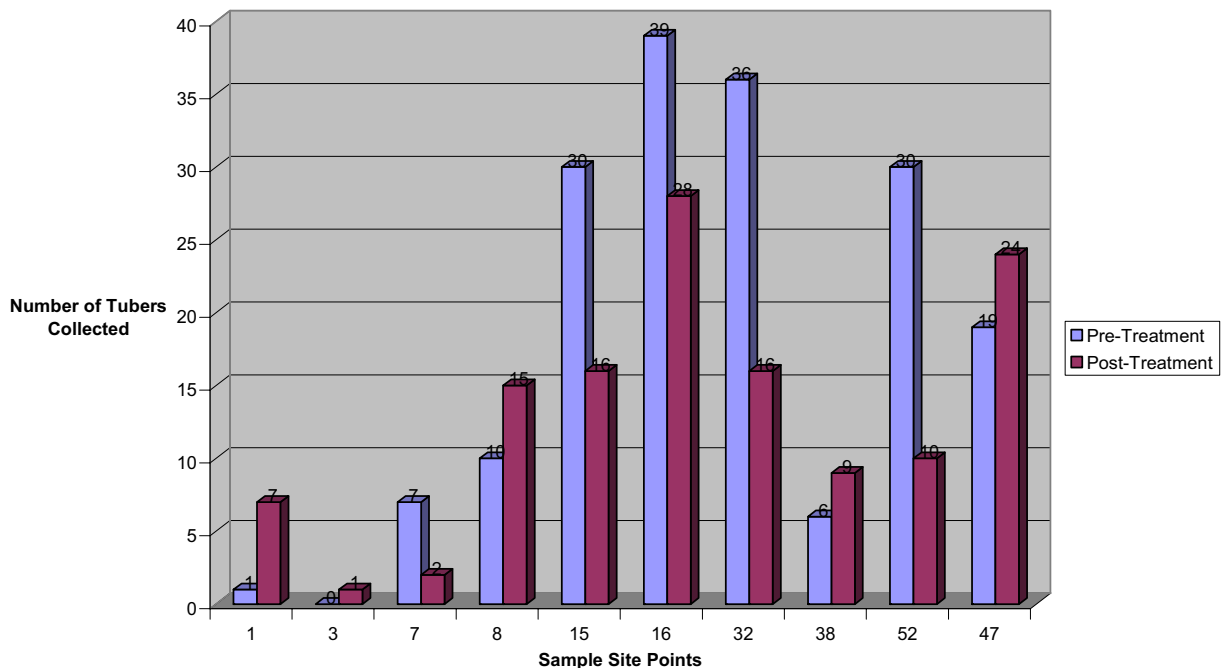
Figure 5 – 2010 Stonewort Distribution Map

- As a result of the extended contact time achieved a reduction in overall plant diversity and distribution was observed post treatment. In fact the two dominant species pre-treatment (stonewort and aquatic moss) percent occurrence fell from 86% to 37% and 70% to 46% respectively.
- Water clarity remained stable throughout the treatment program, with Secchi disk transparency readings averaging about 10 ft. throughout the season. In year one of the program (2009) a decrease in water clarity was observed during the July-August period.
- As in 2009 the treatment program appears to have impacted some of the less abundant native plant species. Many of these species are also present in Long Pond in Barnstable where we have been managing hydrilla for the past eight years. We have often seen fluctuations in the plant assemblage pre and post-treatment and from year to year; however, the non-target native plant community is as diverse and rich as it was prior to the implementation of the program.
- The number of vegetated data points fell from 57 pre-treatment to 35 post-treatment.
- The stonewort distribution decreased from pre-treatment conditions. Stonewort was recorded at a total of 21 data points post-treatment, as opposed to the 49 sites recorded pre-treatment.
- Post-treatment vegetation data indicates effective control of the targeted hydrilla growth. Despite the changes in the non-target vegetation post-treatment, we expect, based on our experience with other similar hydrilla control projects (i.e. Long Pond – Barnstable, MA and Pickerel Pond – Limerick, ME), that as the reduction in hydrilla is achieved greater colonization by native plants will be experienced.

HYDRILLA TUBER SAMPLING

As in 2009, tuber sampling was performed at the time of the pre and post-treatment vegetation surveys. The Ten point intercept data collection points that were selected in 2009 (sites 1, 3, 7, 8, 15, 16, 32, 38, 47, 52) were sampled using a modified post-hole type digger. Ten replicate sediment samples, representative of the upper 4-6 inches of soft sediment, were collected from an approximate one square-meter area (100 total samples). Each sediment sample was then strained on site to extract viable hydrilla tubers and/or turions.

2010 Pre & Post Treatment Tuber Sampling Data



- Pre-treatment tuber density was 17.2 tubers/m², which is nearly 50% less than the tuber density reported for the 2009 pre-treatment sampling effort (33.2 tubers/m²).
- Post-treatment tuber density was reduced to 12.8 tubers/m². This represents a 26% reduction in tuber density pre and post-treatment and a 61% reduction since the beginning of the program.
- At a few of the sample locations an increase in the number of tubers was observed from pre to post treatment. This likely does not represent successful hydrilla propagation, but more likely is a function of the inherent variability in the sampling methodology. These data are not intended to provide statistically significant data, but rather an index on which to further assess management results.

- As in 2009, the tuber sampling data indicates a successful reduction in the existing tuber bank as a result of the Sonar treatment program.

MANAGEMENT RECOMMENDATIONS

The post-treatment hydrilla and tuber density survey data indicates effective control and reproductive suppression of the hydrilla growth. These findings represent good progress toward achieving long-term control of this invasive species. Although reductions in hydrilla growth (based on plant cover, biomass, and tuber density) have been achieved, continued management is required to sustain this level of hydrilla reduction and control. Therefore, in order to provide long-term control or even eradication of the hydrilla growth, annual management is necessary to prevent successful reproduction and reduce the potential for spread to nearby waterbodies.

Based on Hobomock Pond's relatively minimal flushing rate and the development of improved slow release pellet formulations of Sonar, we feel that a slight modification to the treatment protocol in 2011 will reduce the program budget and maintain the same high level of hydrilla control experienced. The relatively new Sonar One pellet formulation offers optimal herbicide release characteristics for a project of this type. Sonar One provides a rapid initial release of the herbicide so that there is no significant lag time between application and the achievement of lethal in-pond concentrations. In addition, Sonar One pellets also slowly release fluridone over time to better achieve the extended contact times necessary for successful Sonar treatment programs. Based on these characteristics we feel that the use of this formulation in the future will aid in the maintenance of targeted in-pond fluridone concentrations with fewer herbicide applications.

The varying levels of hydrilla regrowth associated with annual herbicide treatment requires that, at the very least, the early season vegetation monitoring be continued as part of the program. This repeatable semi-quantitative survey will provide good reliable data on which to re-evaluate the overall management approach.

APPENDIX A

Pre& Post-Treatment Vegetation Data
Pre& Post Tuber Sampling Data
Dominant Vegetation Distribution Maps

2010 Pre & Post Tuber Sampling Data

Data Bint	Total Number of Tubers	
	Pre-Treatment	Post-Treatment
1	1	7
3	0	1
7	7	2
8	10	15
15	30	16
16	39	28
32	36	16
38	6	9
52	30	10
47	19	24
Tubers/q-meter	17.8	12.8

PRE-TREATMENT SURVEY DATA - JUNE 14, 2010

Data Point	Latitude	Longitude	Depth (ft.)	Soft Sediment Thickness	Density Index	Eo	S	Hv	F	I	Ni	Pa	U	Dv	Hh
1	42.05835545	-70.80964844	2.5	0.5	3		X	X	D						
2	42.05835326	-70.80928475	3	0.5	3			X	D			X			
3	42.05835106	-70.80892106	5	0.5	1	D									
4	42.05834887	-70.80855737	4	0	1	D			X		X				
5	42.05834667	-70.80819368	3	0	2				X		D		X		
6	42.05834447	-70.80782999	1.5	0	2				X		D		X		
7	42.05834227	-70.8074663	3	0.5	1	X		X	D	X					X
8	42.05807124	-70.80746925	4.5	0	2			D	X		X				
9	42.05807344	-70.80783294	8	0	3						D		X		
10	42.05807564	-70.80819663	15	0	2				D		X		X		
11	42.05807784	-70.80856032	10	0	3				X		D				
12	42.05808003	-70.80892401	13	0	1	X			X		D				
13	42.05808223	-70.8092877	10	0	2			X	D		D				
14	42.05808442	-70.80965139	7	0.5	1						D				
15	42.05808661	-70.81001508	3.5	0.5	3			X	X	X	D				
16	42.05781558	-70.81001802	4.5	0.5	2			D	X		X				
17	42.05781339	-70.80965433	14	0	2						D				
18	42.0578112	-70.80929064	14	0	3						D		X		
19	42.057809	-70.80892695	14	0	2				D		X				
20	42.0578068	-70.80856327	13	0	1				X		D		X		
21	42.05780461	-70.80819958	14	0	1						D		X		
22	42.05780241	-70.80783589	12	0	1				X		D				
23	42.05780021	-70.8074722	3.5	0	3	D		X			X				X
24	42.05753138	-70.80783884	4.5	0	1	X		X			D				
25	42.05753358	-70.80820253	13	0	1				D						
26	42.05753577	-70.80856621	14	0	1				D		X		X		
27	42.05753797	-70.8089299	13	0	1				D		X		X		
28	42.05754017	-70.80929359	14	0	2				X		D				
29	42.05754236	-70.80965727	8	0	3				X		D				
30	42.05754455	-70.81002096	9	0	3						D				
31	42.05754675	-70.81038465	2	0.5	1	X		D			X				
32	42.05727571	-70.81038759	2.5	0	1		X	X			D		X		
33	42.05727352	-70.8100239	6	0	1						D				
34	42.05727133	-70.80966022	13	0	1				X		D				
35	42.05726914	-70.80929653	14	0	1						X				
36	42.05726694	-70.80893285	13.5	0	1				D		X		X		
37	42.05726474	-70.80856916	13.5	0	1				X		D		X		
38	42.05726255	-70.80820548	7	0	2						D		X		

Data Point	Latitude	Longitude	Depth (ft.)	Soft Sediment Thickness	Density Index	Eo	S	Hv	F	I	Ni	Pa	U	Dv	Hh
39	42.05726035	-70.80784179	2	0	3			X	D		X				
40	42.05699152	-70.80820843	1.5	0.5	3			X	D		X				
41	42.05699371	-70.80857211	14	0	2				D		X		X		
42	42.05699591	-70.80893579	14	0	1				D		X				
43	42.0569981	-70.80929948	13.5	0	1						D		X		
44	42.0570003	-70.80966316	13.5	0	2				X		D				
45	42.05700249	-70.81002684	13	0	2				X		D				
46	42.05700468	-70.81039053	4	0	2			D				X		X	
47	42.05673365	-70.81039347	3.5	0	3	X		X	D						X
48	42.05673146	-70.81002979	12.5	0	2			X	X		D		X		
49	42.05672927	-70.8096661	13.5	0	1				X		D				
50	42.05672707	-70.80930242	13.5	0	1				D		X		X		
51	42.05672488	-70.80893874	14	0	1				X		D		X		
52	42.05672268	-70.80857506	4.5	0	1			X			D				
53	42.05645385	-70.80894169	4	0	1						D				
54	42.05645604	-70.80930537	9	0	1				X		D		X		
55	42.05645824	-70.80966905	5	0	1						D		X		
56	42.05646043	-70.81003273	3	0.5	2	D		X	X	X	X				X
57	42.05618501	-70.80930831	3	0	3		X	X	D	X	X				
Averages			8.596491228	0.087719298	1.7368421										

Eo = slender spike rush (*Eleocharis* sp.)

S = arrowhead (*Sagittaria* sp.)

Hv = hydrilla (*Hydrilla verticillata*)

F = aquatic moss (*Fontinalis* sp.)

I = quillwort (*Isoetes* sp.)

Ni = stonewort (*Nitella* sp.)

Pa = common reed (*Phragmites australis*)

U = bladderwort (*Utricularia* sp.)

Dv = water willow (*Decodon verticillatus*)

Hh = golden hedge hyssop

D = dominant species

X = species present

POTRENT SURF DATA - SEPTEMBER 4, 2010

Data Point	Latitude	Longitude	Depth (ft.)	Soft Sediment Thickness	Density Index	Eo	S	Hv	F	I	Ni	Pa	U	Dv	Hh
1	42.05835545	-70.80964844	2.5	0.5	0										
2	42.05835326	-70.80928475	3	0.5	0										
3	42.05835106	-70.80892106	5	0.5	0										
4	42.05834887	-70.80855737	4	0	0										
5	42.05834667	-70.80819368	3	0	1				D		X				
6	42.05834447	-70.80782999	1.5	0	1				D						
7	42.05834227	-70.8074663	3	0.5	0										
8	42.05807124	-70.80746925	4.5	0	1				D						
9	42.05807344	-70.80783294	8	0	0										
10	42.05807564	-70.80819663	15	0	2				X		D				
11	42.05807784	-70.80856032	10	0	2				D						
12	42.05808003	-70.80892401	13	0	1						D				
13	42.05808223	-70.8092877	10	0	1						X				
14	42.05808442	-70.80965139	7	0.5	2						D				
15	42.05808661	-70.81001508	3.5	0.5	2						D				
16	42.05781558	-70.81001802	4.5	0.5	1						D				
17	42.05781339	-70.80965433	14	0	1				D						
18	42.0578112	-70.80929064	14	0	0										
19	42.057809	-70.80892695	14	0	1				D		X				
20	42.0578068	-70.80856327	13	0	3				D						
21	42.05780461	-70.80819958	14	0	1				D						
22	42.05780241	-70.80783589	12	0	1				X		D				
23	42.05780021	-70.8074722	3.5	0	0										
24	42.05753138	-70.80783884	4.5	0	0										
25	42.05753358	-70.80820253	13	0	2				D		X				
26	42.05753577	-70.80856621	14	0	2				D						
27	42.05753797	-70.8089299	13	0	2				D						
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30	42.05754455	-70.81002096	9	0	3						D				
31	42.05754675	-70.81038465	2	0.5	0										
32	42.05727571	-70.81038759	2.5	0	1						D				
33	42.05727352	-70.8100239	6	0	1						D				
34	42.05727133	-70.80966022	13	0	0										
35	42.05726914	-70.80929653	14	0	1				D		X				
36	42.05726694	-70.80893285	13.5	0	1				D		X				
37	42.05726474	-70.80856916	13.5	0	0										
38	42.05726255	-70.80820548	7	0	1				D		X				

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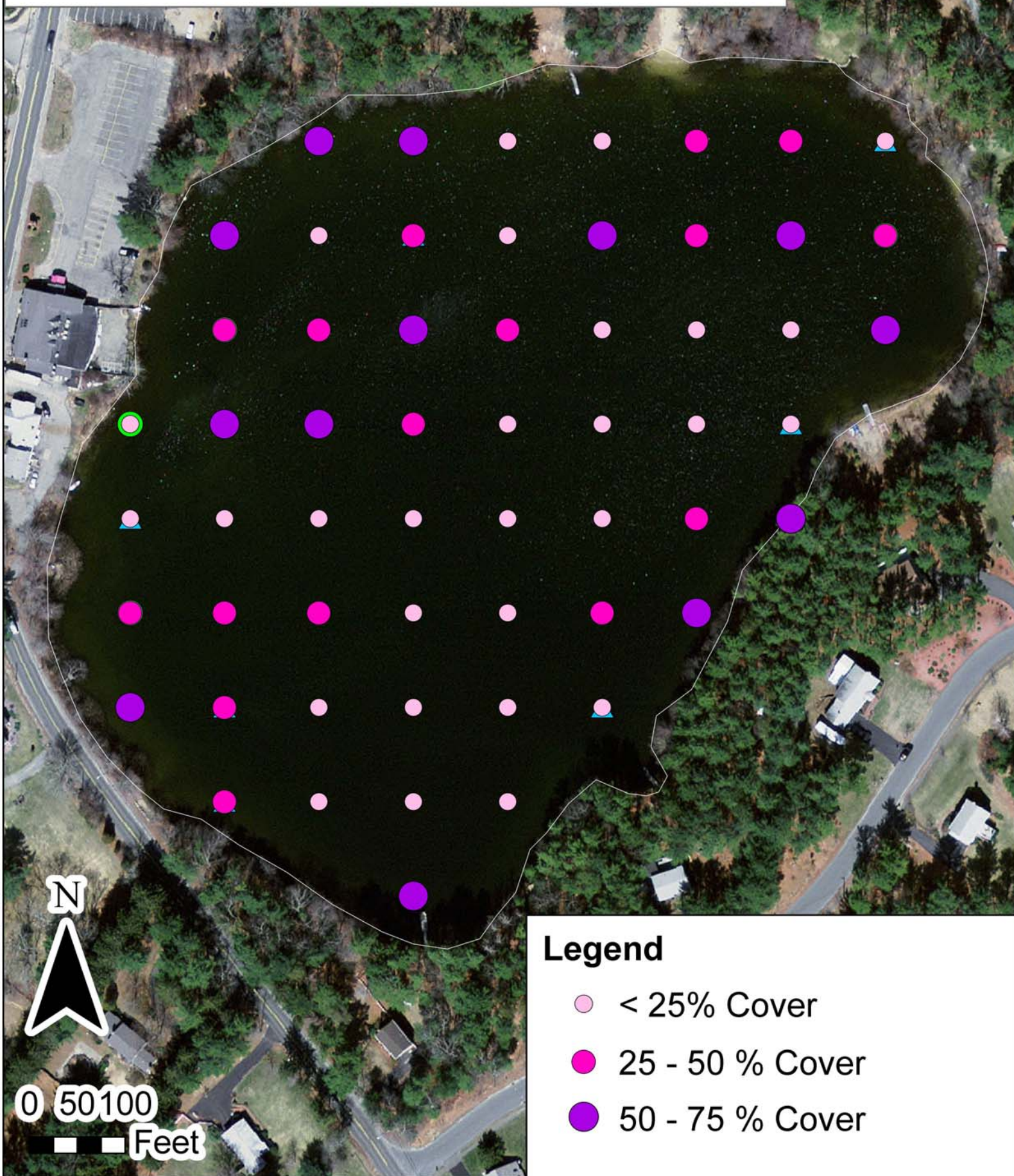
Dv = water willow (*Decodon verticillatus*)

D = dominant species

X = species present

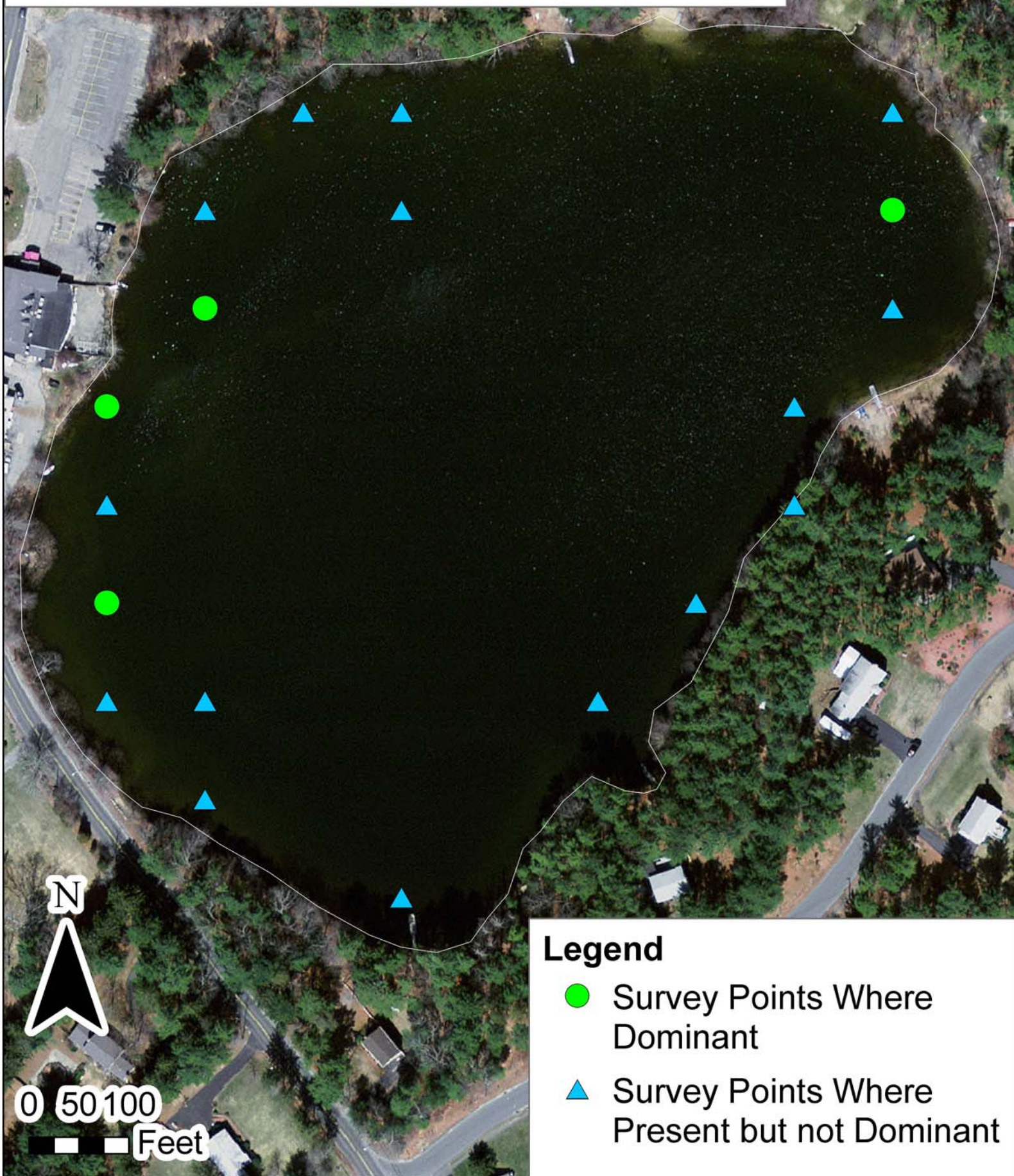
Hobomock Pond - Pembroke, MA

Point Locations



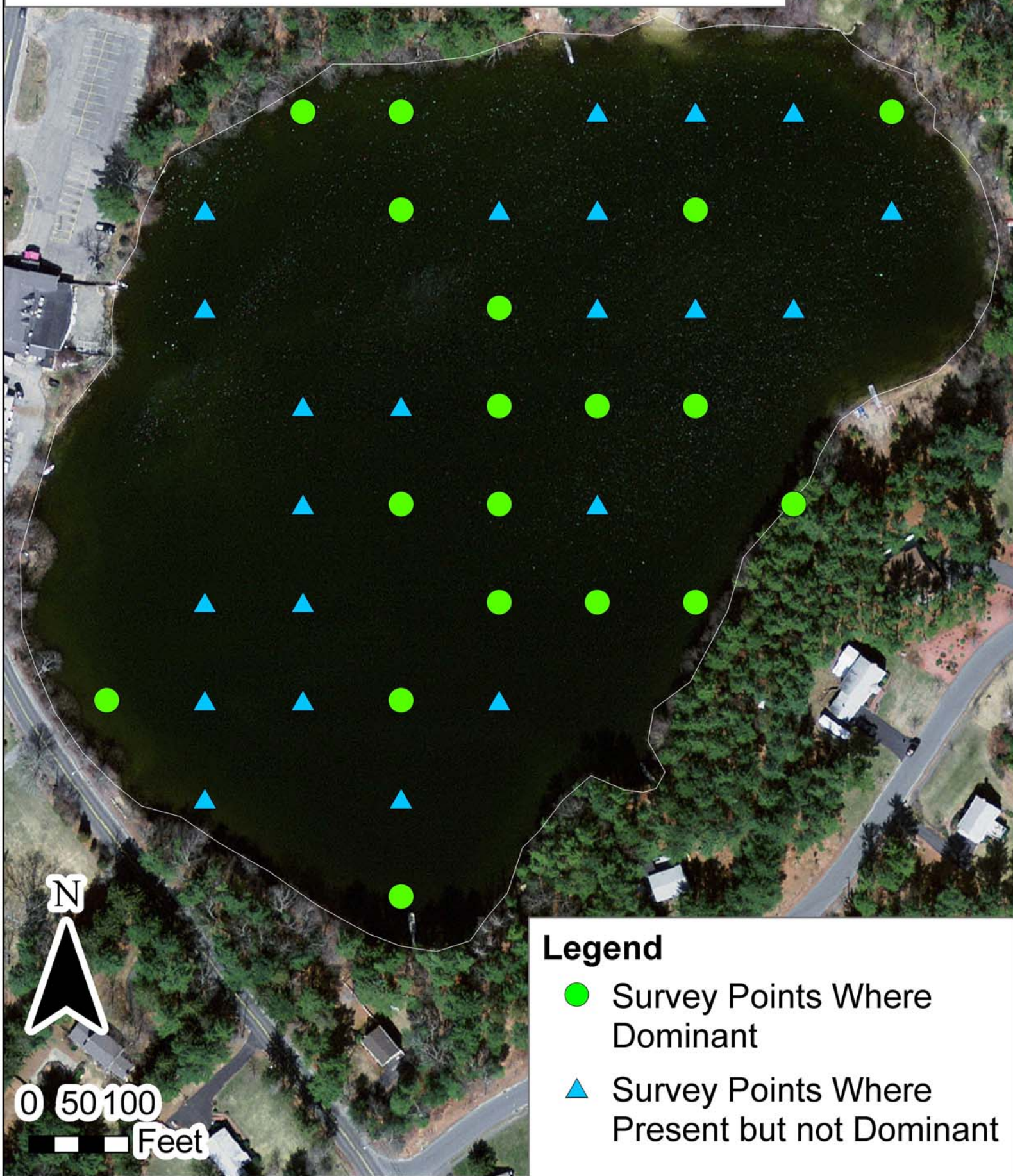
Hobomock Pond - Pembroke, MA

Hydrilla Locations Pre-Treatment



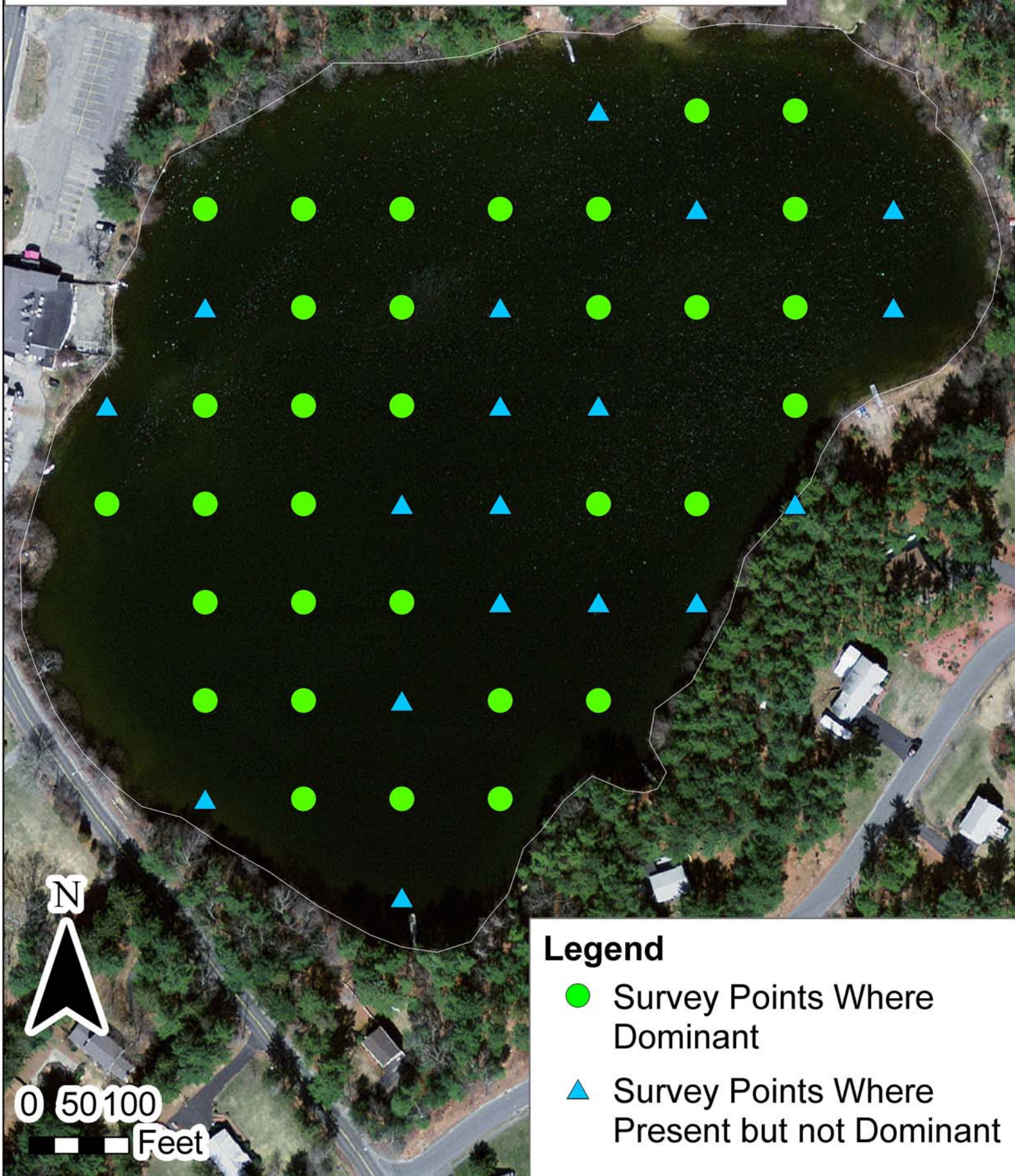
Hobomock Pond - Pembroke, MA

Aquatic Moss Locations Pre-Treatment



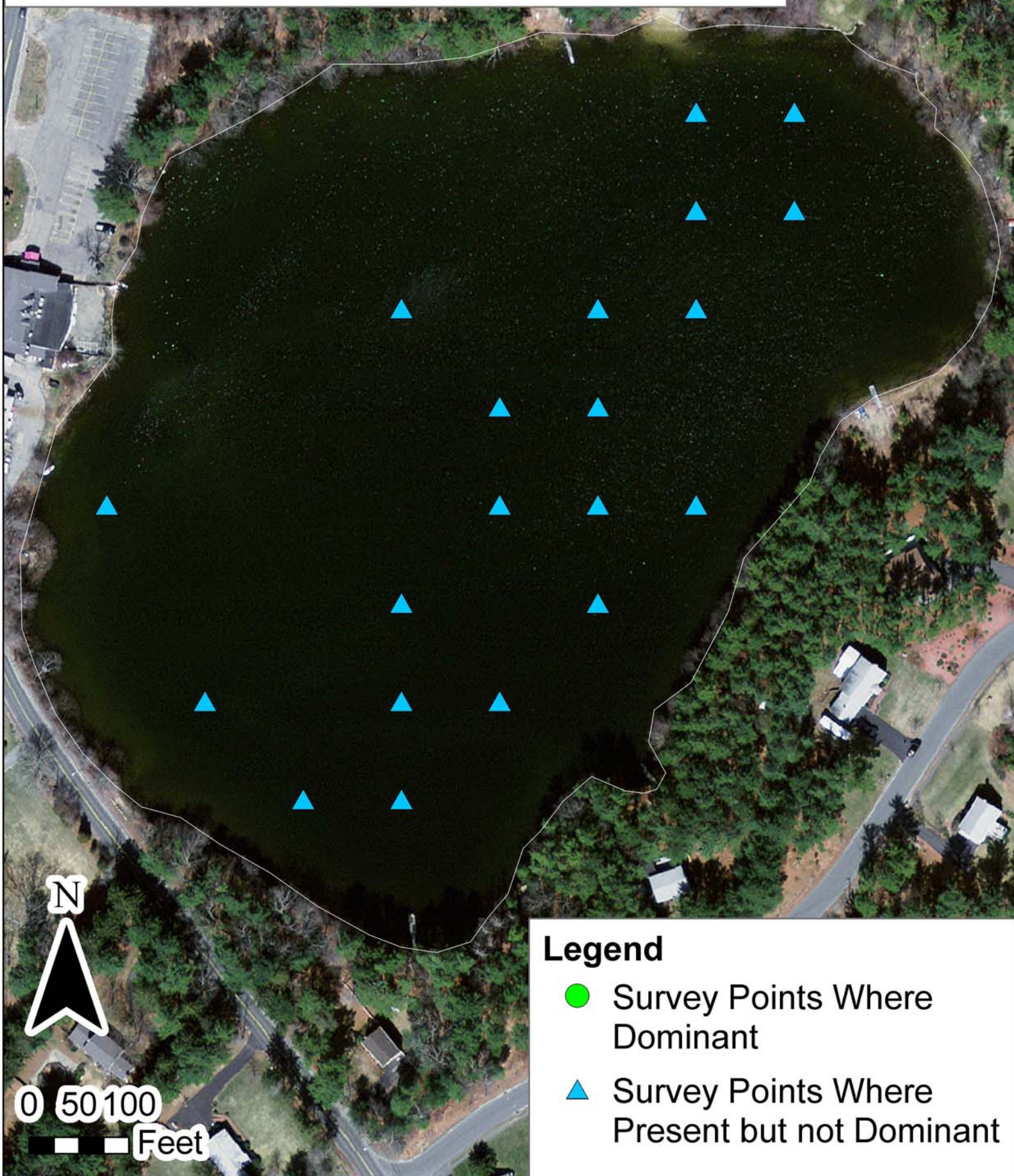
Hobomock Pond - Pembroke, MA

Stonewort Locations Pre-Treatment



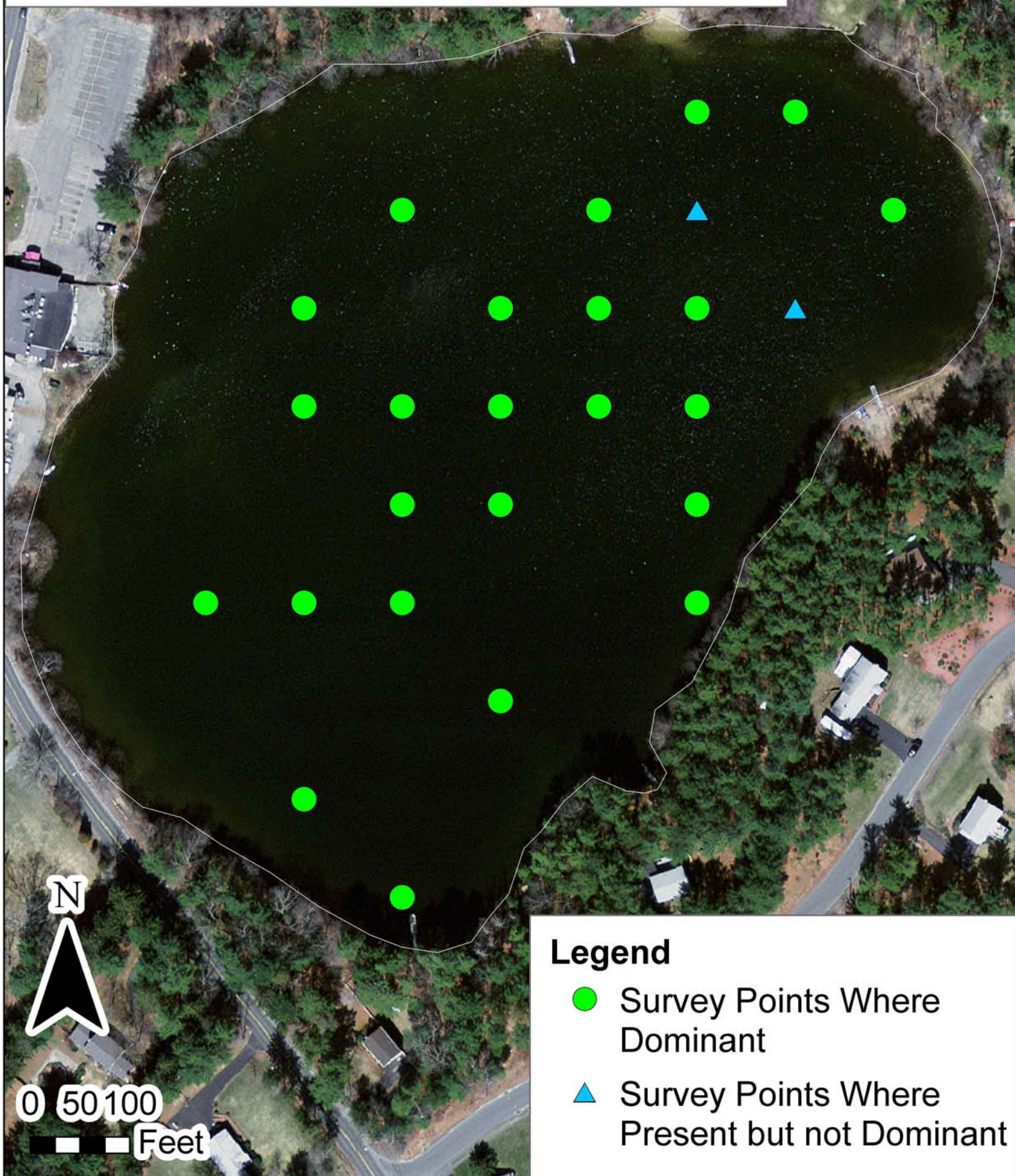
Hobomock Pond - Pembroke, MA

Bladderwort Locations Pre-Treatment



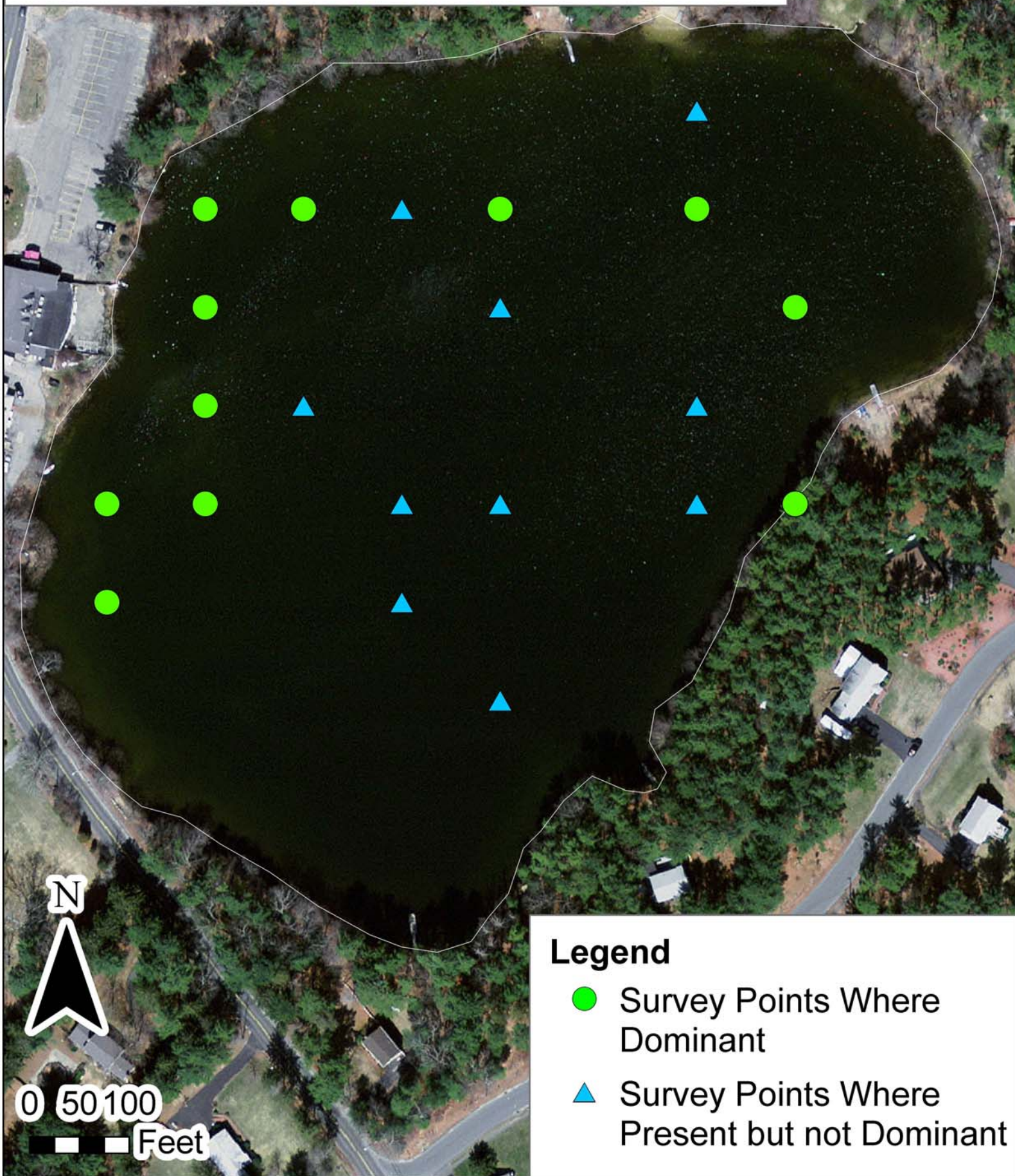
Hobomock Pond - Pembroke, MA

Aquatic Moss Locations Post-Treatment



Hobomock Pond - Pembroke, MA

Nitella Locations Post-Treatment



Hobomock Pond - Pembroke, MA

Vegetation Density Post-Treatment

