2022
Brant Lake AIS Survey

Aquatic Invasive Species Surveys
Survey Team Report

ADIRONDACK RESEARCH

2022 Brant Lake
Aquatic Invasive Species Survey

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Executive Summary

The purpose of this effort was to perform a point intercept survey of in preparation for submitting a permit to the Adirondack Park Agency (APA) for management of Eurasian watermilfoil using the herbicide ProcellaCOR EC.

We surveyed 184 stations (sample points) with a total of 88 points within each of the five proposed treatment areas. A minimum of 12 points and a maximum of 21 points were surveyed at each of these areas. A total of 96 points were surveyed outside of the proposed treatment area. Our survey design and methodologies followed the APA requirements for permit submission.

Our team documented aquatic plant species occurrence, species cover class, overall plant cover class, depth, and species richness at each of the 184 stations.

Eurasian watermilfoil was documented at a total of 50 of the 184 stations (27%); within the proposed treatment area it was recorded at 28 stations, and at 22 locations outside the proposed treatment area. 28 other native species were documented in this survey.

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Overview

We performed an aquatic invasive species (AIS) and native aquatic plant species survey for Brant Lake, in Warren County on the dates of June 30th, July 5th, 6th, and 7th 2022. This survey was completed in preparation for The Brant Lake Association applying to the Adirondack Park Agency for a permit to use the herbicide ProcellaCOR EC for the control of an aquatic pest (AQV). This survey was completed in accordance with all of the required parameters of the linked application requirements: https://www.dropbox.com/s/kn7c043b53k7wns/SIR-AquaticHerbicides.pdf?dl=0

The Brant Lake Association is planning to apply for a permit to use ProcellaCOR EC in 2023 to manage Eurasian watermilfoil. We performed the surveys and created maps and data tables of the survey results per the requirements of the permit.

For more information on our qualifications and services, our Qualifications Packet can be accessed via this link: https://www.dropbox.com/s/2jc37h56z4jkb6i/Lake%20Surveys.pdf?dl=0 You can also learn more about Adirondack Research at www.adkres.org.

Adirondack Research was able to complete the following tasks as part of this project:

- Survey 184 stations in the entirety of the 1,522-acre waterbody over four days with two crew members using a motorboat.
- Survey, identify, and photograph all native plant species at point intercept survey stations within a survey design to meet Adirondack Park Agency requirements for applying for the use of the herbicide ProcellaCOR EC.
- Draft maps showing survey locations, overall plant abundance, depth, species richness, and abundance for each of the 28 species recorded, in GIS.
- Create tables displaying: station number, GPS coordinates, depth, species richness, and abundance of the target species; abundance of each species at all stations; the total count of station numbers each species is found, including overall percentages; and susceptibility of each species to herbicide ProcellaCOR EC.
- Detailed descriptions of all 28 species including information of the impacts of each species on their environment.
- Produced this report of the described survey effort.

Methods

Below is a description of the survey methods used while surveying your lake. We've included a brief description of the equipment used, our cleaning procedure for all of our equipment before accessing your lake, and a description of our survey techniques.

Equipment

Equipment used while completing the Aquatic Invasive Species (AIS) survey of the lake consisted of double-sided rakes for collecting plant samples from under the water, an iPad 4 mini for data collection. All data and observations were recorded using ESRI's Collector for ArcGIS application. Surveys were conducted via motorboat.

Cleaning

As our team is frequently moving from one water body to another, specific precautionary measures were taken to ensure that all equipment used was decontaminated and free of AIS. To ensure that all equipment was free of AIS, we thoroughly washed and decontaminated all of our equipment at one of the Adirondack AIS Prevention Program's free boat wash and decontamination stations. High pressure hot water was used at these sites to ensure that no AIS spread via equipment.

Monitoring Techniques

While out on the waterbody, we surveyed plants at survey stations, or sites, that were predetermined prior to performing the on-the-water survey. These survey stations were selected based on criteria outlined by the Adirondack Park Agency as requirements for applying for a permit application to perform management using the herbicide ProcellaCOR EC. Specifically, we established a sampling design based on the following APA requirements:

1. Perform survey at height of growing season
2. Establish point intercept survey points (stations/Sites) based on a grid size one acre or less.
3. Survey area must include the entire littoral zone (buffer zone) within 0.3 miles of the edge of the proposed treatment area.
4. Perform point intercept surveys at a minimum of 12 sites within the proposed treatment area and at least 24 sites outside of the proposed treatment area and within the 0.3 mile buffer zone.
5. Perform rake toss surveys at each site or sample point by throwing as many rake tosses as needed to find all plants at or near the sample point or site. This method is biased towards finding every plant species that may exist within the vicinity of a sampling location.
6. Record each species along with the following parameters (water depth, overall rake plant abundance, abundance of each species)
7. Additionally, photograph one example of each species identified during the survey.

The littoral zone typically encompasses the area from shoreline to a depth of about 15 feet. We utilized publicly available bathymetric maps of the proposed treatment areas as well as the surrounding area within 0.3 miles to determine the survey extent. We then evenly distributed roughly 24 survey points outside of the proposed treatment areas, for a total of 96 points across the entirety of the lake. We then shifted points to distribute our sampling locations across different habitat types, locations around shorelines, and to be within the water depths of the littoral zones based on maps and aerial imagery.

The team surveyed the area by navigating to each survey point, tossing the rake and by performing visual surveys where possible. All plants retrieved by rake toss or seen by visual inspection were identified to the best of our abilities (usually to the species level, but sometimes to genus). Both native and invasive plants found were identified using the "Maine Field Guide to Invasive Aquatic Plants and their common native look-alikes" by Lake Stewards of Maine.

Based upon how much plant material was observed on the rake toss, we assigned a percent cover for the entire rake and for each species on the rake. Plants that were observed visually and not collected on a rake toss were estimated based on their appearance from the water surface. Based on plant abundance, we used the following density classes:

Density Class	Class Description		Coverage Class (plant density)
T	Trace	1-2 stems	Less than 5%
S	Sparse	3-10 stems	5 - 25%
M	Moderate	Rakeful; no empty tines	26 - 50%
D	Dense	Rakeful; no visible tines	51 - 75%
HD	High Density	Difficult to bring on boat	76 - 100%

Table 1: Note we collect two density classes between 51-100% (51-75% and 75-100%) while some studies combine the two. Colors in the density class correspond to their relative abundance markers on maps (3 and 5-32).

Results

The team surveyed 184 sites in total over the course of four days in late June and early July in 2022; detecting one invasive species (Eurasian watermilfoil) and 27 native species including one native milfoil *Myriophyllum humile* (Low-water milfoil). Table 2 provides a summary of all aquatic vegetation detected in Brant Lake, in addition to their count and frequency of occurrence relative to the 184 points surveyed, invasive species are dictated in red. Full descriptions for each of these species, and impacts on their environment are attached in the appendix.

Table 2. Summary of Aquatic Vegetation Occurrences and Frequency – Brant Lake 2022

Common Name	Scientific Name	# Stations	% Occurrence
Stonewort	*Nitella sp.*	117	63.59%
Robbins pondweed	*Potamogeton robbinsii*	102	55.43%
Purple bladderwort	*Utriculaaria purpurea*	69	37.50%
Canadian water weed	*Elodea sp.*	67	36.41%
Bladderwort	*Utricularia macro*	63	34.24%
Eelgrass	*Vallisneria americana*	61	33.15%
Eurasian watermilfoil	*Myriophyllum spicatum*	50	27.17%
Slender naiad	*Najas flexilis*	47	25.54%
Watershield	*Brasenia schreberi*	41	22.28%
Hairgrass	*Eleocharis*	33	17.93%
Broadleaf pondweed	*Potamogeton natans*	30	16.30%
White waterlily	*Nymphaea odorata*	26	14.13%
Common pipewort	*Eriocaulon aquaticum*	24	13.04%
White stemmed pondweed	*Potamogeton praelongus*	23	12.50%
Clasping leaf pondweed	*Potamogeton perfoliatus*	22	11.96%
Small pondweed	*Potamogeton pusillus*	19	10.33%
Pickerelweed	*Pontederia cordata*	13	7.07%
Variable-leaf pondweed	*Potamogeton gramineus*	13	7.07%
Ribbon leaf pondweed	*Potamogeton epihydrus*	12	6.52%
Spatterdock	*Nuphar lutea*	10	5.43%
Bur-reed	*Sparganium sp.*	5	2.72%
Narrow-leaf Bur-reed	*Sparganium natans*	3	1.63%
Water lobelia	*Lobelia dortmanna*	2	1.09%
Water marigold	*Bidens beckii*	2	1.09%
Cattails	*Typha latifolia*	1	0.54%
Coontail	*Ceratophyllum demersum*	1	0.54%
Low water milfoil	*Myriophyllum humile*	1	0.54%
Quillwort	*Iseotes sp.*	1	0.54%

A total of 858 individual plant records were logged amongst the 184 stations. Coverage class was recorded for each of these and are displayed in Table 4.

Species Distributions

Myriophyllum spicatum (Eurasian watermilfoil)

This plant was found at a total of 50 sample points resulting in 27.17% of occurrences. It was most commonly found growing at trace levels, (n=32, 64%) followed by sparse, (n=12, 24%), moderate, (n=5, 10%), and highly-dense levels at (n=1, 2%).

Bidens beckii (Water marigold)

This plant was found at a total of 2 sample points resulting in 1.09% of occurrences. Both of these occurrences were found at sparse levels, (n=2, 100%).

Brasenia schreberi (Watershield)

This plant was found at a total of 41 sample points resulting in 22.28% of occurrences. It was most commonly found growing at trace levels, (n=23, 56%) followed by sparse, (n=14, 34%), moderate, (n=2, 5%), and dense levels (n=2, 5%).

Ceratophyllum demersum (Coontail)

This plant was found at of 1 sample point resulting in 0.54% of occurrences. It was found in trace amounts (n=1, 100%).

Eleocharis sp. (Hairgrass)

This plant was found at a total of 33 sample points resulting in 17.93% of occurrences. It occurred across all five coverage classes, most commonly at dense levels, (n=9, 27%) followed by sparse, (n=8, 24%), moderate, (n=8,24%), trace (n=6, 18%), and highly-dense levels, (n=2, 6%).

Elodea sp. (Canadian water weed)

This plant was found at a total of 67 sample points resulting in 36.41% of occurrences. It occurred most commonly at trace levels, (n=49, 73%) followed by sparse, (n=17, 25%), and moderate levels (n=1, 1%).

Eriocaulon aquaticum (Common pipewort)

This plant was found at a total of 24 sample points resulting in 13.04% of occurrences. It was most commonly found growing at trace levels, (n=14, 58%) followed by sparse, (n=8, 33%), and dense levels, (n=2, 8%).

Iseotes sp. (Quillwort)

This plant was found at a total of 1 sample point resulting in 0.54% of occurrences. It was found in trace amounts (n=1, 100%).

Lobelia dortmanna (Water lobelia)

This plant was found at a total of 2 sample points resulting in 1.09% of occurrences. Both of these occurrences were found at trace levels, (n=2, 100%).

Myriophyllum humile (Low watermilfoil)

This plant was found at a total of 1 sample point resulting in 0.54% of occurrences. It was found in trace amounts (n=1, 100%).

Najas flexilis (Slender naiad)

This plant was found at a total of 47 sample points resulting in 25.54% of occurrences. It was most commonly found growing at trace levels, (n=26, 58%) followed by sparse (n=17, 38%), moderate, (n=1, 2%), and dense levels (n=1, 2%).

Nitella sp. (Stonewort)

This plant was found at a total of 117 sample points resulting in 63.59% of occurrences. It occurred across all five coverage classes, most commonly at sparse levels, (n=67, 57%) followed by trace, (n=23, 20%), moderate, (n=19, 16%), dense (n=7, 6%), and at highly-dense levels, (n=1, 1%).

Nuphar lutea (Spatterdock)

This plant was found at a total of 10 sample points resulting in 5.43% of occurrences. It was most commonly found growing at moderate levels, (n=5, 50%) followed by trace, (n=3, 30%), and sparse levels, (n=2, 20%).

Nymphaea odorata (White water lily)

This plant was found at a total of 26 sample points resulting in 14.13% of occurrences. It occurred across all five coverage classes, most commonly at trace levels, (n=10, 38%) followed by sparse, (n=7, 27%), moderate, (n=4, 15%), dense, (n=3, 12%), and highly-dense, (n=2, 8%).

Pontederia cordata (Pickerelweed)

This plant was found at a total of 13 sample points resulting in 7.07% of occurrences. It was most commonly found growing at sparse levels, (n=10, 77%) followed by trace, (n=2, 15%), and moderate, (n=1, 8%).

Potamogeton epihydrus (Ribbon leaf pondweed)

This plant was found at a total of 12 sample points resulting in 6.52% of occurrences. It was found growing at trace levels for all occurrences, (n=12, 100%).

Potamogeton gramineus (Variable-leaf pondweed)

This plant was found at a total of 13 sample points resulting in 7.07% of occurrences. It was most commonly found growing at trace levels, (n=12, 92%) and then moderately (n=1, 8%).

Potamogeton natans (Floating-leaf pondweed or Broad-leaf pondweed)

This plant was found at a total of 30 sample points resulting in 16.30% of occurrences. It was most commonly found growing at sparse levels, (n=14, 47%) followed by trace, (n=9, 30%), moderate, (n=4, 13%), and dense, (n=3, 10%).

Potamogeton perfoliatus (Clasping-leaf pondweed)

This plant was found at a total of 22 sample points resulting in 11.96% of occurrences. It was found growing at trace, (n=14, 64%) and sparse levels, (n=8, 36%).

Potamogeton praelongus (White stemmed pondweed)

This plant was found at a total of 23 sample points resulting in 12.50% of occurrences. It was most commonly found growing at trace levels, (n=10, 43%), followed by sparse, (n=8, 35%), and moderate, (n=5, 22%).

Potamogeton robbinsii (Robbin's pondweed)

This plant was found at a total of 102 sample points resulting in 55.43% of occurrences. It was most commonly found growing at sparse levels, (n=46, 45%) followed by trace, (n=26, 25%), moderate (n=19, 19%), and dense levels, (n=11, 11%).

Potamogeton pusillus (Small pondweed)

This plant was found at a total of 19 sample points resulting in 10.33% of occurrences. It was most commonly found growing at trace levels, (n=16, 84%) and then sparsely, (n=3, 16%).

Sparganium sp. (Bur-reed)

This plant was found at a total of 5 sample points resulting in 2.72% of occurrences. It was most commonly found growing at trace levels, (n=3, 60%), and then sparsely, (n=1, 20%)

Sparganium natans (Narrow-leaf bur-reed)

This plant was found at a total of 3 sample points resulting in 1.63% of occurrences. It had an even distribution for trace, sparse, and moderate coverage at, (n=1, 33%).

Typha latifolia (Cattail)

This plant was found at 1 sample point resulting in 0.54% of occurrences. It was found growing at sparse levels, (n=1, 100%).

Utricularia intermedia (Bladderwort)

This plant was found at a total of 63 sample points resulting in 34.24% of occurrences. It was most commonly found growing at trace levels, (n=36, 57%) followed by sparse, (n=16, 25%), moderate, (n=10, 16%), and dense levels, (n=1, 25%).

Utriculaaria purpurea (Purple bladderwort)

This plant was found at a total of 69 sample points resulting in 37.50% of occurrences. It was most commonly found at trace, (n=33, 49%) and sparse levels, (n=16, 25%); followed by moderate, (n=10, 16%), and dense levels, (n=1, 2%).

Vallisneria americana (Eelgrass)

This plant was found at a total of 61 sample points resulting in 33.15% of occurrences. It was most commonly found in trace amounts, (n=49, 80%) followed by sparse, (n=11, 18%), and moderate levels, (n=1, 2%).

Eurasian watermilfoil distribution

Of the 50 stations Eurasian watermilfoil, 28 were recorded in the proposed treatment area, and 22 were located outside the proposed treatment area. The majority of occurrences were recorded at the northern portion of the lake. Of the 28 points recorded in the treatment area the majority of points, (n=17, 61%) were recorded at trace densities. Followed then by sparse coverage, (n=8, 29%) and moderate coverage at, (n=3, 11%). Dense or highly-dense coverage was not found at any of the points in the treatment area. Of the 22 stations outside of the treatment area the majority of points, (n=15, 68%) were recorded at trace densities, followed by sparse, (n=4, 18%), and moderate coverage (n=2, 9%). Eurasian watermilfoil was found at one point outside of the treatment area, (station 35) with highly-dense coverage, (n=1, 5%). Dense coverage was not found at any of the points outside the treatment area. Table 3 displays the station number, respective GPS coordinates and depth that Eurasian watermilfoil was recorded, along with its abundance and the total species richness at that point. Tables are ordered from lowest to highest density, separated by the four coverage classes Eurasian watermilfoil was detected at.

Table 3. Eurasian watermilfoil Presence – Brant Lake 2022

Station #	X	Y	Depth (ft.)	Abundance of Target Species	Total Species Richness
3	-73.6801	43.73767	1	less than 5%	7
7	-73.68	43.73911	3	less than 5%	4
8	-73.68	43.73984	2	less than 5%	5
16	-73.6785	43.74313	2	less than 5%	3
17	-73.6785	43.74313	2	less than 5%	3
27	-73.6734	43.74207	9	less than 5%	5
47	-73.6803	43.72756	2	less than 5%	5
62	-73.7311	43.69577	1	less than 5%	4
76	-73.7256	43.69229	6	less than 5%	8
82	-73.7212	43.6935	2	less than 5%	5
84	-73.7201	43.69492	2	less than 5%	4
89	-73.7166	43.70024	1	less than 5%	8
93	-73.7156	43.70208	8	less than 5%	8
110	-73.7076	43.70781	4	less than 5%	8
134	-73.6967	43.72739	12	less than 5%	11
135	-73.6962	43.72809	21	less than 5%	7
136	-73.6967	43.72841	12	less than 5%	13
137	-73.6958	43.72856	6	less than 5%	6
139	-73.6968	43.73115	4	less than 5%	5
142	-73.6974	43.73269	1	less than 5%	10
146	-73.6958	43.73333	2	less than 5%	5
149	-73.6945	43.73381	1	less than 5%	12
150	-73.6939	43.73332	3	less than 5%	8

Table 3. Continued

Station #	X	Y	Depth (ft.)	Abundance of Target Species	Total Species Richness
152	-73.6928	43.73325	3	less than 5%	7
155	-73.6916	43.73379	1	less than 5%	4
156	-73.6906	43.73373	1	less than 5%	7
159	-73.6896	43.73315	4	less than 5%	6
165	-73.6876	43.73198	1	less than 5%	7
166	-73.6881	43.73096	4	less than 5%	4
179	-73.6821	43.73425	4	less than 5%	5
181	-73.6821	43.73474	4	less than 5%	6
184	-73.6806	43.73527	10	less than 5%	5
4	-73.6802	43.73843	1	5% - 25%	6
14	-73.6778	43.74202	8	5% - 25%	8
21	-73.6781	43.74426	1	5% - 25%	10
29	-73.6749	43.73938	10	5% - 25%	5
48	-73.6814	43.72686	9	5% - 25%	3
85	-73.7198	43.69563	3	5% - 25%	4
124	-73.7162	43.70801	2	5% - 25%	5
141	-73.6968	43.73254	2	5% - 25%	6
147	-73.6955	43.73421	1	5% - 25%	15
153	-73.6918	43.73253	14	5% - 25%	5
178	-73.682	43.73373	8	5% - 25%	4
180	-73.6813	43.73423	12	5% - 25%	7
10	-73.679	43.74055	2	26% - 50%	8
31	-73.6746	43.73763	8	26% - 50%	2
117	-73.7038	43.71205	8	26% - 50%	5
145	-73.6958	43.73259	6	26% - 50%	6
158	-73.6911	43.73245	14	26% - 50%	8
35	-73.6762	43.7354	22	75% - 100%	2

Table 3. Note: The survey point with the highest density coverage class was located in an area outside of the treatment area

Table 4. Abundance of Species by Site – Brant Lake 2022

Station Number	Depth (ft.)	Eurasian watermilfoil	Broadleaf pondweed	Bur-reed	Canadian water weed	Cattails	Clasping leaf pondweed	Bladderwort	Eelgrass	Common pipewort	Coontail	Hairgrass	Low water milfoil	Narrow-leaf Bur-reed	Pickerelweed	Purple bladderwort	Quillwort	Ribbonleaf pondweed	Robbins pondweed	Slender naiad	Small pondweed	Spatterdock	Stonewort	Variable-leaf pondweed	Water lobelia	Water marigold	Watershield	White stemmed pondweed	White waterlily	Species Richness	Overall Abundance
1	1																													3	75-100%
2	1				S			T											T				T							4	5-25%
3	1	T			T		T		T									T	D					T						7	51-75%
4	1	S	D		T				T										D				S							6	51-75%
5	1				T				T						S					T			S				T			6	5-25%
6	1								T											T			M							3	26-50%
7	3	T																	S	S								T		4	5-25%
8	2	T						S	S										T				T							5	5-25%
9	1				T				T			S				T			S				S				S			7	5-25%
10	2	M			T				T							T			T	T									M	8	26-50%
11	7				T											T							S							3	5-25%
12	15												T						D											2	51-75%
13	14																		T				S							2	5-25%
14	8	S	T		T				T							S			S	T			S							8	5-25%
15	2							M								S								T		S			HD	5	75-100%
16	2	T																		S			M							3	26-50%
17	2	T																		S			M							3	26-50%
18	1									S		T			S	M			T			S							D	7	51-75%
19	1				T											S			D							S				4	51-75%
20	1							S				HD			M	T						M					M		S	7	75-100%
21	1	S	S		T			S	S							T			S			M					M		T	10	26-50%
22	1				T																									1	Less than 5%
23	5				T											N/A			S	S			T							5	5-25%
24	1							T	S					S									S						S	5	5-25%
25	1		T					T	T	T									M				S	T					S	8	5-25%
26	1							T				D							T			M		T			S		D	7	51-75%
27	9	T														T			S				D					T		5	51-75%
28	10																						S							1	5-25%
29	10	S					S	T											S									S		5	5-25%
30	9															T			S				T							3	5-25%
31	8	M																					S							2	26-50%
32	3								S					M	S				S											4	26-50%
33	4								S																					1	5-25%
34	16																						T							1	Less than 5%
35	22	HD																	D											2	75-100%
36	6								S							S							S							3	5-25%
37	22											M																		1	26-50%
38	4							T				D				T														3	51-75%
39	4				T							T								N/A			S				T			5	5-25%
40	10																			T			T							2	Less than 5%
41	9		M		S														T	N/A			S				T			7	5-25%
42	8		M		T				T										S	T							T	S		7	26-50%
43	10											T											S							2	5-25%
44	4							T				T							D											3	51-75%
45	5								T																					1	Less than 5%
46	2				M		T												D								T			4	26-50%
47	2	T	S				T													T			T							5	5-25%
48	9	S			S			S																						3	5-25%
49	1											S																		1	5-25%
50	1			D				S				T			S												D		M	6	51-75%
51	1											D				S														2	51-75%
52	1															S														2	51-75%
53	1							S				S				S			T				T				S			7	5-25%
54	1														S	S											T		M	4	26-50%
55	1								T			D																		2	51-75%
56	1															M														1	26-50%
57	1				T			T				M				T			T											5	26-50%
58	1															D							T				S		D	4	51-75%
59	1															S			M	S										3	26-50%
60	1															S														1	5-25%
61	1							T											S											2	5-25%
62	1	T						S											S				S							4	5-25%
63	1																		S	T			S							3	5-25%
64	1				T							S				T			D	T										5	51-75%
65	1															S			T	S			S							4	5-25%
66	1											S				T			M											3	26-50%
67	15																						M							1	26-50%
68	2															T			S									M		3	26-50%
69	1				T				T							T				S			T							5	5-25%
70	4				T			T								S			M				S					M		6	26-50%

Table 4 continued

Station Number	Depth (ft.)	Eurasian watermilfoil	Broadleaf pondweed	Bur-reed	Canadian water weed	Cattails	Clasping leaf pondweed	Bladderwort	Eelgrass	Common pipewort	Coontail	Hairgrass	Low water milfoil	Narrow-leaf Bur-reed	Pickerelweed	Purple bladderwort	Quillwort	Ribbonleaf pondweed	Robbins pondweed	Slender naiad	Small pondweed	Spatterdock	Stonewort	Variable-leaf pondweed	Water lobelia	Water marigold	Watershield	White stemmed pondweed	White waterlily	Species Richness	Overall Abundance
71	10																		S									T		2	5-25%
72	15				T																		S							2	5-25%
73	8		M				T											T										T		4	26-50%
74	3															T							T							2	Less than 5%
75	12				T		T	S								T			M				S							6	26-50%
76	6	T	T		T			S								S			S				M					M		8	26-50%
77	3				S							S				S			M				T					S		6	26-50%
78	1			T				D	S			M				S			T								S		M	8	51-75%
79	3											S				S			T									T		4	5-25%
80	6							S								T			T				S					S		5	5-25%
81	11															T			M									S		3	26-50%
82	2	T						M								T			T				S							5	26-50%
83	3				T														S								T			3	5-25%
84	2	T			T			T															M							4	26-50%
85	3	S						T											S				S							4	5-25%
86	1		M				T				T					S			T	T										6	26-50%
87	2		S																	S			S							3	5-25%
88	1				T			T								S			M	T			M							6	26-50%
89	1	T	T					T								T			T	D			S				T			8	51-75%
90	5																							T						1	Less than 5%
91	6				T			S	T										S				S							5	5-25%
92	5																		M									S	T	3	26-50%
93	8	T	S					S	T							T			M	T			S							8	26-50%
94	2															T				S			S				T			4	5-25%
95	7								T										S				S					S		4	5-25%
96	2																		S				S							2	5-25%
97	6																		T				S							2	5-25%
98	9				T			T								T			T				S							6	5-25%
99	8				T											S			S				M							4	26-50%
100	2				T		T	M								S			S		T		S							7	26-50%
101	10							T											S				D							3	51-75%
102	12		S		T		T	M								T			S				HD							7	75-100%
103	3							T	T										S				M					T		5	26-50%
104	13							M											S		T		D							4	51-75%
105	12				S														S				D							3	51-75%
106	3															T							S							2	5-25%
107	12				T			T								S					T		M					M		6	26-50%
108	20																						D							1	51-75%
109	15																						T							1	Less than 5%
110	4	T			T	S														S		M					S		S	8	26-50%
111	9							T															S							2	5-25%
112	3				S		T	T	S									T	S		T		S	M			T			10	26-50%
113	11				T		T	M								S			S				M	T						7	26-50%
114	2								T							T							M							3	26-50%
115	3				T														D									T		3	51-75%
116	3			T	T				S	D					T					S	T		T							8	51-75%
117	8	M			S		S		T										M											5	26-50%
118	8								T	S													D		T					4	51-75%
119	10									T							T			S	T									4	5-25%
120	4				T														S		T									3	5-25%
121	2				S																		S							2	5-25%
122	3								T	D					S								S				S			5	51-75%
123	1				T					S									S	T	T		S							6	5-25%
124	2	S	S		T		S	T																						5	5-25%
125	1				T			T	T	T									S	T			M							7	5-25%
126	1				T				T							T				S	T		S				S			7	5-25%
127	1																			T	T		S							3	5-25%
128	1		T					T	T			D				S			T				S					M	T	9	51-75%
129	1							10				HD				S								T					HD	5	75-100%
130	1							T				M			S	T						M					D		S	7	51-75%
131	1						S		T	S								T						T						5	5-25%
132	1				S		T	T	S	T					T			T	T	T	T		T						T	12	5-25%
133	1									T								T	M	S	S	T		T			T			8	26-50%
134	12	T			S			T	S	T									M	S	T		T	T			T			11	26-50%
135	21	T	S						T	S								T	S				S							7	5-25%
136	12	T			T		M		T	T		M			S				S		S		S				T		T	13	26-50%
137	6	T	S		S							S							D				S							6	51-75%
138	5							T	T			M				S			T				S				T		T	8	26-50%
139	4	T							M										S				M				T			5	26-50%
140	3											T								T	S		S							4	5-25%

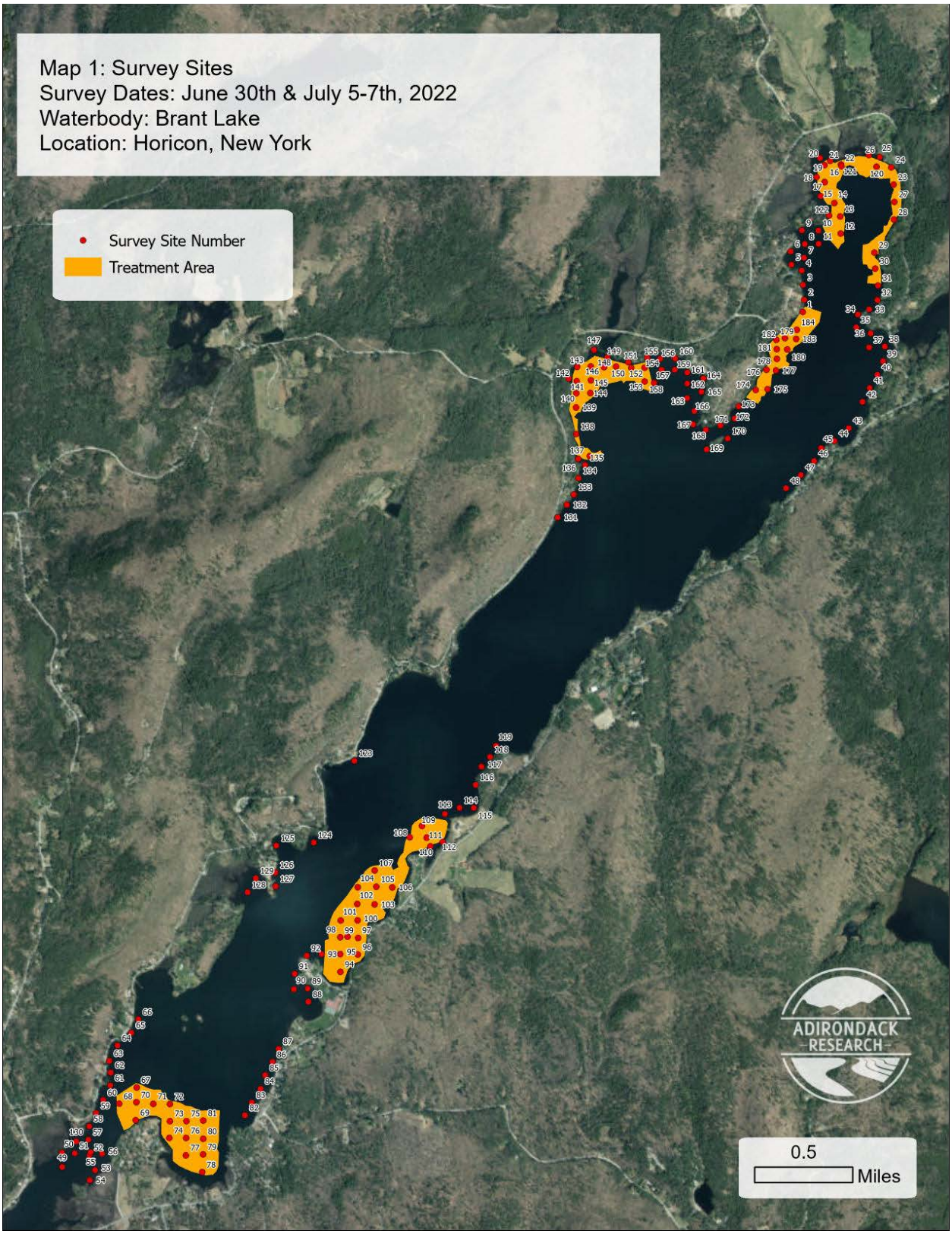
Table 4 continued

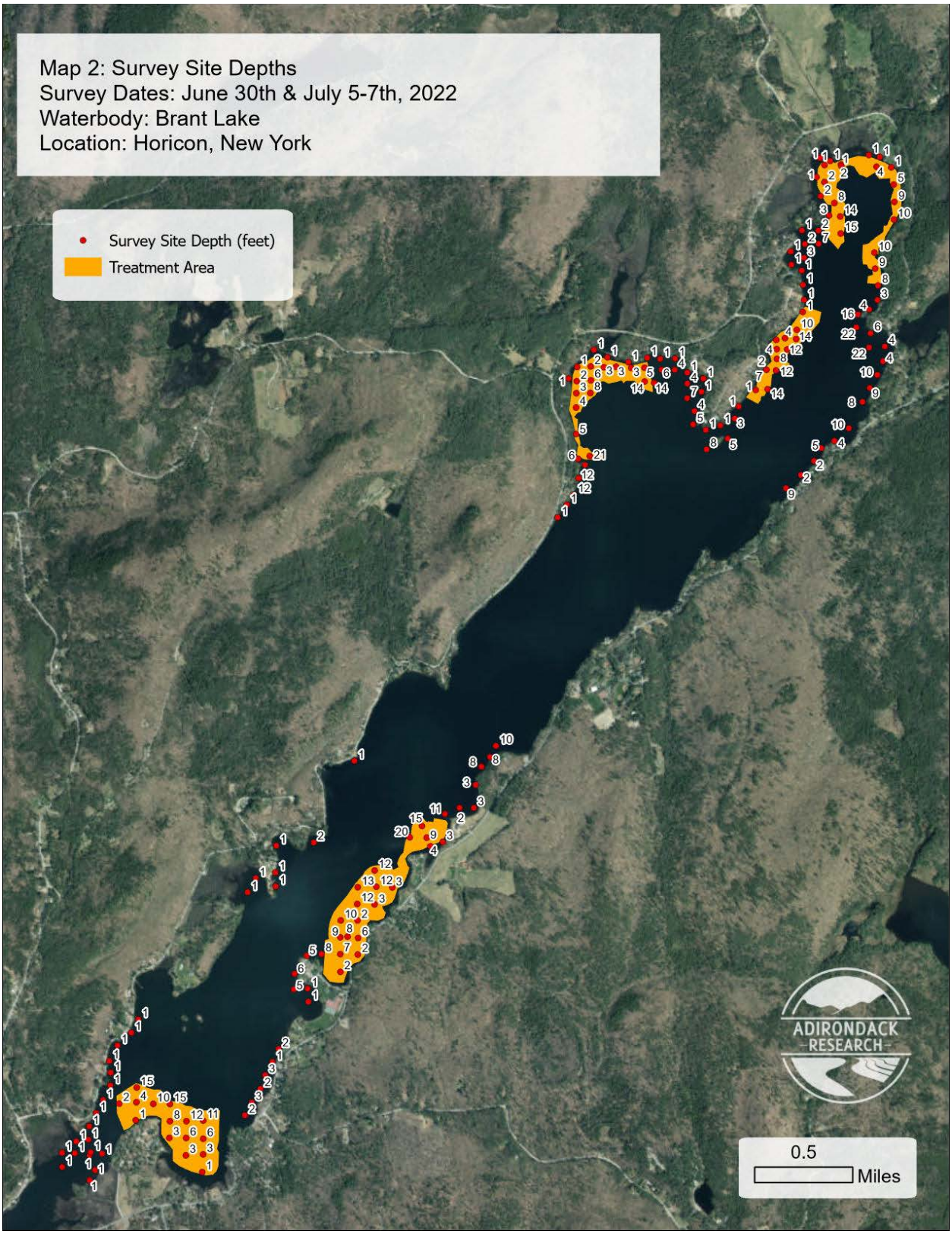
Station Number	Depth (ft.)	Eurasian watermilfoil	Broadleaf pondweed	Bur-reed	Canadian water weed	Cattails	Clasping leaf pondweed	Bladderwort	Eelgrass	Common pipewort	Coontail	Hairgrass	Low water milfoil	Narrow-leaf Bur-reed	Pickerelweed	Purple bladderwort	Quillwort	Ribbonleaf pondweed	Robbins pondweed	Slender naiad	Small pondweed	Spatterdock	Stonewort	Variable-leaf pondweed	Water lobelia	Water marigold	Watershield	White stemmed pondweed	White waterlily	Species Richness	Overall Abundance
141	2	S						S								S							M				T		S	6	26-50%
142	1	T		S	S				T										M	T			S				S		T	10	75-100%
143	1								T			D				S			S	S							S			6	51-75%
144	8				T																		D							2	51-75%
145	6	M			T			M								S			S				M							6	26-50%
146	2	T							T			D				S													T	5	51-75%
147	1	S		T	T			T	T			D			S	S		T	S		T	S					S	T	T	15	51-75%
148	3				S		S	S				M				S			S				S							7	26-50%
149	1	T			T			T	T			D			S	T		T	T			T					S		S	12	51-75%
150	3	T					T		T			M				T							S	T			T			8	26-50%
151	1		M						T	T						T		T	T				S				T		T	9	26-50%
152	3	T	D						T							T			T	T			M							7	51-75%
153	14	S	S				T	S															M							5	26-50%
154	5		S						T												T		S				T			5	5-25%
155	1	T																	T				T				S			4	5-25%
156	1	T						T	T	T									T				T				T			7	Less than 5%
157	6		D					M															M							3	51-75%
158	14	M	S		S			M								T		T	M				S							8	26-50%
159	4	T			T			M	T														S					S		6	26-50%
160	1								T	S										T			T	T						5	5-25%
161	1									T													T							2	Less than 5%
162	4																						S							1	5-25%
163	7																						S							1	5-25%
164	1		T						T	S											T		T				T			6	5-25%
165	1	T			T				T									T	S	M			S							7	26-50%
166	4	T	T					T																			T			4	Less than 5%
167	5							T	T										S											3	5-25%
168	1									T																				1	Less than 5%
169	8								T																					1	Less than 5%
170	5																						S							1	5-25%
171	1		T		T		T	T	T											T			T							7	Less than 5%
172	3																						T							1	Less than 5%
173	1								T	S									S	T		T	S		T					7	5-25%
174	1				S					T				T					M								T	T		6	26-50%
175	14																						S							1	5-25%
176	7		S		S				T	T						S			M	T							S			8	26-50%
177	12																						S							1	5-25%
178	8	S																	D	T								T		4	51-75%
179	4	T							T										S	T			S							5	5-25%
180	12	S	T		S		S	S								T							S							7	5-25%
181	4	T			T					T									M	S			S							6	26-50%
182	4								T										M	T			S							4	26-50%
183	14				T														S		T		S							4	5-25%
184	10	T			T			T											S				S							5	5-25%

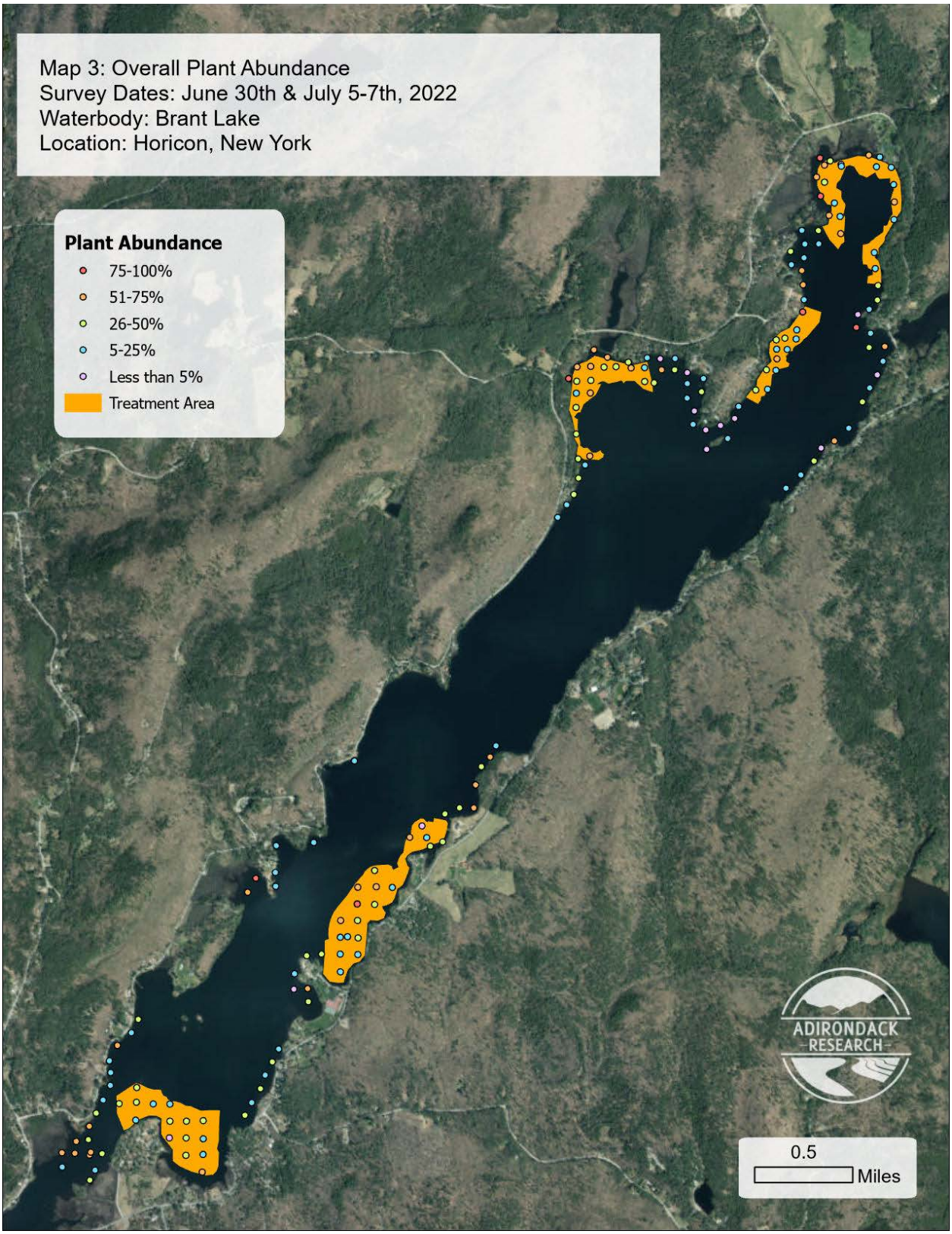
Table 4. Note: Species were collected at 3 points where coverage class was not recorded, these are marked N/A. Three species were noted at station 1 with recorded coverage class, however species names were not recorded

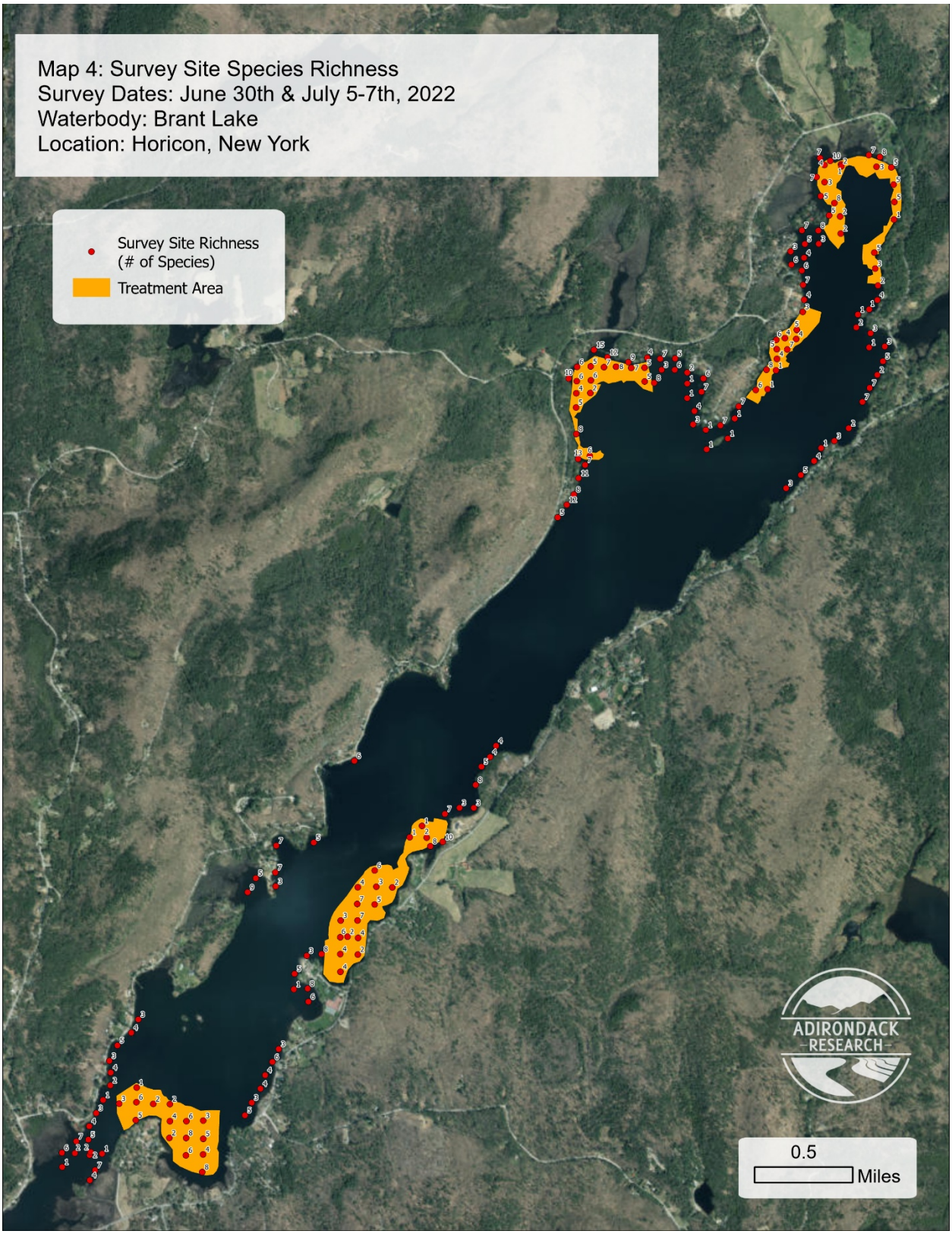
Maps

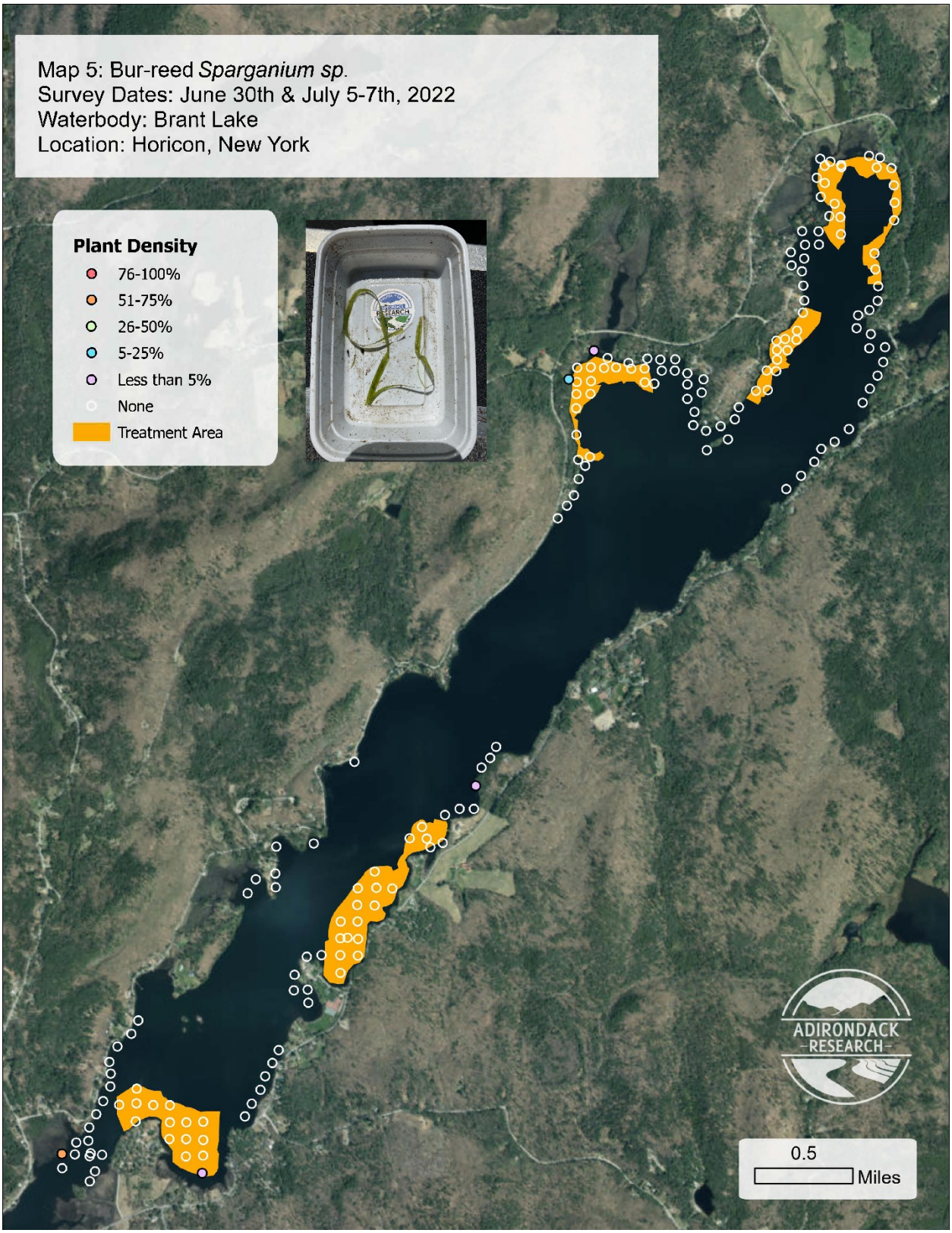
Maps 5-32 display the plant abundance for each species across all survey points. Map 1 marks the numbered station points, Map 2 displays depth at each station point, Map 3 displays overall plant abundance, and Map 4 displays species richness per site.

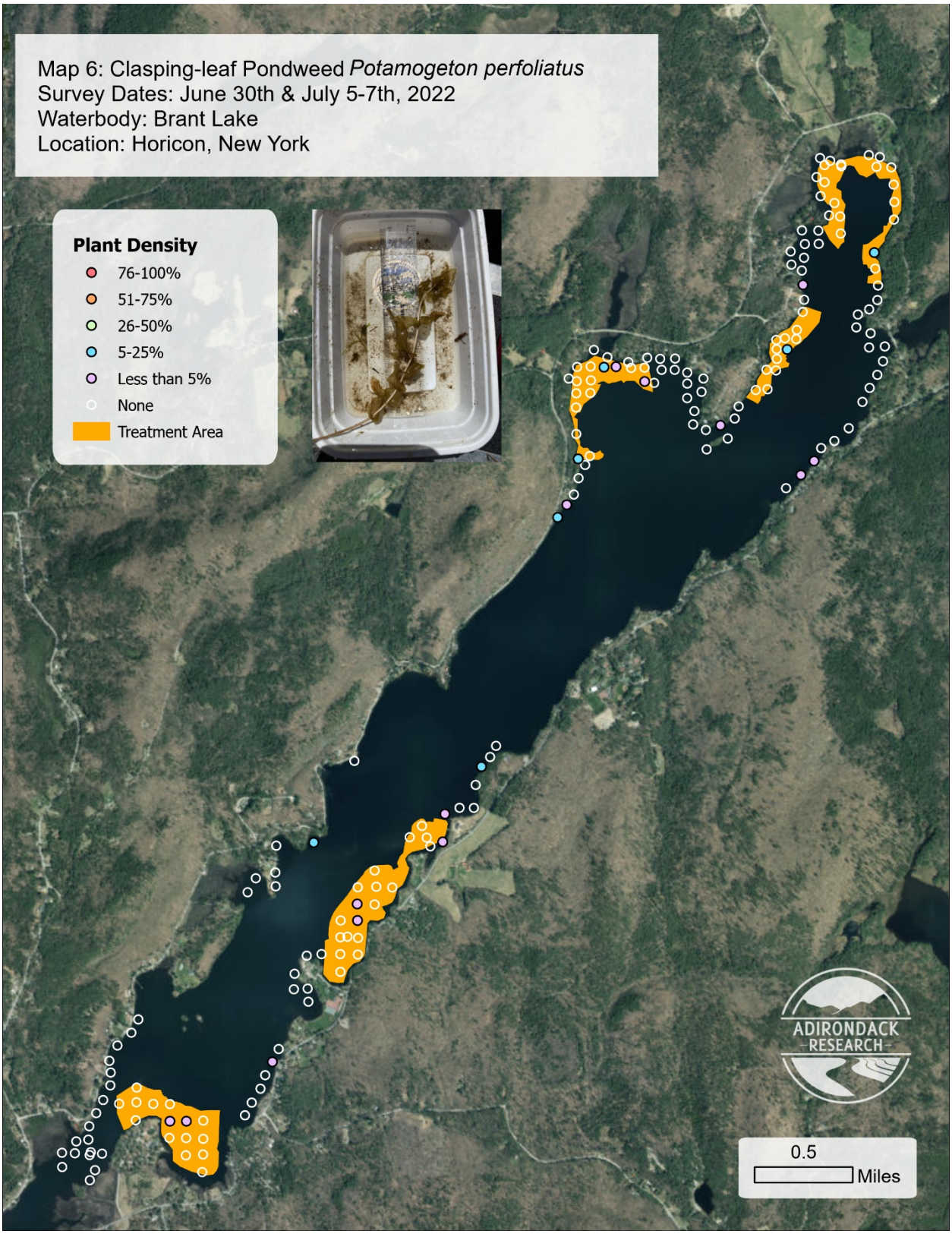

Map 1: Survey Sites
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Survey Site Number
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

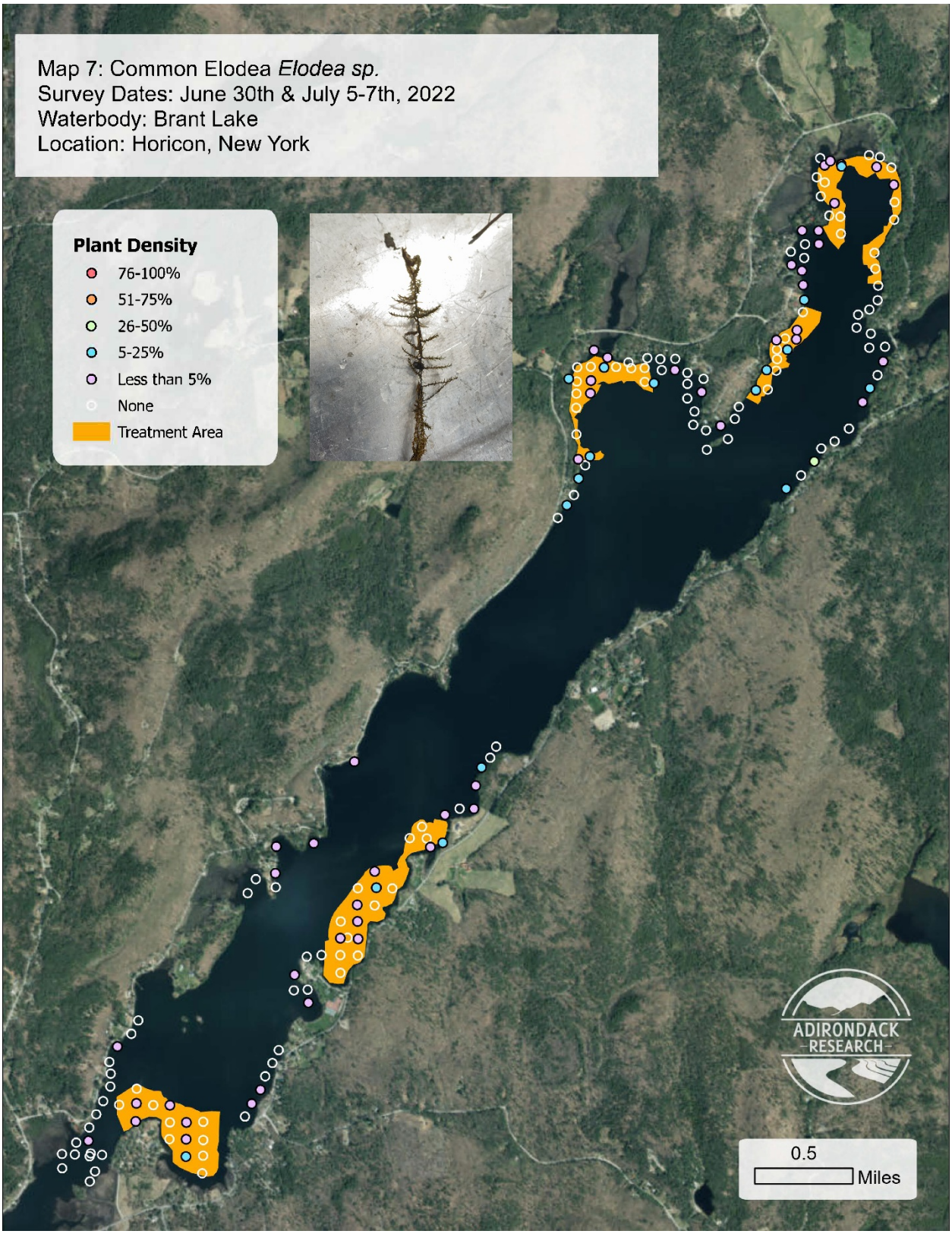

Map 2: Survey Site Depths
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Survey Site Depth (feet)
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

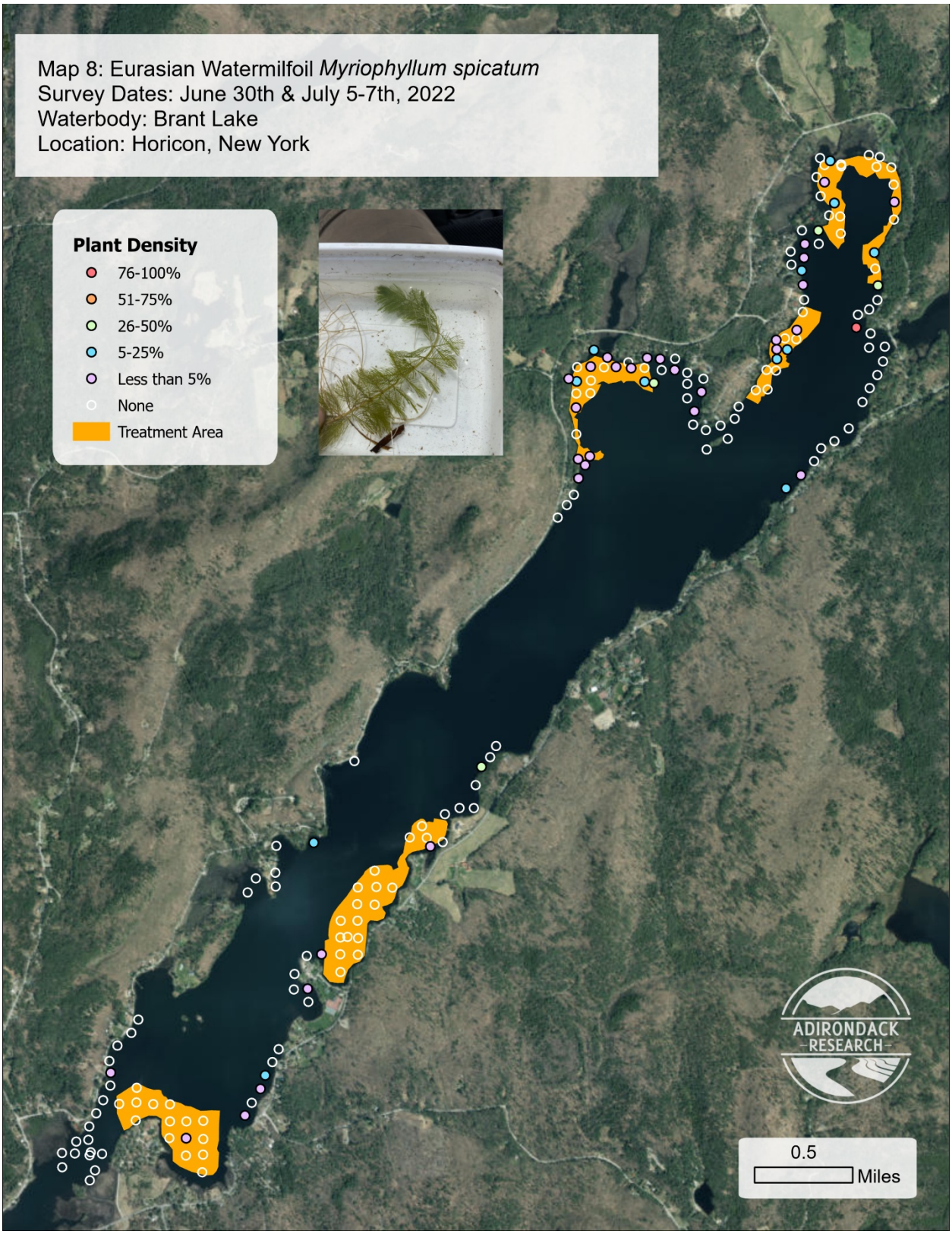

Map 3: Overall Plant Abundance
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Abundance
75-100%
51-75%
26-50%
5-25%
Less than 5%
Treatment Area
ADIRONDACK
RESEARCH
0.5
Miles

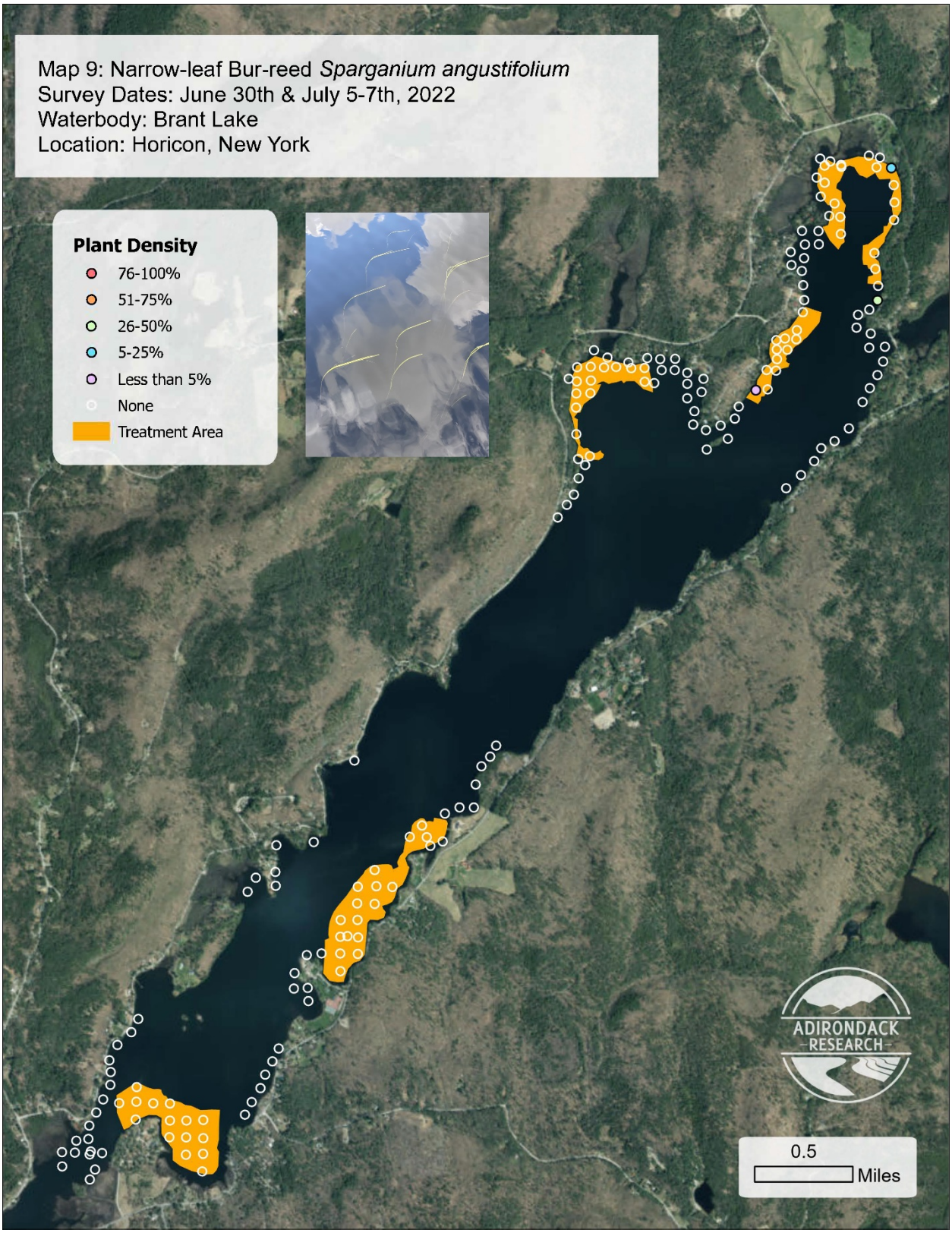

Map 4: Survey Site Species Richness
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Survey Site Richness
(# of Species)
Treatment Area
ADIRONDACK
RESEARCH
0.5
Miles

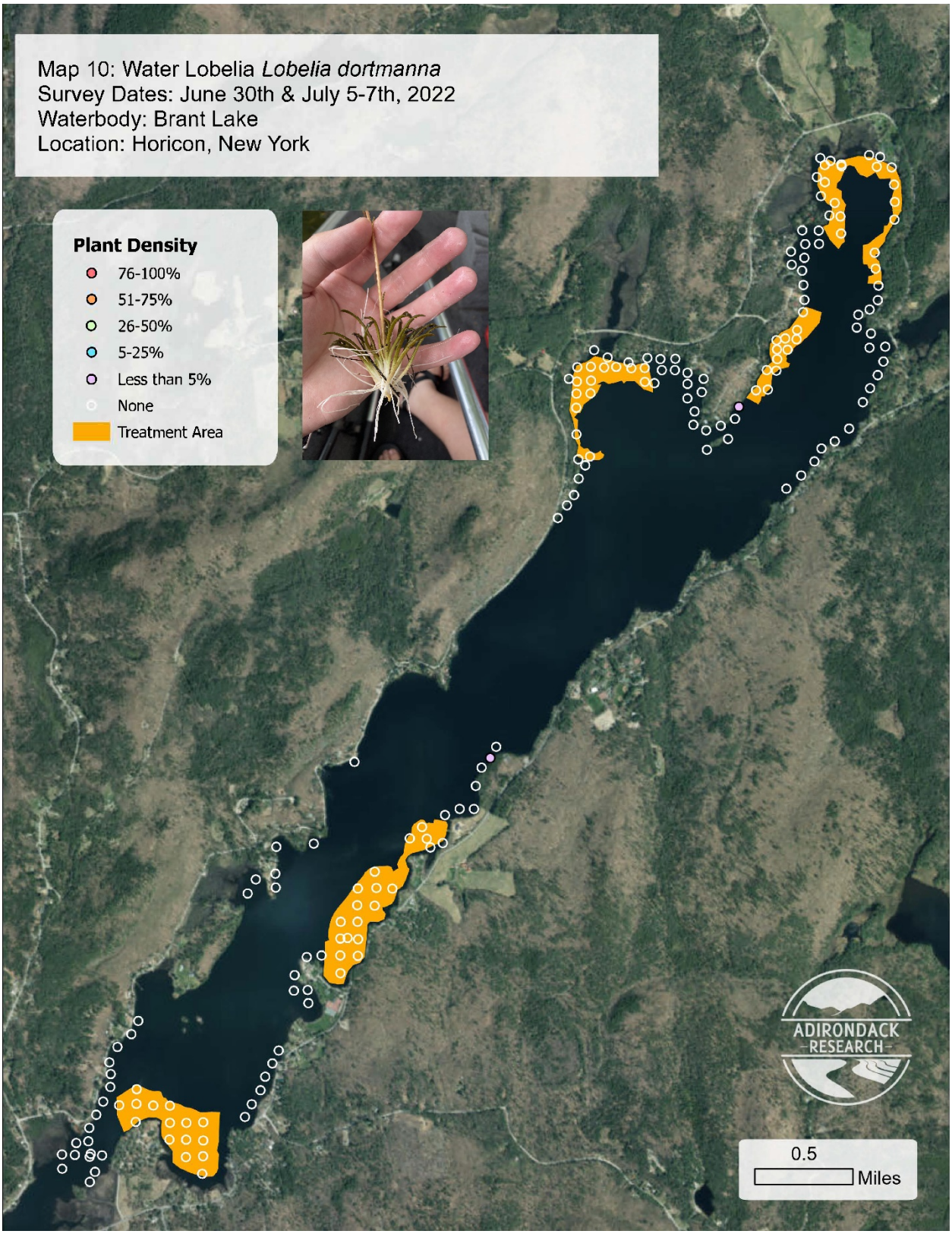

Map 5: Bur-reed *Sparganium sp.*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK
RESEARCH
0.5
Miles

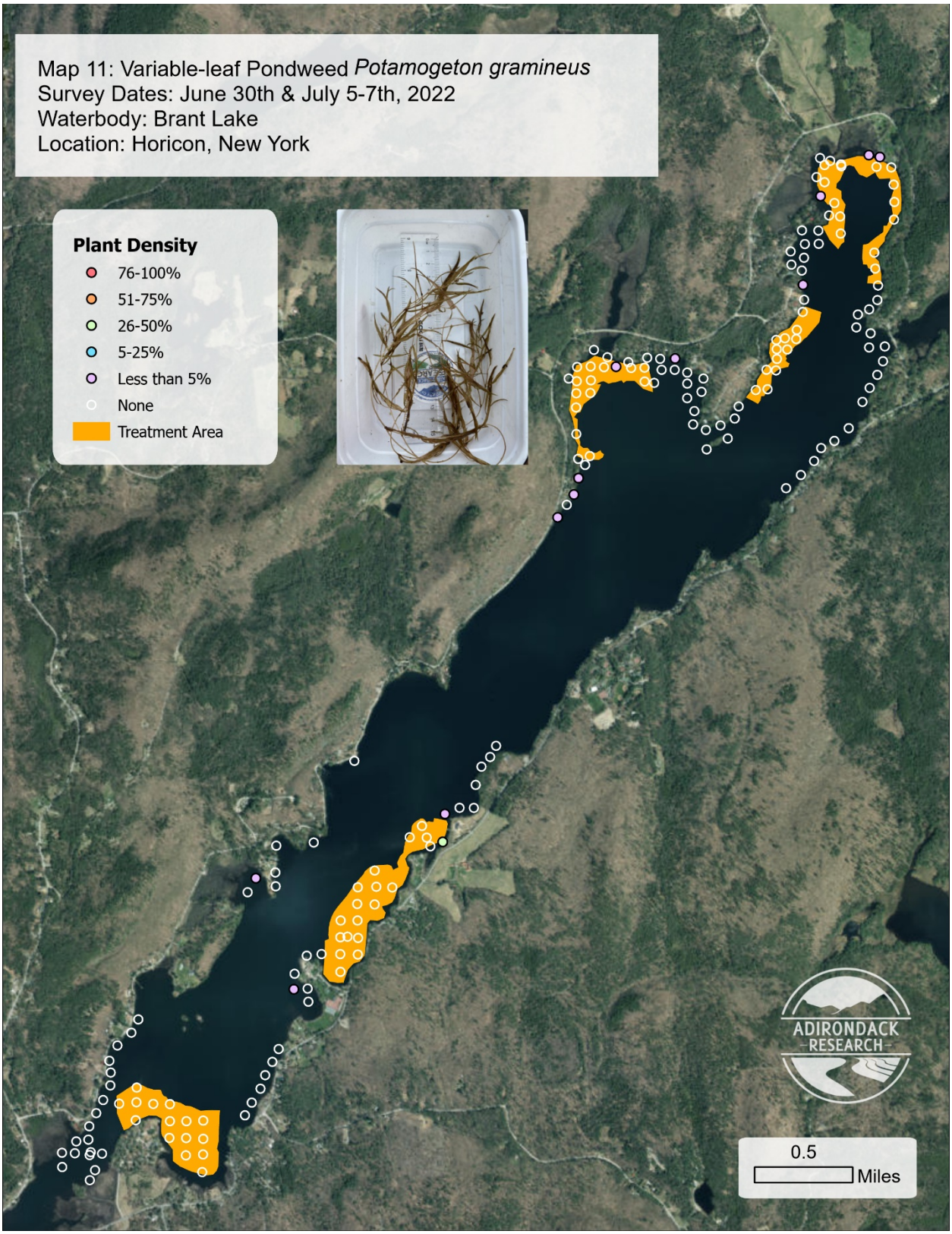

Map 6: Clasping-leaf Pondweed *Potamogeton perfoliatus*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

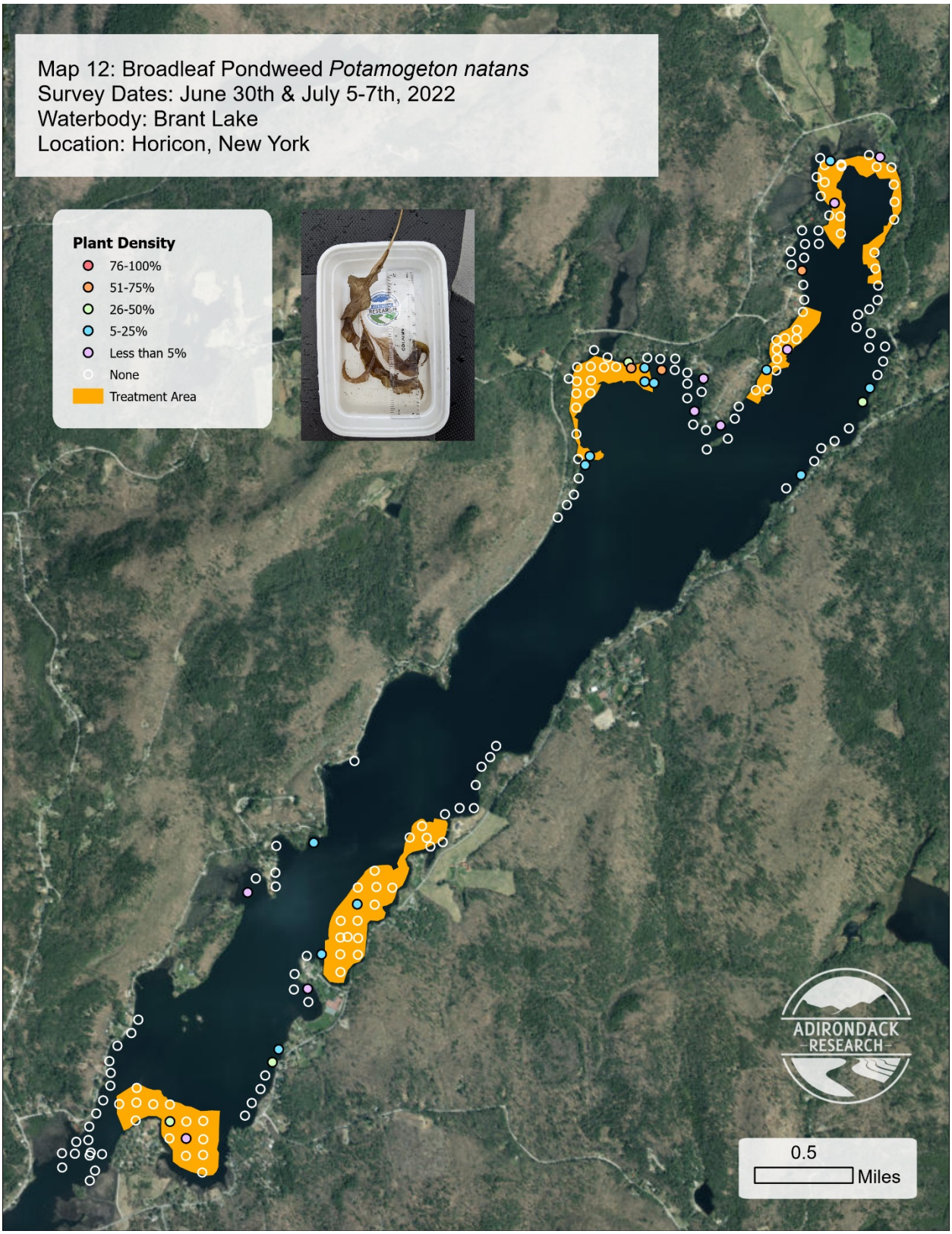

Map 7: Common Elodea *Elodea sp.*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

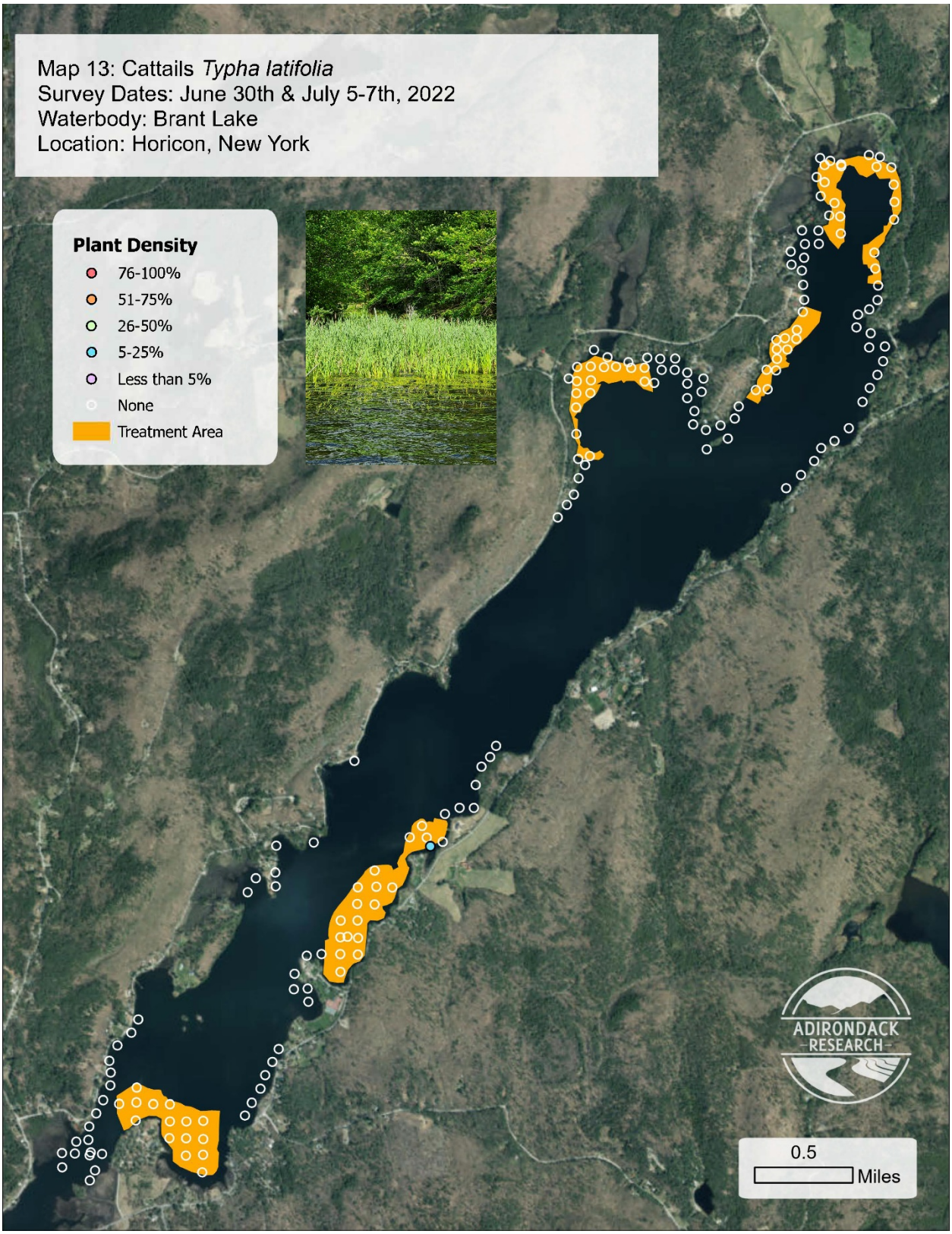

Map 8: Eurasian Watermilfoil *Myriophyllum spicatum*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

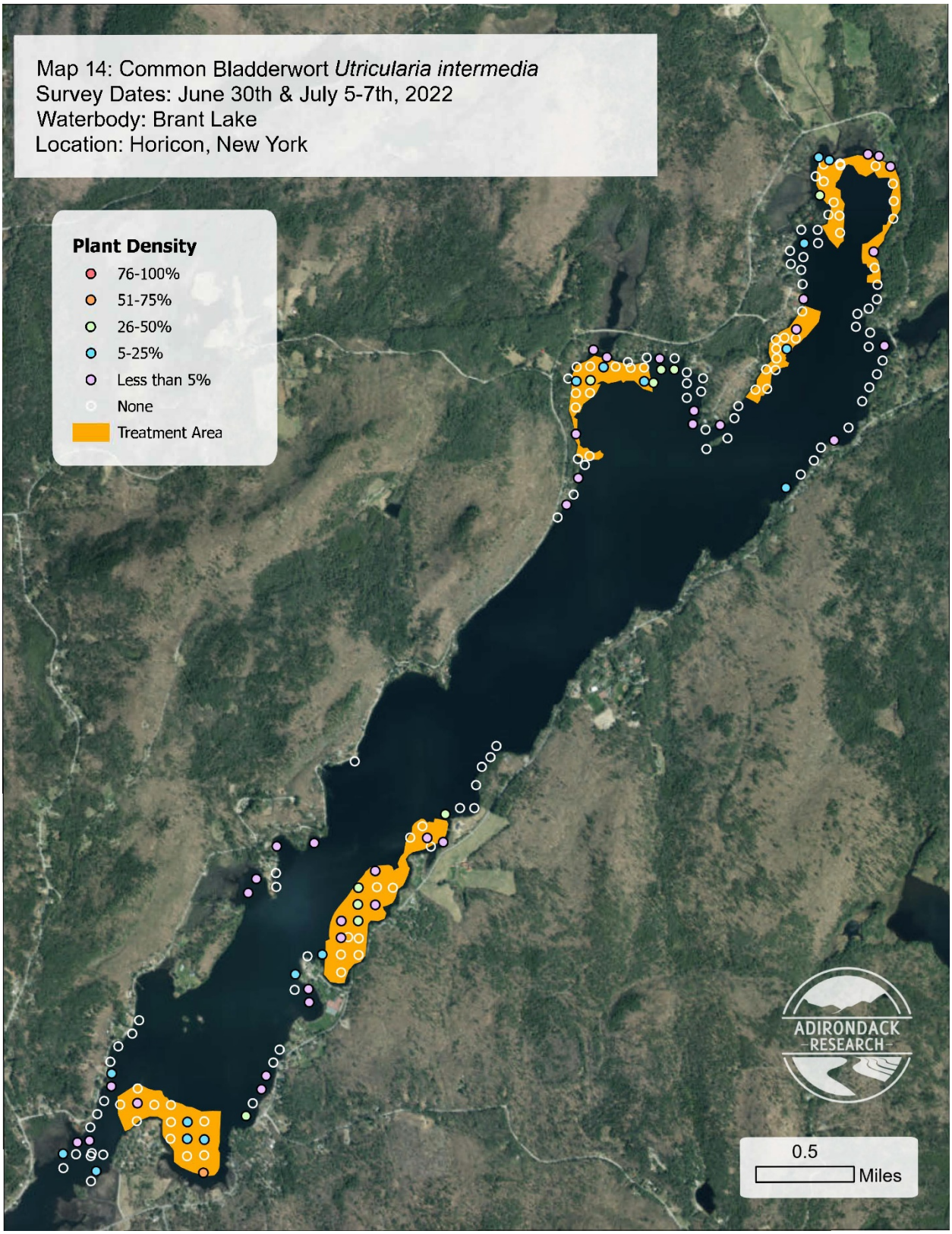

Map 9: Narrow-leaf Bur-reed *Sparganium angustifolium*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

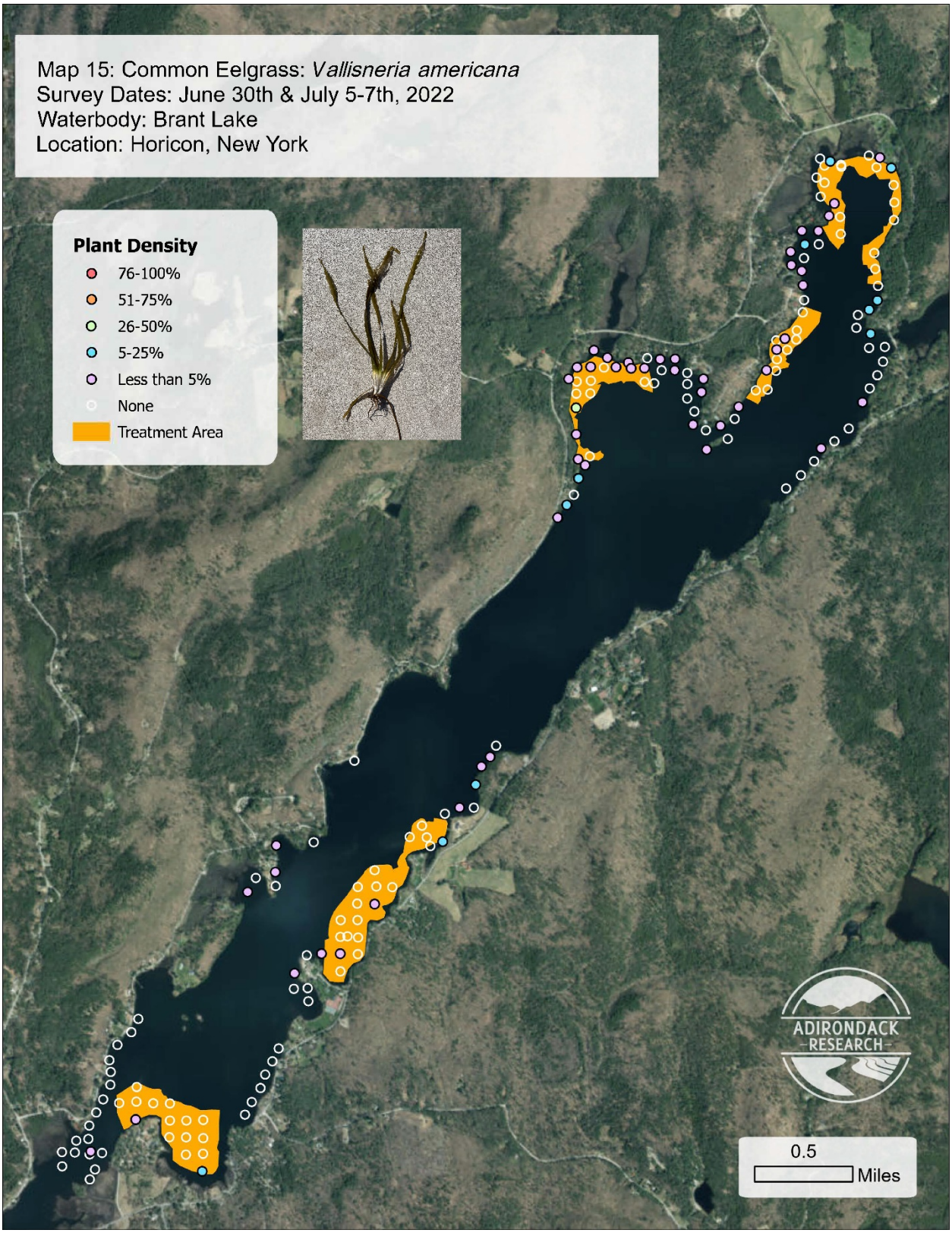

Map 10: Water Lobelia *Lobelia dortmanna*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK
RESEARCH
0.5
Miles

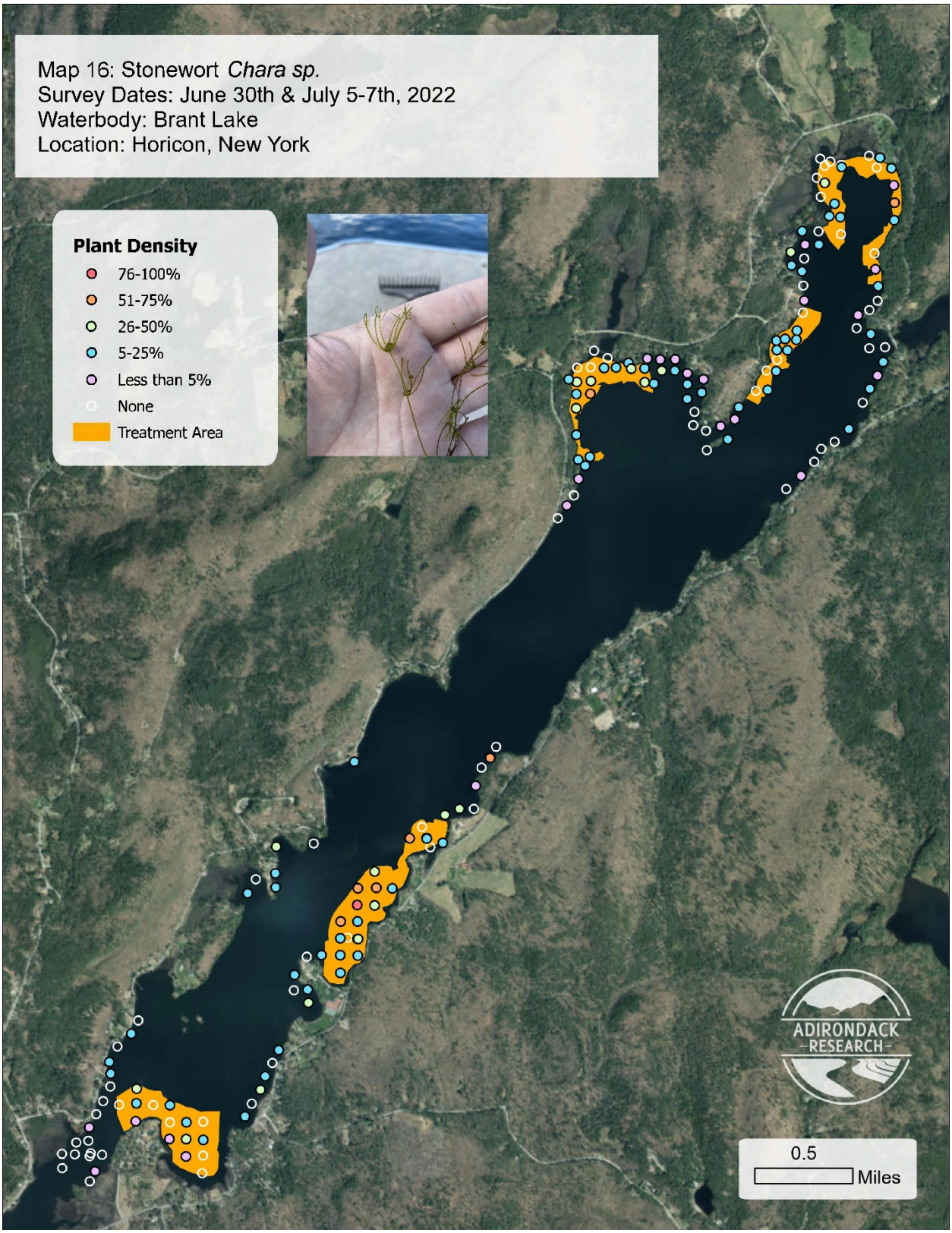

Map 11: Variable-leaf Pondweed *Potamogeton gramineus*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

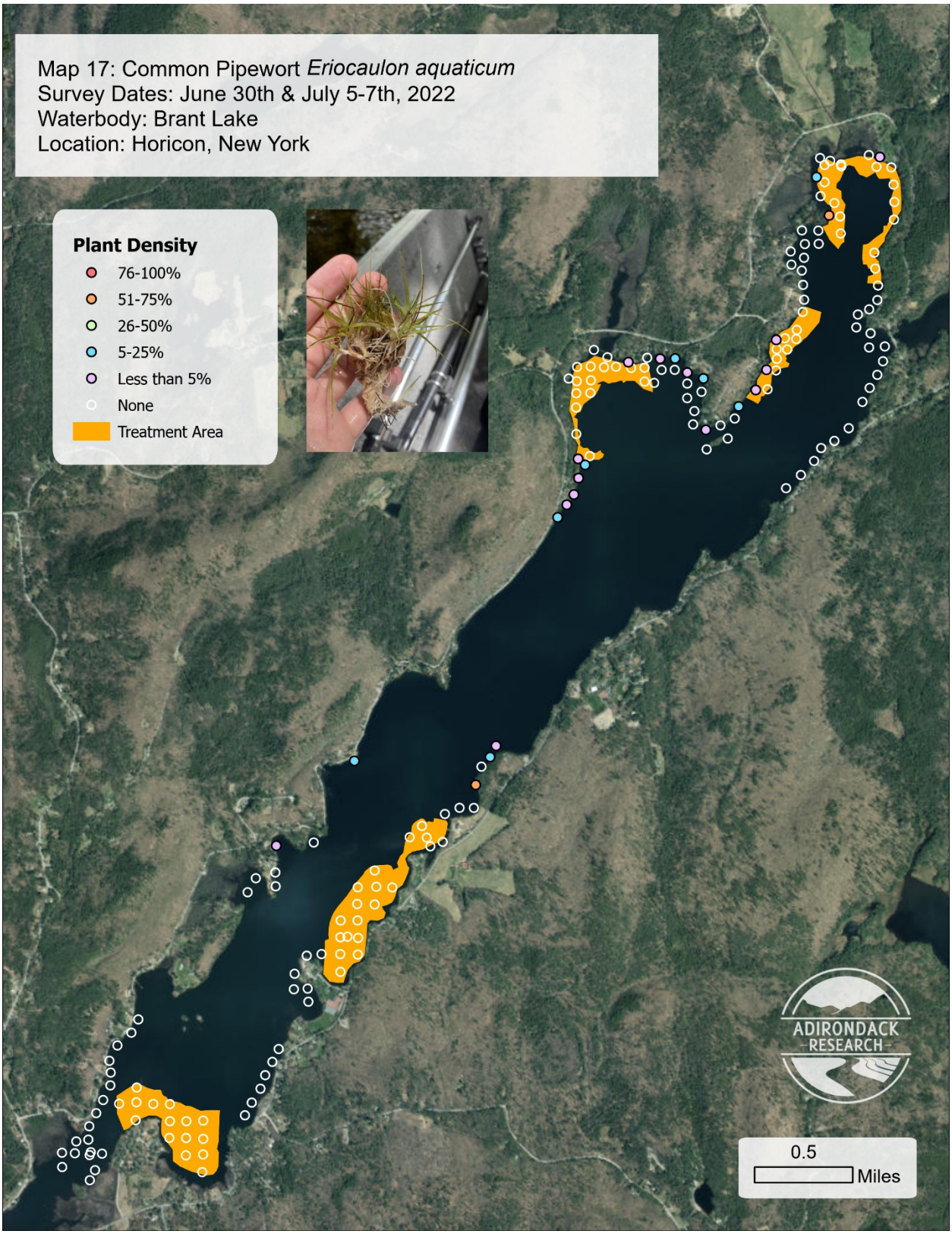

Map 12: Broadleaf Pondweed *Potamogeton natans*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

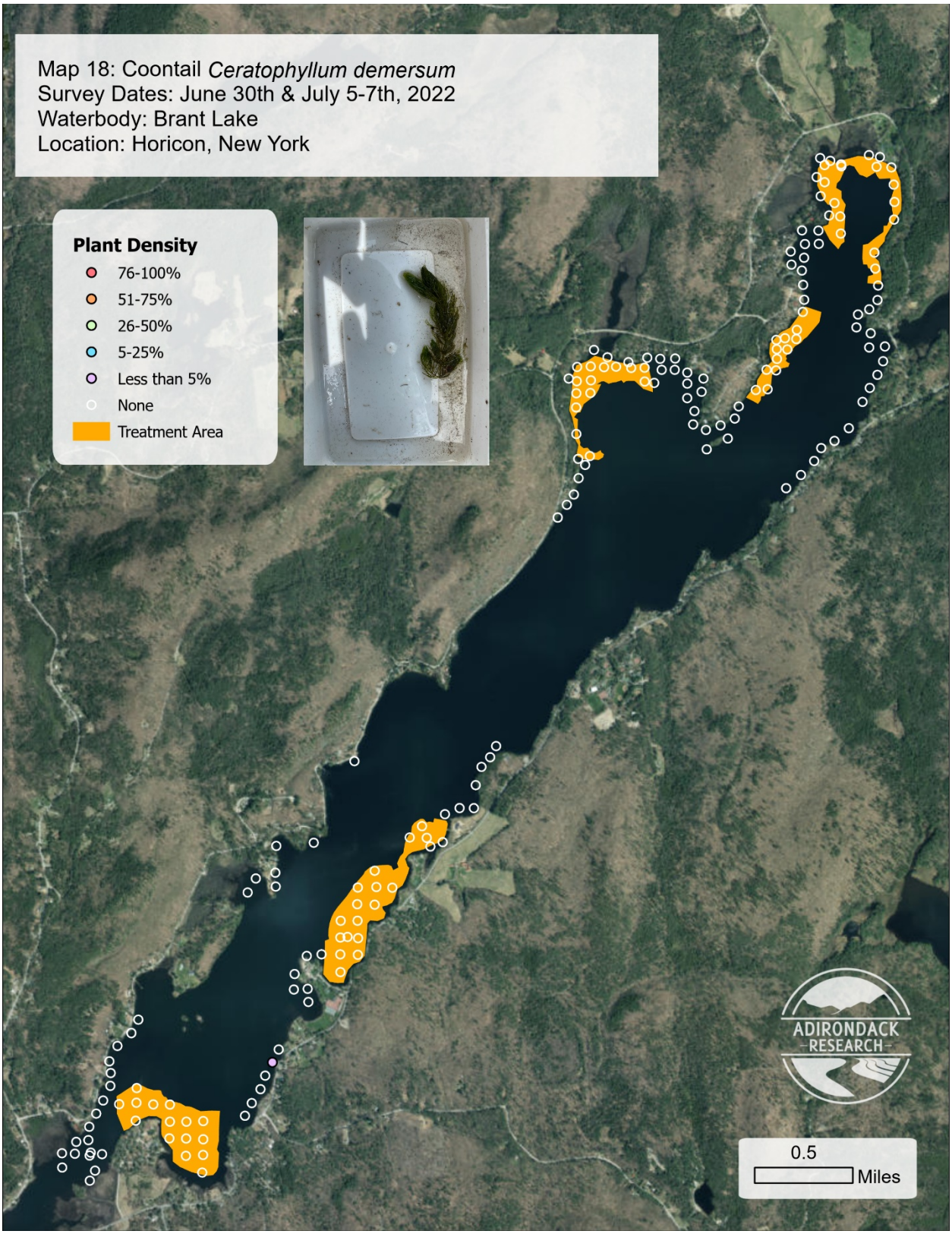

Map 13: Cattails *Typha latifolia*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

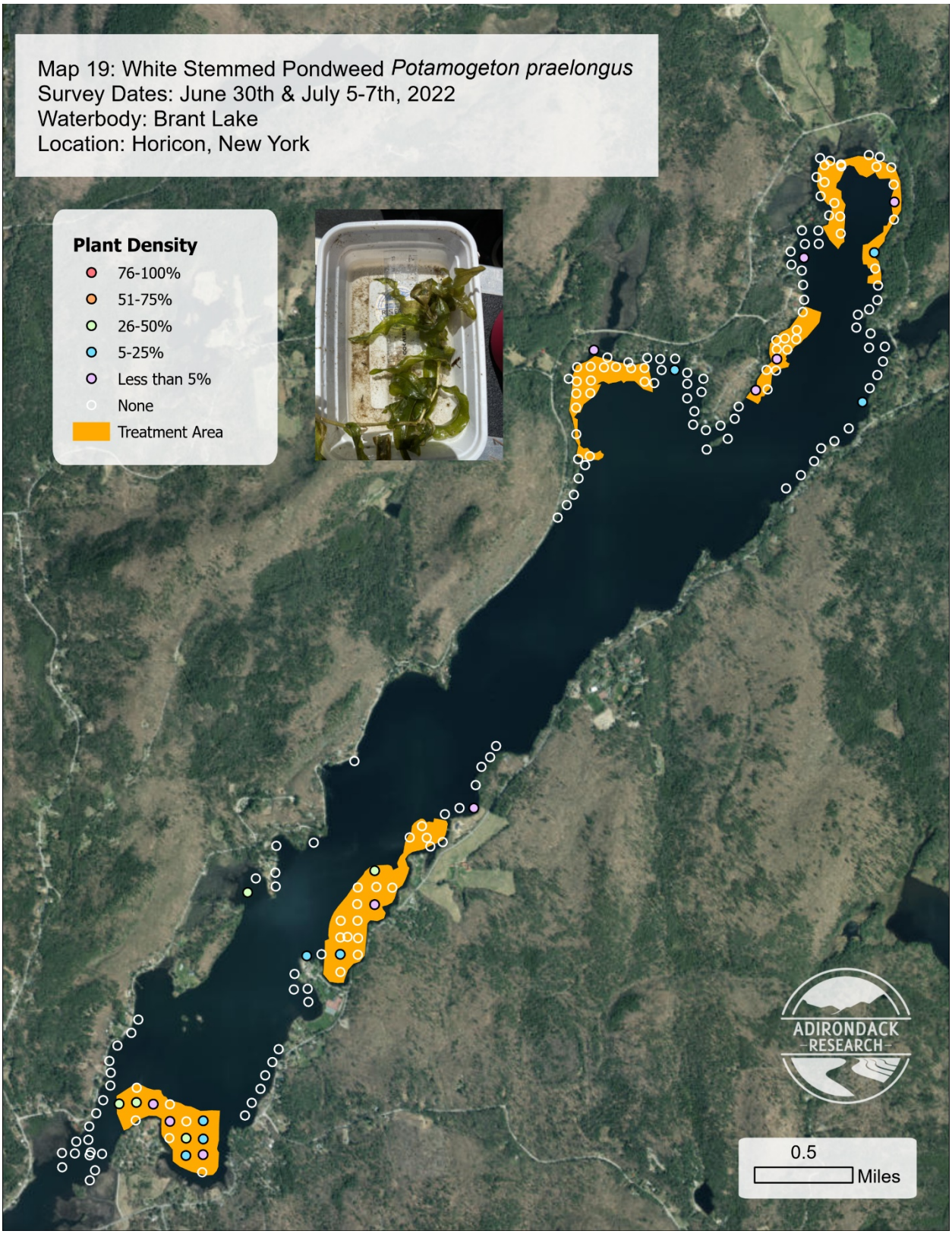

Map 14: Common Bladderwort *Utricularia intermedia*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

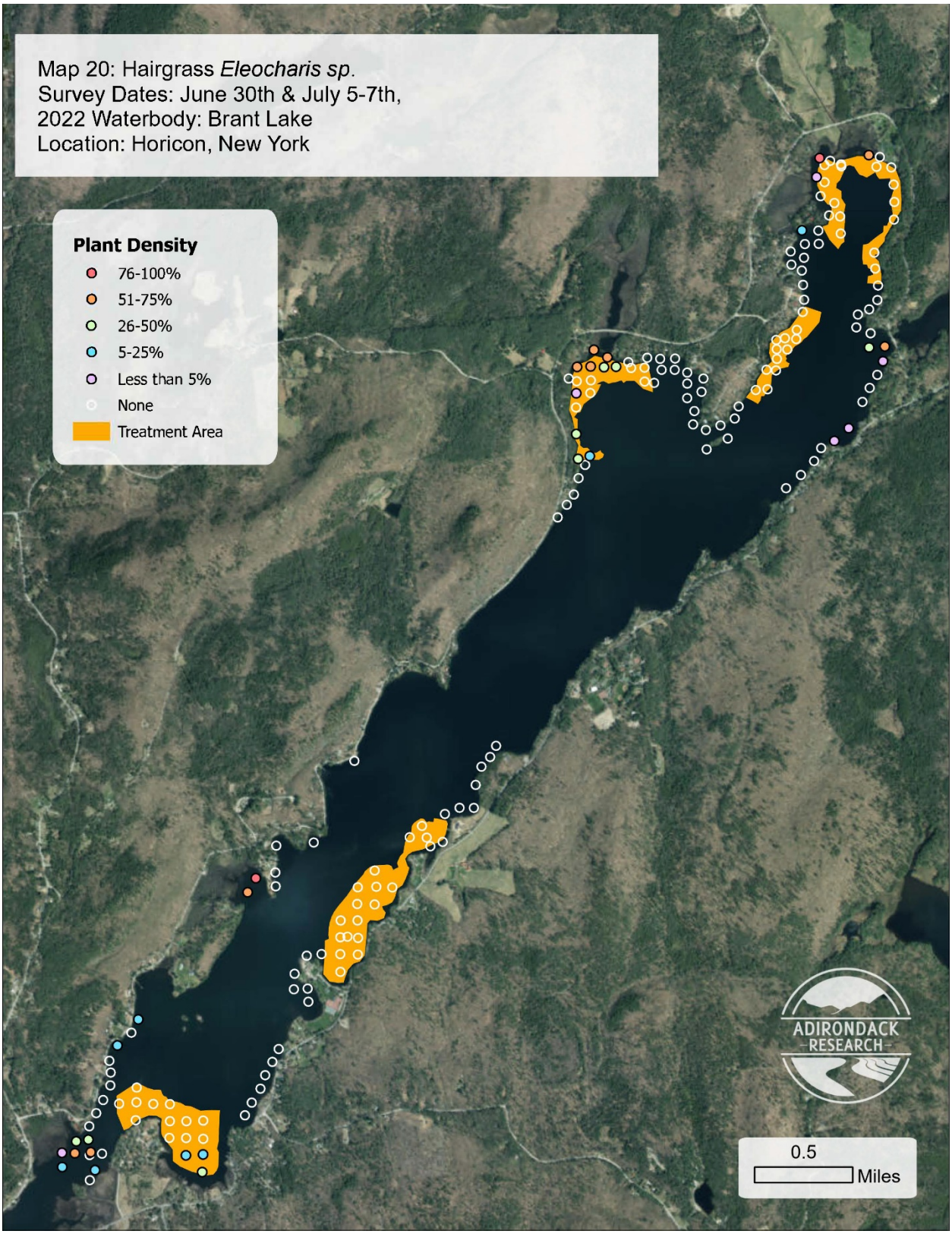

Map 15: Common Eelgrass: *Vallisneria americana*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

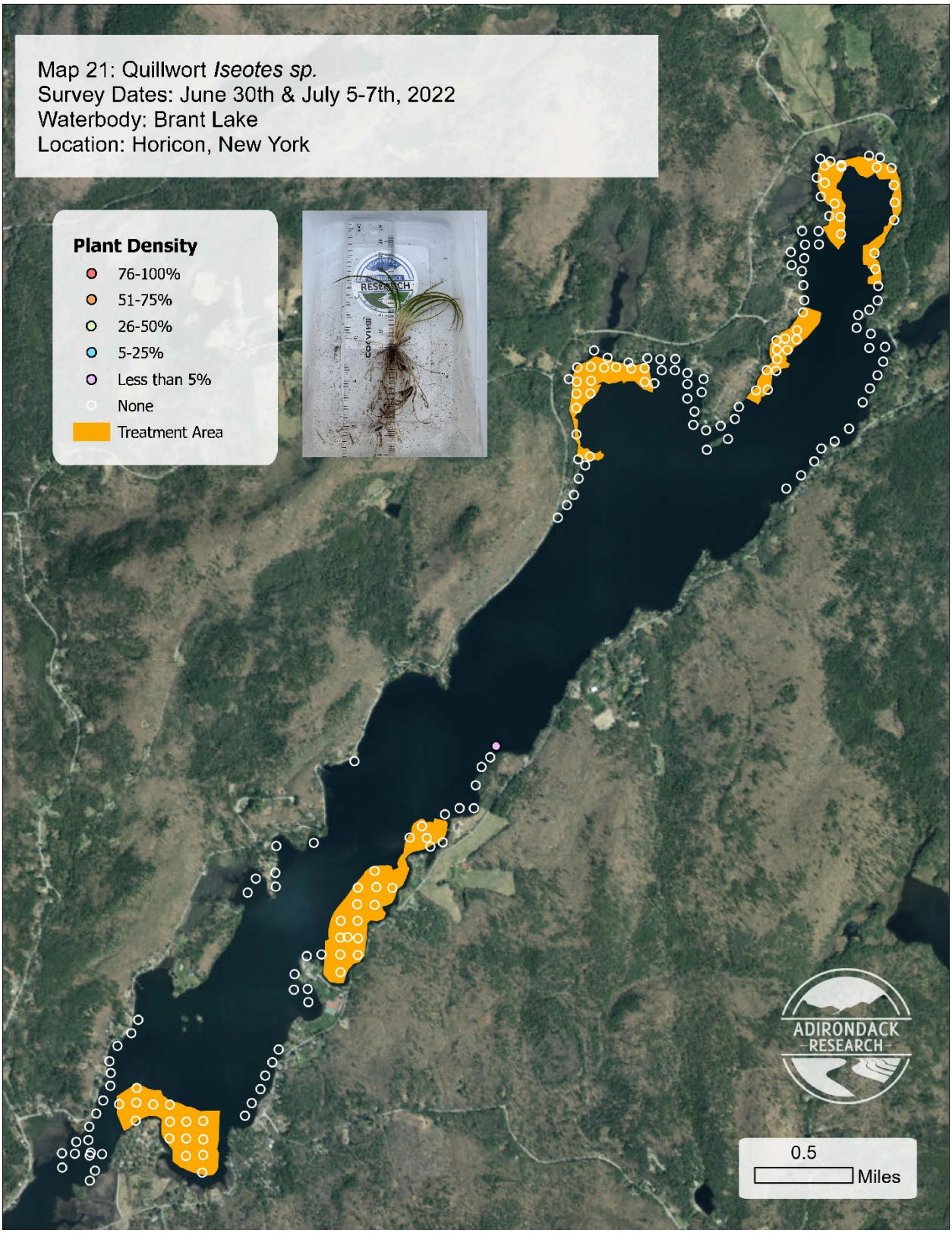

Map 16: Stonewort *Chara sp.*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK
RESEARCH
0.5
Miles

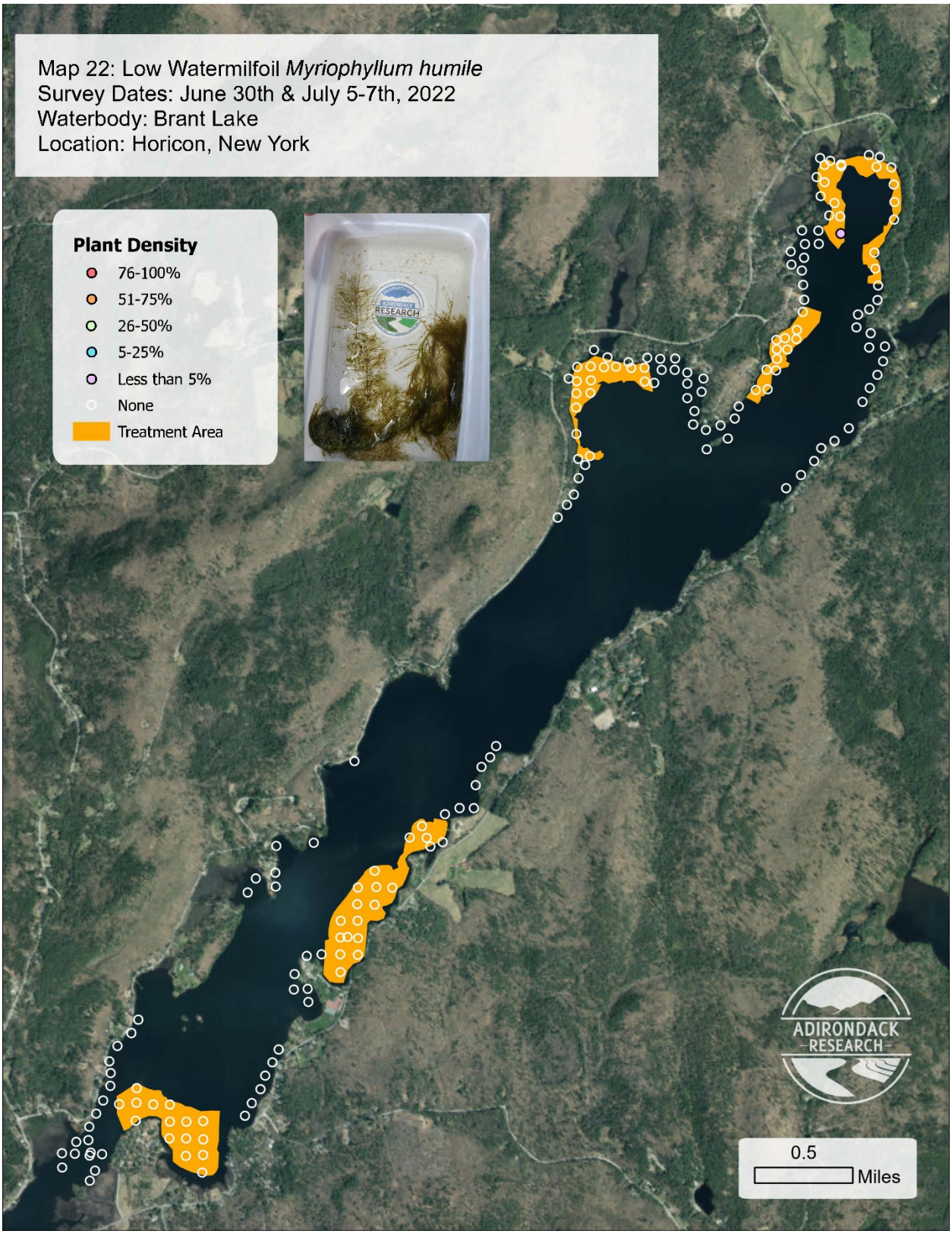

Map 17: Common Pipewort *Eriocaulon aquaticum*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

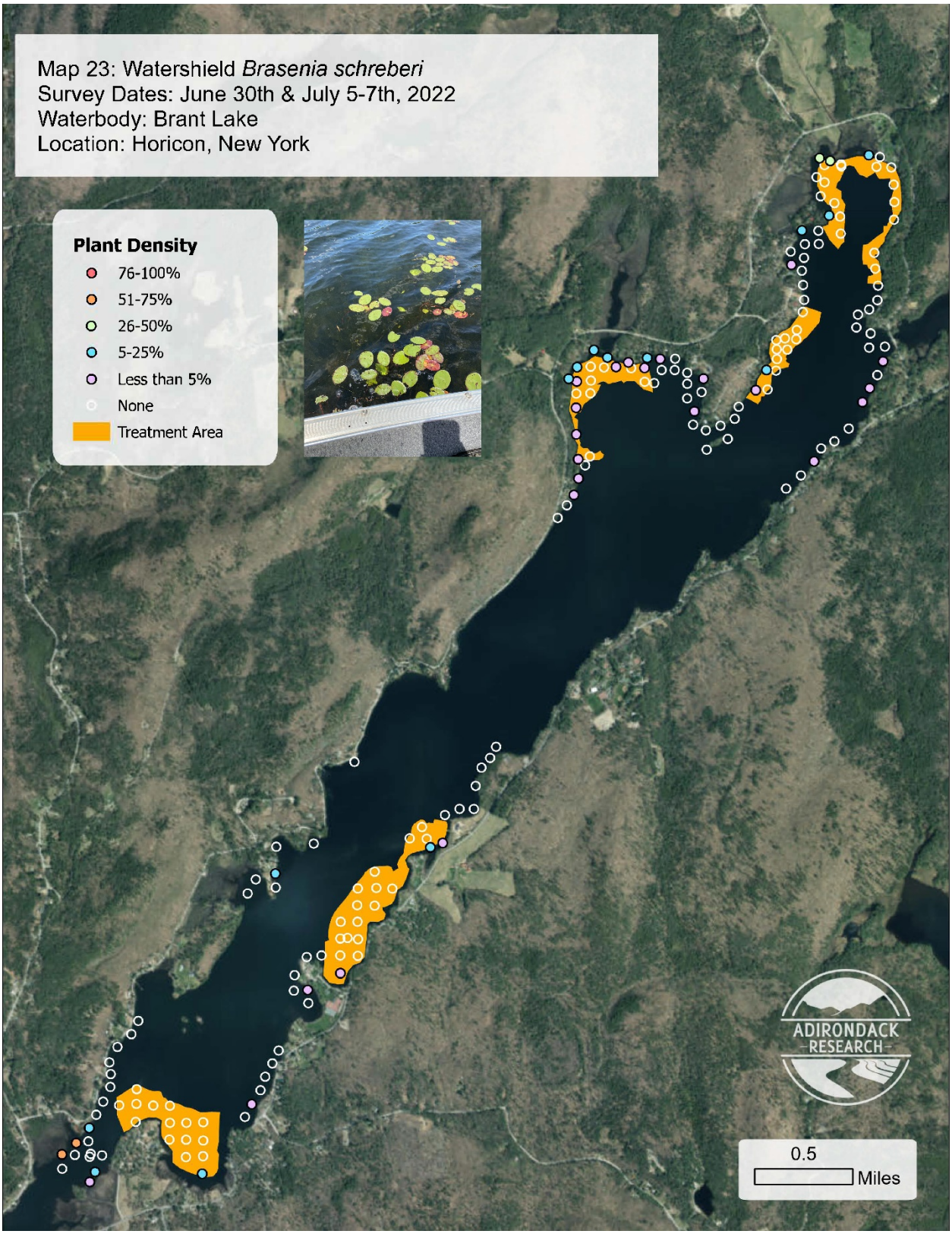

Map 18: Coontail *Ceratophyllum demersum*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

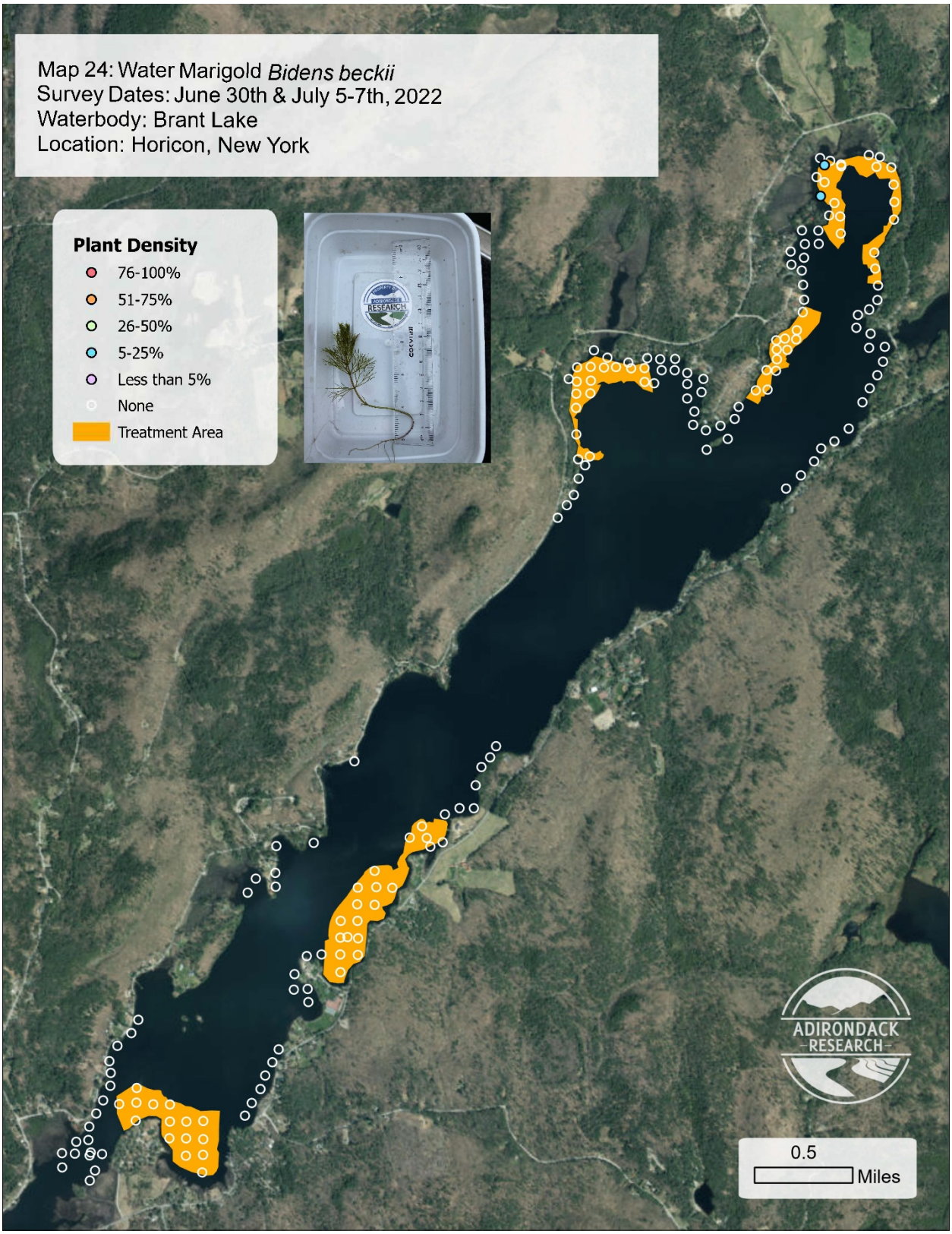

Map 19: White Stemmed Pondweed *Potamogeton praelongus*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

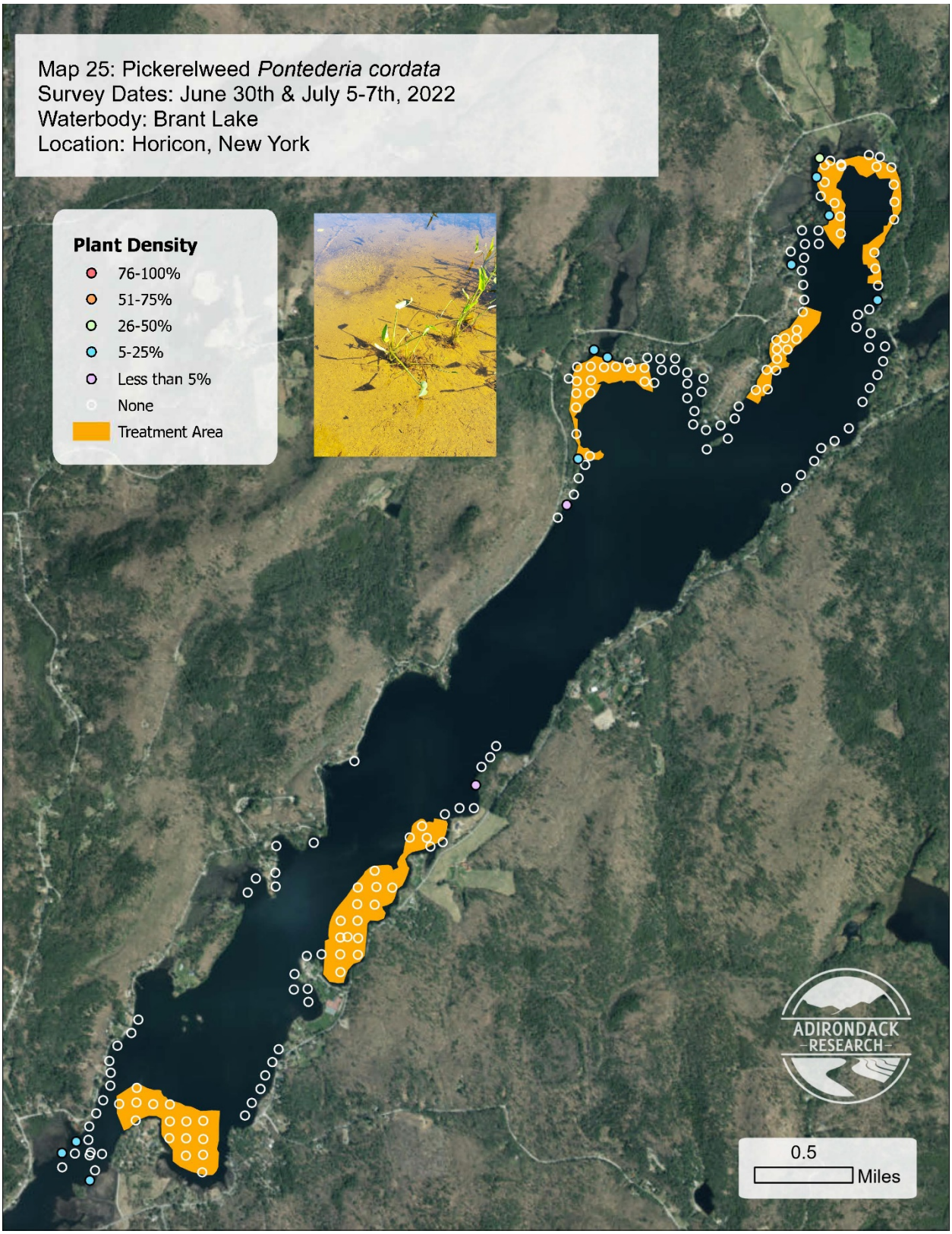

Map 20: Hairgrass *Eleocharis sp.*
Survey Dates: June 30th & July 5-7th, 2022 Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

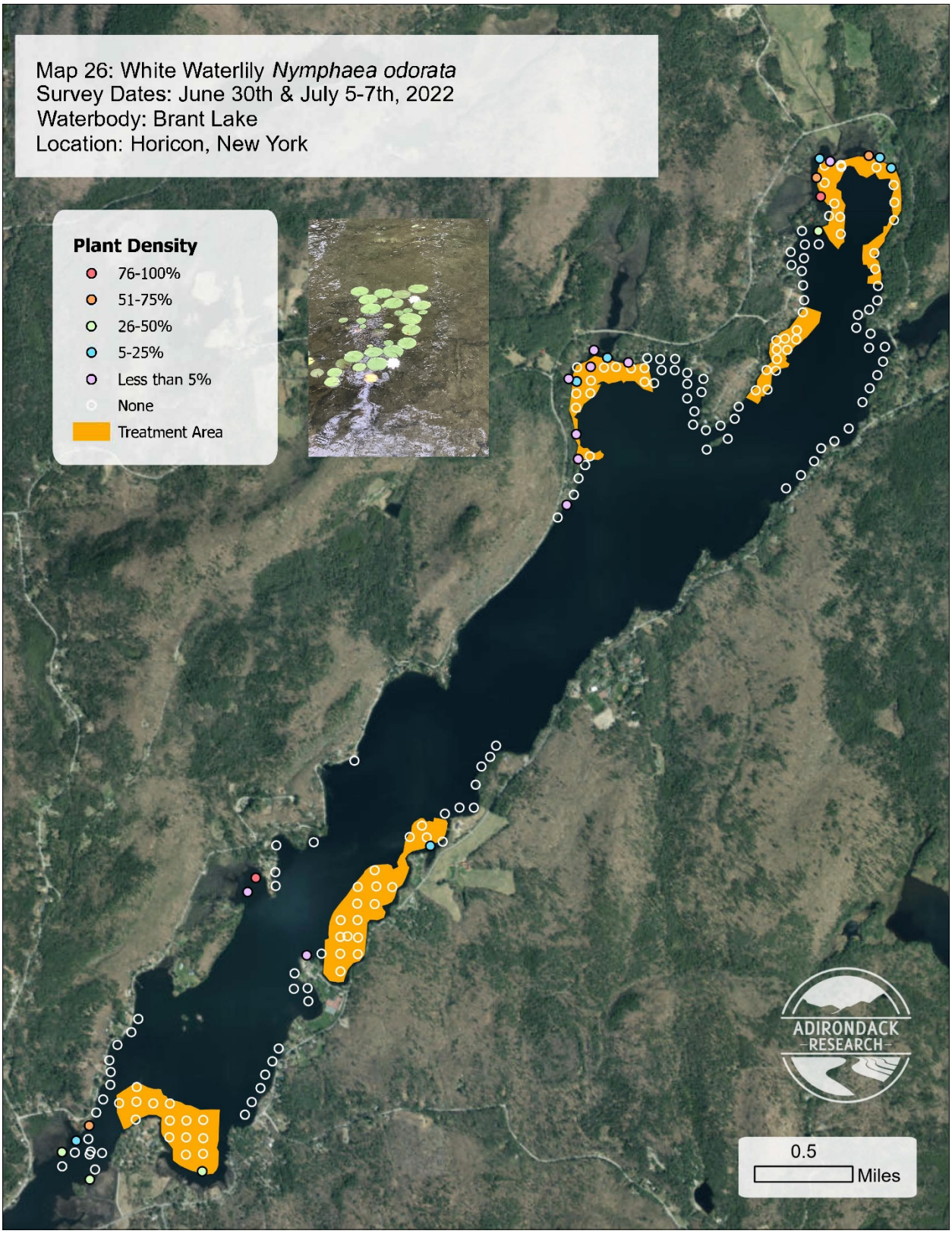

Map 21: Quillwort *Iseotes sp.*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

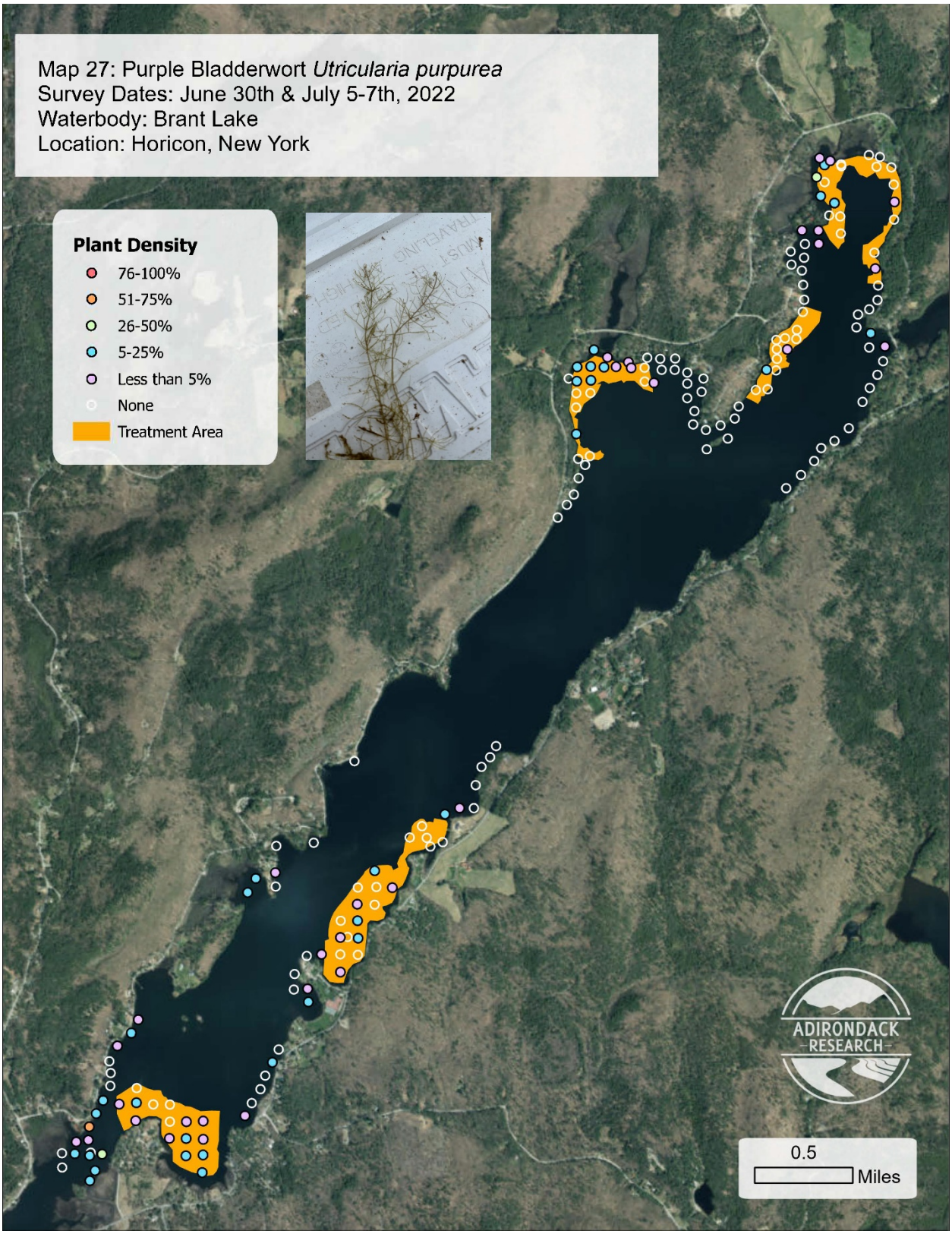

Map 22: Low Watermilfoil *Myriophyllum humile*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

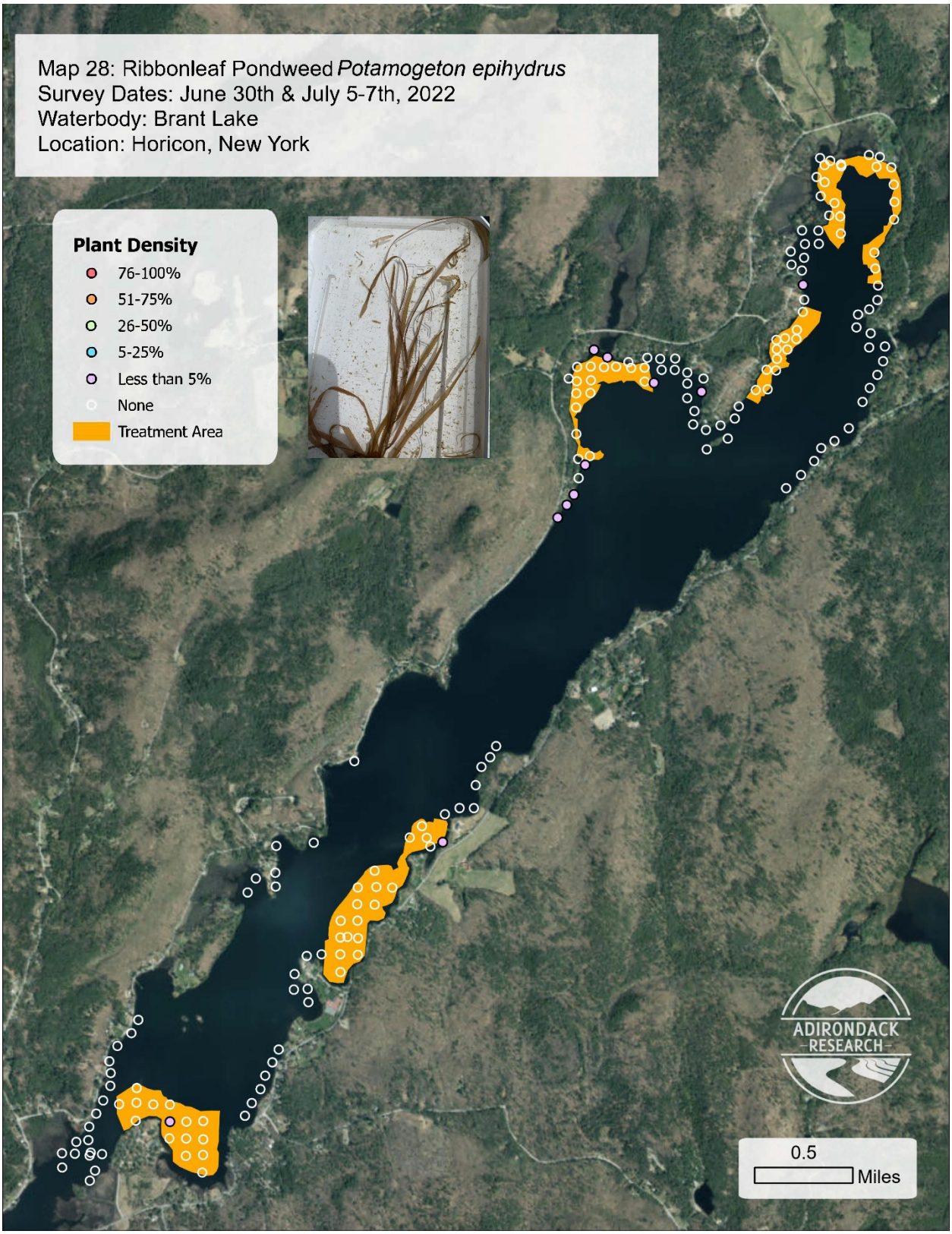

Map 23: Watershield *Brasenia schreberi*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

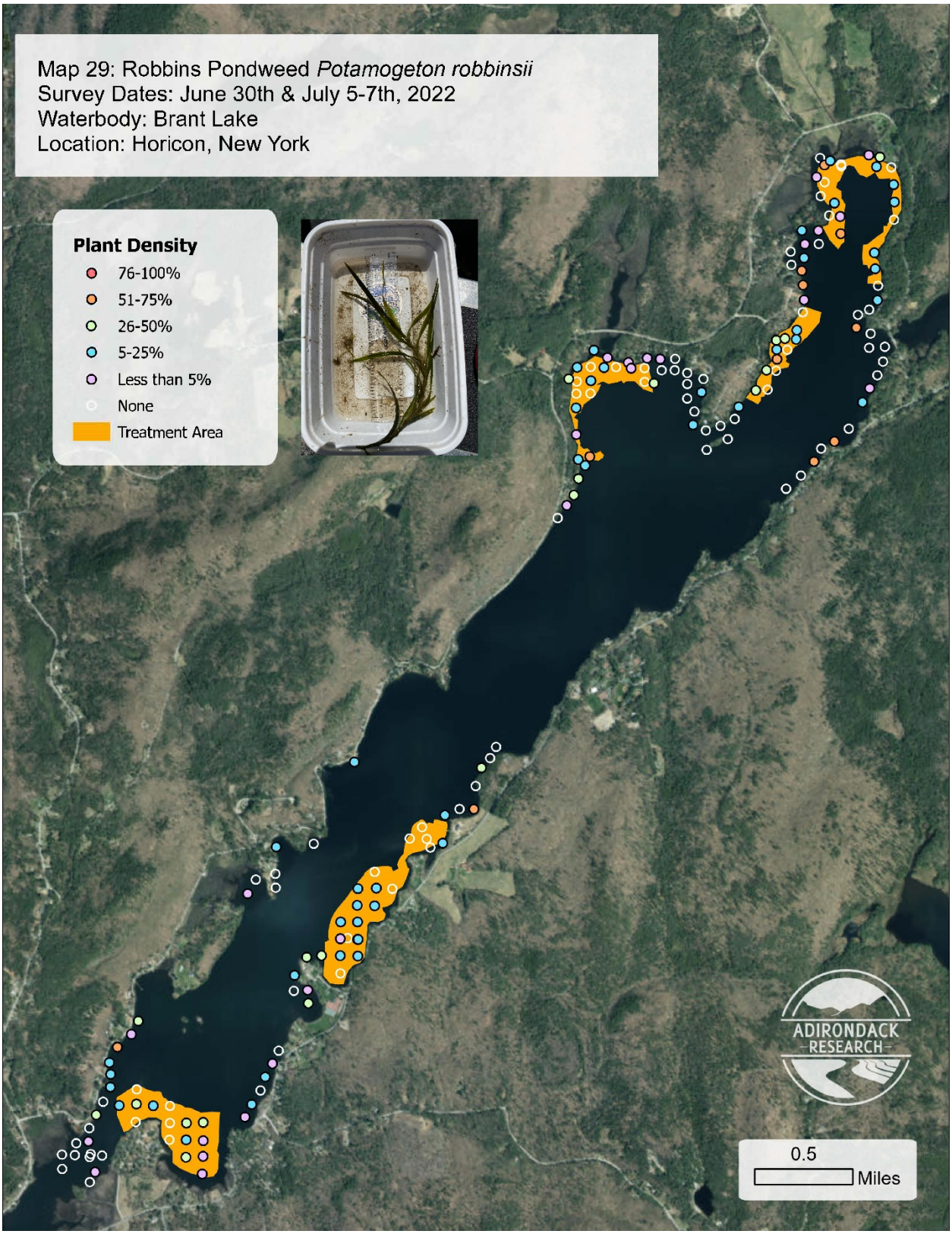

Map 24: Water Marigold *Bidens beckii*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

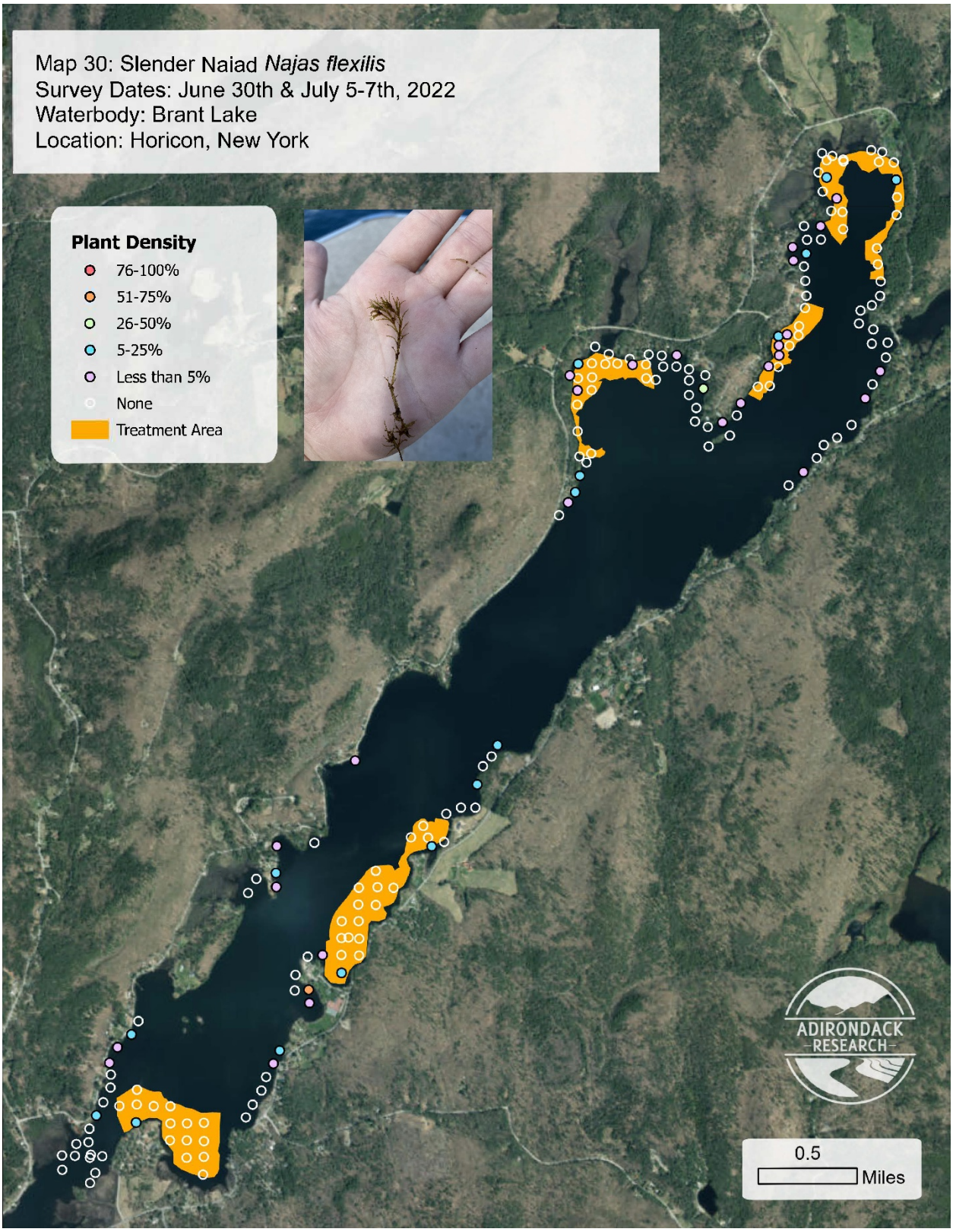

Map 25: Pickerelweed *Pontederia cordata*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK
RESEARCH
0.5
Miles

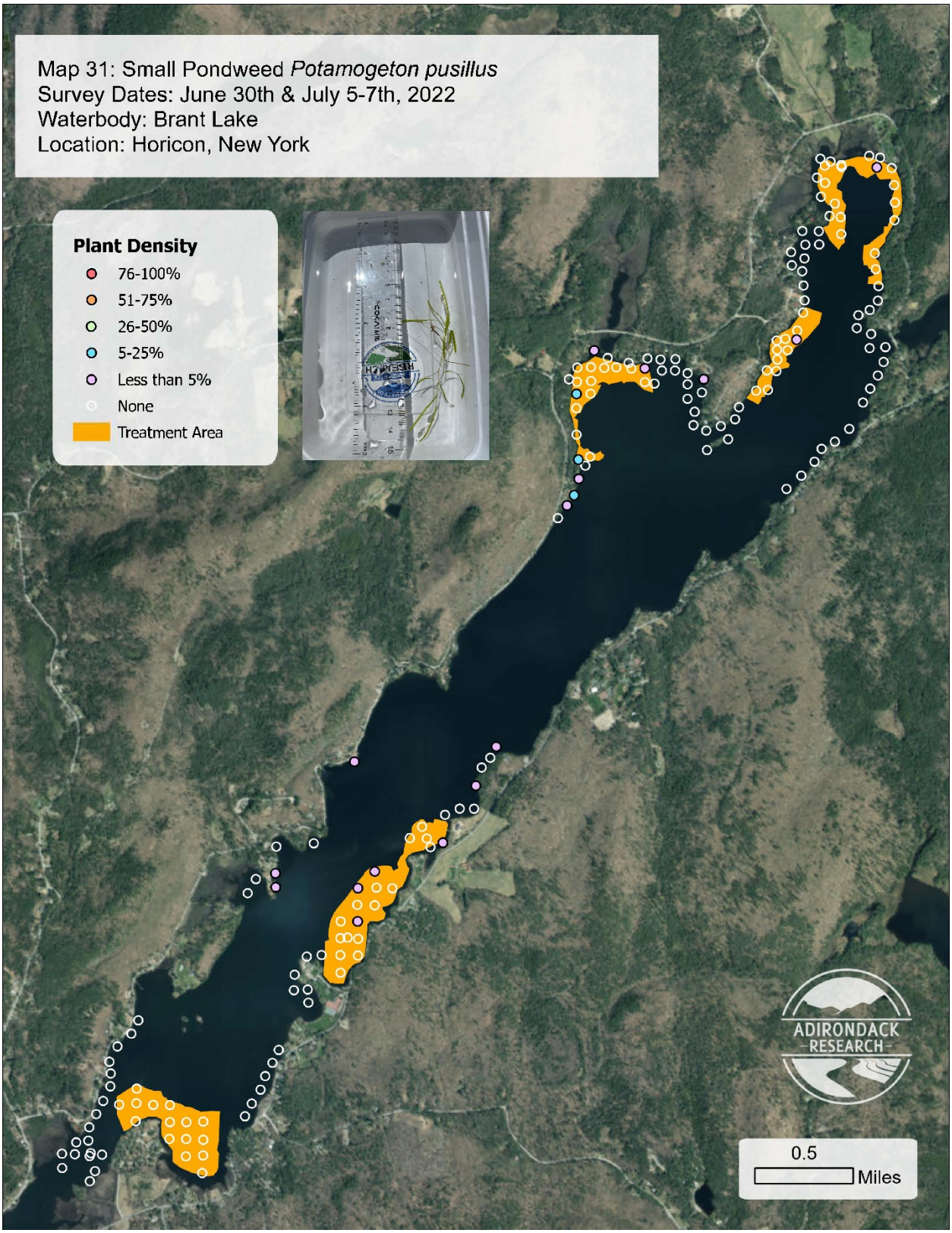

Map 26: White Waterlily *Nymphaea odorata*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

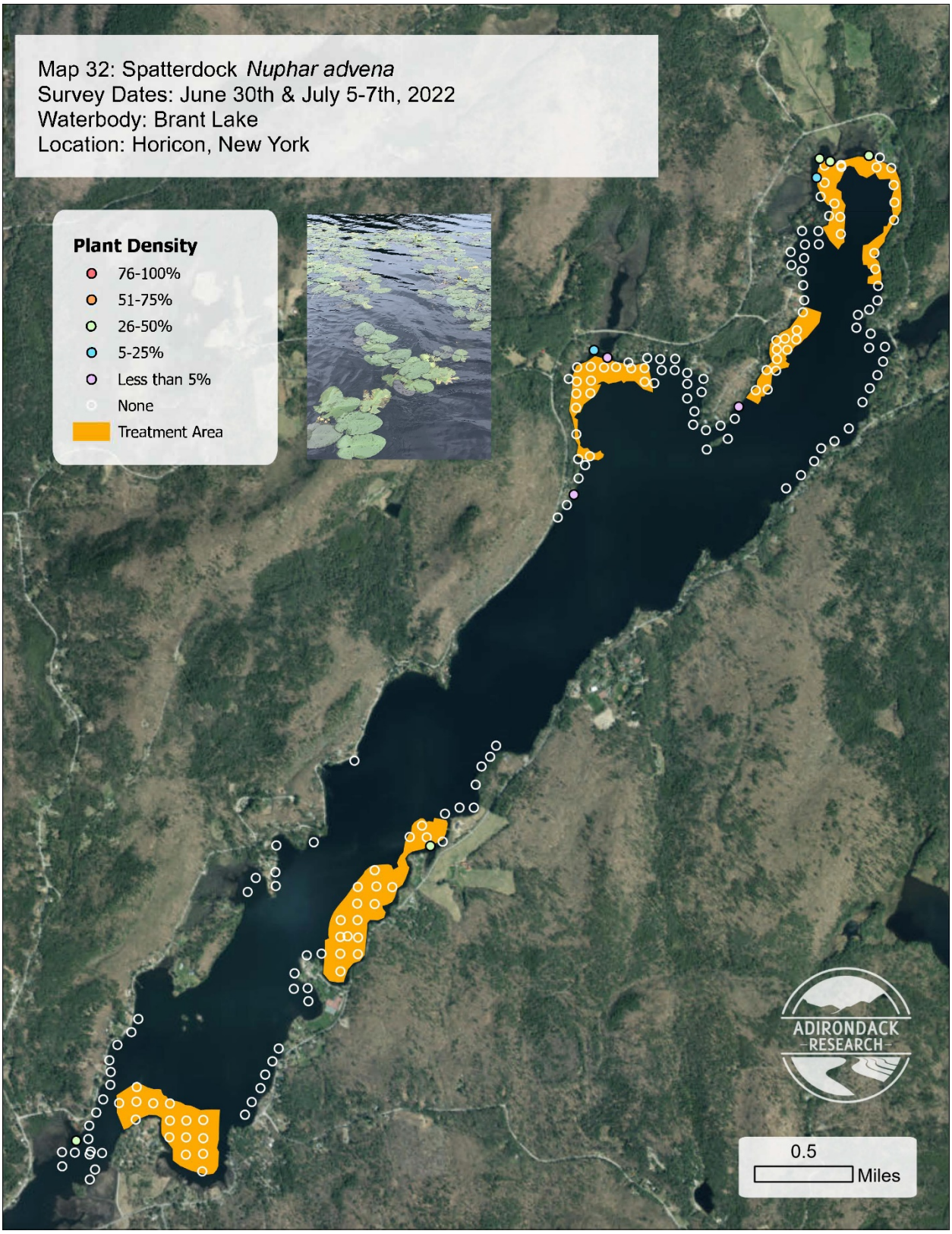

Map 27: Purple Bladderwort *Utricularia purpurea*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles


Map 28: Ribbonleaf Pondweed *Potamogeton epihydrus*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles


Map 29: Robbins Pondweed *Potamogeton robbinsii*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles


Map 30: Slender Naiad *Najas flexilis*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK
RESEARCH
0.5
Miles


Map 31: Small Pondweed *Potamogeton pusillus*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles


Map 32: Spatterdock *Nuphar advena*
Survey Dates: June 30th & July 5-7th, 2022
Waterbody: Brant Lake
Location: Horicon, New York
Plant Density
76-100%
51-75%
26-50%
5-25%
Less than 5%
None
Treatment Area
ADIRONDACK RESEARCH
0.5
Miles

Plant Descriptions & ProcellaCOR Sensitivity

[1]Table 5. ProcellaCOR sensitivity

Common Name	Scientific Name	ProcellaCOR Sensitivity	Source
Broadleaf pondweed	*Potamogeton natans*	LOW	1
Bur-reed	*Sparganium sp.*	N/A	
Canadian water weed	*Elodea sp.*	LOW	1
Cattails	*Typha latifolia*	LOW	1
Clasping leaf pondweed	*Potamogeton perfoliatus*	LOW	1
Bladderwort	*Utricularia intermedia*	LOW	1
Eelgrass	*Vallisneria americana*	LOW	1
Common pipewort	*Eriocaulon aquaticum*	N/A	
Coontail	*Ceratophyllum demersum*	LOW-MODERATE	1
Eurasian watermilfoil	*Myriophyllum spicatum*	HIGH	1
Hairgrass	*Eleocharis sp.*	LOW	
Low water milfoil	*Myriophyllum humile*	HIGH	1
Narrow-leaf Bur-reed	*Sparganium natans*	N/A	
Pickerelweed	*Pontederia cordata*	LOW-MODERATE	1
Purple bladderwort	*Utriculaaria purpurea*	LOW	1
Quillwort	*Iseotes sp.*	N/A	
Ribbonleaf pondweed	*Potamogeton epihydrus*	LOW	1
Robbins pondweed	*Potamogeton robbinsii*	LOW	1
Slender naiad	*Najas flexilis*	LOW	1
Small pondweed	*Potamogeton pusillus*	LOW	1
Spatterdock	*Nuphar lutea*	LOW-MODERATE	1
Stonewort	*Nitella sp.*	LOW	2
Variable-leaf pondweed	*Potamogeton gramineus*	LOW	1
Water lobelia	*Lobelia dortmanna*	N/A	
Water marigold	*Bidens beckii*	LOW	1
Watershield	*Brasenia schreberi*	MODERATE-HIGH	1
White stemmed pondweed	*Potamogeton praelongus*	LOW	1
White waterlily	*Nymphaea odorata*	MODERATE	1

Table 5. ProcellaCOR sensitivity for all species detected in Brant Lake. Species with unavailable or unknown responses to ProcellaCOR are marked N/A

[1]**Source 1:** Heilman, M. (2019). "Selective Control of Invasive Watermilfoils with ProcellaCOR® Aquatic Herbicide and Response of Native Aquatic Plants." SePRO. https://lgpc.ny.gov/system/files/documents/2022/03/technical-summary-procellacor-selective-control-of-invasive-watermilfoils-plus-appendix-28jan2019.pdf
Source 2: Vermont Department of Environmental Conservation (2022), "ProcellaCOR EC Aquatic Macrophyte Species Frequency of Occurrence Pre-and Post-Treatment Statistical Analysis." https://dec.vermont.gov/sites/dec/files/wsm/lakes/ANC/docs/Procellacor%20Aquatic%20Macrophyte%20Species%20Frequency%20of%20Occurrence%20Pre-and%20Post-Treatment%20Statistical%20Analysis%204-12-22.pdf

Myriophyllum spicatum (Eurasian watermilfoil)

Originating in Europe and Asia, this is a rapidly spreading invasive milfoil species. It's ability to grow in cool water and at low light conditions, in addition to reproducing by fragmentation and fruit production; allows it to quickly overtake waterbodies and choke out native species. *Myriophyllum spicatum* (Eurasian watermilfoil) has feather-like leaves, arranged in whorls of 4 to 5 along the stem, and each leaf has a central axis with 12 to 21 leaflet pairs. It has relatively large spaces between each whorl, sometime greater than ½ inch. These leaves are attached to thin stems that can normally grow 3 to 10 feet but have been reported as long as 33 feet in length. The stem is typically light brown in color and the tips are occasionally red or pink in color. These stems branch off repetitively at the water's surface forming large, floating mats of vegetation that block light to native species and imped water traffic. It is extremely sensitive to ProcellaCOR treatment, completely wiping out exposed plant beds and resulting in severe browning to the extent the plant is no longer recognizable.

Bidens beckii (Water marigold)

Is a shallow-water plant found in lakes and slow-moving rivers. In flower, it is instantly recognizable for its showy yellow blooms that sit pertly above the water's surface. Flowers are 1 to 1½ inch across with 8 yellow petals that may be notched or toothed at the tip. The center disk is less than ½ inch wide, made up of 10 to 30 tiny yellow disk flowers. Its submerged leaves are highly divided and feathery, round to fan-shaped in outline and 1 to 2 inches in length. Whereas its aerial leaves are simple and stalkless, lance to egg-shaped, ¾ to 1½ inches long with smooth edges or sharply toothed to varying degrees especially around the tip end. Submerged stems can be up to 8 feet long with little branching, the emergent portion is rarely more than 6 inches long. Seeds are edible and are eaten by water fowl, while its submerged leaves provide shelter and protection for small fish. *Bidens beckii* (Water marigold) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in in little to no response observed on the plants health after treatment.

Brasenia schreberi (Watershield)

A floating-leaf aquatic plant, resembling miniature water lily leaves; with 2–5-inch oval, bright green leaves and red to purple bottoms. Its stems are attached to a rooted rhizome, anchoring into the ground and providing a source of nutrients. Purple flowers bloom in late summer to early fall for a two-day period on short 1-inch stocks. It is most commonly found in clear, soft water, up to depths of 10 feet. *Brasenia schreberi* (Watershield) provides shade and cover for panfish, largemouth bass, northern pike, and is eaten by waterfowl. This plant has been found to have a moderate to high sensitivity to ProcellaCOR treatment. Notable reductions in density and coverage of this plant can be observed after treatment, along with severe discoloration. Effects from ProcellaCOR with be dependent of the proximity of watershield to treatment areas.

Ceratophyllum demersum (Coontail)

Is rootless and free-floating, with submerged feathery, fan-shaped leaves that are arranged in whorls on its hollow stem. The jointed stems are pale green to reddish purple, glabrous, and fragile, often dividing into smaller segments. The medium to dark green leaves are more crowded towards the tips of stems than elsewhere giving the plant a "coontail" or "Christmas tree" appearance. Both stems and leaves have a tendency to be somewhat stiff and brittle. Very small flowers grow at the leaf bases. Many waterfowl species eat the shoots, and this plant provides cover for young bluegills, perch, largemouth bass, and northern pike, in addition to supporting insects that fish and ducklings eat. Its growth can

become dense and overwhelming, causing nuisance conditions along shorelines. *Ceratophyllum demersum* (Coontail) has been found to have a low to moderate sensitivity to ProcellaCOR treatment. It is more common to suffer effects such as discoloration and slight loss of biomass density after treatment. However, it will still generally tend to make a full recovery in time. Effects from ProcellaCOR with be dependent of the proximity to treatment areas.

Elodea sp. (Canadian water weed)

Grows entirely underwater, except for a small white flower that blooms during the summer. Leafy shoots between 8 inches and 3.5 feet long are elongated, with slender, unbranched roots, and branched stems. Leaves are dark green, oval-shaped and arranged in clusters of 3-4. *Elodea sp.* (Canadian water weed) is an excellent oxygen producer and provides a habitat for many small aquatic animals, which fish and wildlife eat. However, dense growth of this plant can create a nuisance, and its closed, compact structure is not ideal fish habitat. Canadian water weed has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Eriocaulon aquaticum (Common pipewort)

Is an emergent aquatic plant most recognizable by its cottony, gray-white, knob-like flower head atop a 7-sided, leafless stalk. Its grass-like leaves form a basal rosette and are papery thin, often translucent with 3 to 9 parallel veins the length of the blade, and notable cross hatched veinlets near its base. Its submerged portions provide habitats for invertebrates that are used as food by fish and other wildlife species. Sensitivity to ProcellaCOR treatment is unknown.

Iseotes sp. (Quillwort)

Quillwort leaves grow from a fleshly, lobed underground stem adorned with forked roots, in water 1 to 3 meters deep. Its leaves are hollow and narrow, growing on average to be 0.8-8 inches long arranged in a rosette, radiating from the base of the plant. Spores form inside sacks located on the spoon-like bases of the leaves; examining the megaspores the only way to positively identify quillworts to species. Foliage is sometimes consumed by waterfowl. Sensitivity to ProcellaCOR treatment is unknown.

Lobelia dortmanna (Water lobelia)

Preferring shallow water and growing anywhere from 10 to 40 inches; Water lobelia has submerged alternate or basal, linear, flattened leaves with a hollow stem that holds a purple-white cup shaped flower. It provides a habitat and shelter for fish and leaves and stems are eaten by deer and muskrats. *Lobelia dortmanna's* (Water lobelia) sensitivity to ProcellaCOR treatment is unknown.

Myriophyllum humile (Low watermilfoil)

Is extremely variable and shows different morphologies depending on water level. It is commonly confused with *Myriophyllum spicatum* (Eurasian watermilfoil) and *Myriophyllum farwellii* (Farwell's watermilfoil*)*, but can be distinguished from other species by having only alternate or subopposite pinnately divided leaves. Stems generally become longer and branches bear more and finer segments as water depth increases. It has 4 parted flowers in the axils of submersed leaves, or in short spikes, with mostly alternate bracts that are longer than the flowers themselves. Like other milfoils, *Myriophyllum humile* (Low watermilfoil), is highly sensitive to ProcellaCOR treatment, completely wiping out exposed plant beds and resulting in severe browning to the extent the plant is no longer recognizable.

Najas flexilis (Slender naiad)

Is an annual submersed rooted or floating plant with slender, branching stems and fibrous roots. Growth is usually compact and relatively bushy; the highly branched stems can grow up to 4 feet in length and fragment easily. Leaves are commonly 1 mm wide and 0.5 to 3.5 cm long, and are typically stiff, curled and pointed, and have spines along the margins that are visible to the naked eye. Tiny flowers appear in the axil of the plant with separate male and female flowers on the same plant. *Najas flexilis* (Naiad sp.) can form dense surface mats of vegetation that inhibit growth of native plant species and reduce the water quality of habitat utilized by aquatic fauna. Naiad's have been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Nitella sp. (Stonewort)

Are branched multicellular algae, that may grow several feet long and resemble larger plants. Commonly light-green to bright-green in color with forked, bushy branches 1/16 to 1/8 inches in diameter, and does not flower. *Nitella sp.* (Stonewort) grows entirely below the water surface, usually in deeper zones, to depths of 30 feet. The plant provides food for waterfowl and cover for fish and also supports insects and other small aquatic animals, which provide substance for trout, bluegills, small mouth bass, and largemouth bass. Stonewort has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Nuphar lutea (Spatterdock)

Recognizable by its 8-to-16-inch heart shaped, grass-green colored floating "lily-like" leaves; *Nuphar lutea* (Spatterdock) exists in shallow waters with muck or silt bottoms. Its flowers rise several inches above the water to form a yellow ball with inward curving petals. The underside of its leaves and stem are coated in a clear gelatinous slime. The underwater roots contain starch and are edible and fruits are eaten by waterfowl, beavers, and muskrats. The floating leaves additionally provide shade and cover for fish. *Nuphar lutea* (Spatterdock) has been found to have a low to moderate sensitivity to ProcellaCOR treatment. Initial symptoms, including a reduction in biomass and browning of leaves can be seen almost imminently to 2 weeks. However, this plant will tend to make a strong to full recovery over-time. Effects from ProcellaCOR with be dependent of the proximity to treatment areas.

Nymphaea odorata (White water lily)

Roots in relatively shallow, silty bottoms up to 5 feet deep and produces a familiar round floating leaf 6 to 12 inches in diameter. Flowers have twenty to thirty white tapering petals. They also have forty or more bright yellow stamens in the center and a whorl of four green to purplish sepals at the base. The flowers, which are three to five inches wide, are fragrant and emerge in early Summer. *Nymphaea odorata* (White water lily) provide shad and protection for largemouth bass and sunfish. Seeds are eaten by waterfowl and leaves, stems, and flowers provide food for beavers and muskrats. White water lily has been found to have a moderate sensitivity to ProcellaCOR treatment. Initial symptoms, including a reduction in biomass and browning of leaves can be seen almost imminently to 2 weeks. However, this plant will tend to make a strong to full recovery over-time.

Pontederia cordata (Pickerelweed)

Pickerelweed is a perennial emergent that can reach three to four feet in height. It is easily recognizable by its bright purple to blue flowers spiking up 6 inches from the water. Deep green, heart shaped leaves, 1 to 6 inches in width and 2 to 10 inches in length, emerge at the ends of stems that are fibrously rooted

in soil commonly, no more than 3 feet deep. Fish and small mammals use the foliage for cover, while waterfowl consume its seeds, and deer and muskrats consume its vegetation. *Pontederia cordata* (Pickerelweed) has been found to have a low to moderate sensitivity to ProcellaCOR treatment. It is more common to suffer effects such as discoloration and slight loss of biomass density after treatment. However, it will still generally tend to make a full recovery in time.

Potamogeton epihydrus (Ribbon leaf pondweed)

Can be distinguished by its two types of leaves. The submersed leaves are narrow and ribbon-like, thin and transparent, that can reach up to two meters long, and alternate along the stem. Its floating leaves are broad and elliptical and supported by a stalk. Found in shallow, quiet waters of soft water lakes and ponds, it can grow between 4 inches to 3 feet in height, most commonly in mucky substrates. Fruiting stalks are located on the top of these stems, which provide nutritious seeds for waterfowl. *Potamogeton epihydrus* (Ribbon leaf pondweed) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Potamogeton gramineus (Variable-leaf pondweed)

Also known as grassy pondweed, it is often found in less than 3 feet of water, it grows from a creeping rhizome that anchors in wet substrate, producing thin, cylindrical, heavily branching stems. Leaf appearance is variable depending on depth. Floating leaves are rounded at the base and can be rounded or pointed at the tip about 1½ inches long, and up to 2cm wide, while submersed leaves are narrowly elliptic and almost always pointed at the tip. This species hybridizes frequently, but can be recognized by its flower, a dense cylindrical spike with 5-10 whorls of flowers that just reaches above the surface of the water. *Potamogeton gramineus* (Variable-leaf pondweed) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Typha latifolia (Cattail)

This marsh perennial forms dense stands in shallow water, stemming from 4-8 feet tall. Recognizable by its long, emergent, broad, linear leaf blades and large cylindrical brown flowering pistillate spikes, that turn to downy tuffs of white in Autumn. Its root system produces edible, thick, starchy rhizomes and fibrous roots, while its dense growth provides a favorable habitat for red-winged blackbirds, as well as other marsh birds, and muskrats. *Typha latifolia* (Cattail) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in in little to no response observed on the plants health after treatment.

Potamogeton natans (Floating-leaf pondweed or Broad-leaf pondweed)

Growing from 2 to 4 feet tall, *Potamogeton natans* (Floating-leaf pondweed) have long, pale, bent leaf stalks that connect to green, heart-elliptical shaped, 1 to 2 inch wide, 1.5 to over 4 inch long, floating leaves. It can tolerate a variety of sediment types and water chemistries, commonly growing in waters no deeper than 8 feet. Its leaves provide shade and hunting opportunities for fish. *Potamogeton natans* (Floating-leaf pondweed) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Potamogeton perfoliatus (Clasping-leaf pondweed)

Growing from a network of rhizomes, with stems ranging from 1 to 10 feet long, this pondweed is most recognizable by its wide, wavy, oval shaped leaves that partially surround the plants stem. Small

greenish flowers emerge from a stem that can either be submerged for emergent from the water's surface. The leaves and stems of Clasping leaf pondweed are colonized by invertebrates and provide cover for fish, while it's fruit and leaves provide food for waterfoil, muskrats, beaver, and deer. *Potamogeton perfoliatus* (Clasping-leaf pondweed) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Potamogeton praelongus (White stemmed pondweed)

Commonly found in quiet, clear waters up to 20 feet deep, it is recognized by its pale, zig-zag stem and large white stripules. Stalkless leaves grow to be 4 to 8 inches long, ¾ to 1½ inches (2 to 4 cm) wide, with wavy edges, and 11 to 35 veins and a boat-shaped tip that splits when pressed. Its leaves are all submersed and more or less spirally arranged along the stem. It produces a dense cylindrical spike held above the surface of the water, 1 to 3 long at the tip of the stem. Spikes have 6 to 12 whorls of flowers, with 4 pedals. Seeds and leaves provide a source of nutrients for waterfowl, muskrats, and deer. *Potamogeton praelongus* (White stemmed pondweed) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Eleocharis sp. (Hairgrass)

Growing in water up to 2 meters deep, Hairgrass also known as spikerush prefers a firmer substrate and can tolerate turbid conditions. Its stems are usually slender and short (up to 12 cm long), that emerge from tufts of fine spreading rhizomes, resembling the appearance of grass. The stems are topped with a spikelet of a tight spiral of flowers and eventually nutlets. The nutlets widely vary in surface patterns, and this characteristic is needed for identification to species level. Its leaves provide suitable food for waterfowl, and shelter for aquatic invertebrates. Its dense mats provide an excellent habitat for fish to lay their eggs. Sensitivity to ProcellaCOR treatment is unknown.

Potamogeton robbinsii (Robbin's pondweed)

Found in waters 2 to 20+ feet deep, *Potamogeton robbinsii* (Robbin's pondweed) thrives in deeper water and can range in height 20 to 40 inches. It tends to form dense colonies with dark green, crowded, linear, fern-like leaves. Leaves are stalkless and the stems are round, with little branching seen on the lower portion and more frequent branching seem further up the plant. Its dense coverage can provide a suitable habitat and cover for lie-in-wait predaceous fish. *Potamogeton robbinsii* (Robbin's pondweed) has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Potamogeton pusillus (Small pondweed)

A perennial, submersed aquatic plant with slender, ribbon-like leaves alternate on the thin, green stems that can grow up to 3 feet long. At some of the leaf bases along the stems, there are pairs of translucent glands, differentiating it from its look-a-like *Potamogeton foliosu* (Leafy pondweed). It is common along shorelines in depths up to 8 feet and can form dense clumps that provide cover for invertebrates and small fish. Additionally, its flowers and fruits are produced in 1 to 4 whorls on a slender stalk. The fruit is plump with a smooth back and a short-hooked beak, and generally appears earlier in the season than most other aquatic fruits, providing a vital source of nutrition for waterfowl. Pondweeds have been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Sparganium sp. (Bur-reed)

Often found in less than 2 feet of water, with a height ranging from 1 to 3 feet, it has flexible, linear, grass-like leaves which float on the water's surface, ranging from 200-2500 mm in length. There are various species of Bur-reed, varying only in minute details, however it is most commonly recognizable by round flower heads in a spike-like arrangement at the top of the stem, with separate male and female flower heads on the same plant. *Sparganium sp.'s* (Bur-reed) sensitivity to ProcellaCOR treatment is unknown.

Sparganium natans (Narrow-leaf bur-reed)

Often found in less than 2 feet of water, with a height ranging from 1 to 3 feet, it has thin, flexible, linear, grass-like leaves which float on the water's surface. The leaf length can range from 200-2500 mm. It is most commonly recognizable by round flower heads in a spike-like arrangement at the top of the stem, with separate male and female flower heads on the same plant. *Sparganium natans's* (Narrow-leaf bur-reed) sensitivity to ProcellaCOR treatment is unknown.

Utricularia intermedia (Bladderwort)

Is a carnivorous free-floating, non-rooted plant that can reach 2-3 meters in length with submerged stems, bladders, and overwintering buds. Stems are slender, 1/16 inches think or smaller with small, crowded, linear leaves forked 3-7 times. Dark bladders cover the stems and are responsible for capturing prey, opening like a valve to trap microorganisms then using enzymes to slowly digest prey and absorb needed nutrients. Prey can consist of aquatic insect larvae, water mites, nematodes, gastropods, small tadpoles, crustaceans, diatoms, and other aquatic microorganisms. *Utricularia intermedia* (Bladderwort) produces 1-4 bright yellow 1/3 inch snap-dragon-like blooms with a slender green stalk. Its stems provide food and cover for many fish species. Bladderworts have been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Utriculaaria purpurea (Purple bladderwort)

Purple Bladderwort is a carnivorous, submerged perennial that is rootless and free-floating. Its stems can be up to 3 feet long with floating leaves produced in whorls of 5-7 that branch into numerous lacy slender segments. The bladders are small and roughly spherical and are attached at the tips of the leaf segments. Small, spherical, dark bladders attached at the tips of the leaf segments are responsible for capturing prey, opening like a valve to trap microorganisms then using enzymes to slowly digest prey and absorb needed nutrients. Prey can consist of aquatic insect larvae, water mites, nematodes, gastropods, small tadpoles, crustaceans, diatoms, and other aquatic microorganisms. It produces a purple, lipped flower with 2-3 petals from a stalk several inches above the water. This plant attracts birds, flies, butterflies, and moths and its stems provide food and cover for many fish species. Bladderworts have been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

Vallisneria americana (Eelgrass)

A submerged, flowering seagrass that thrives in soft, sandy sediment in shallow bays and inlets. It is a grass like plant with dark-green, narrow, ribbon shaped leaves with rounded tips, that grow 20 to 50 cm in length. These leaves shoot from rhizomes binding the plant to the sediment. *Vallisneria americana* (Eelgrass) form dense underwater meadows, that support a diversity of flora and fauna, and act as a nursery to fish and shellfish. Additionally, it adds structure to silty sands that would otherwise shift and erode. Eelgrass has been found to have a relatively low sensitivity to ProcellaCOR treatment, resulting in little to no response observed on the plants health after treatment.

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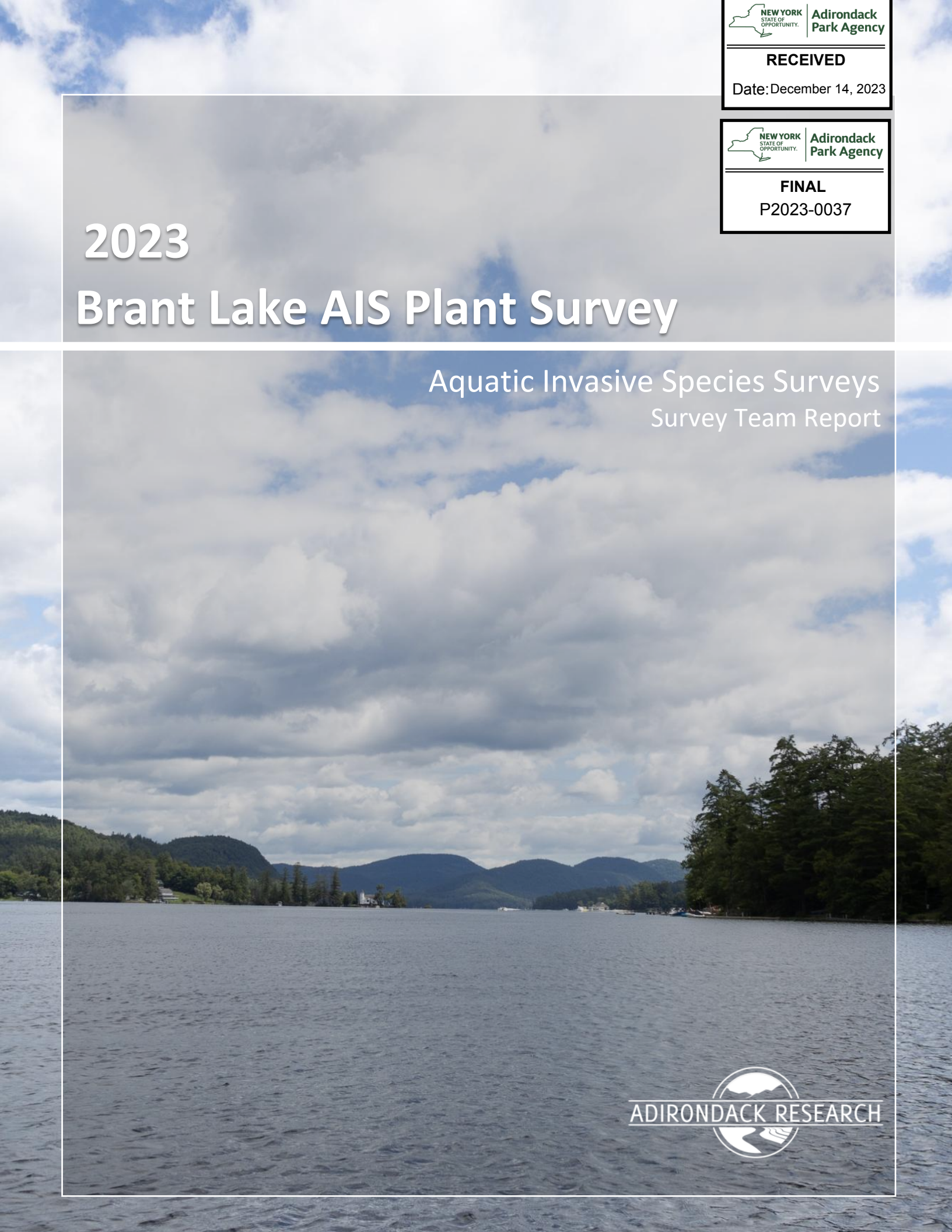
2023
Brant Lake AIS Plant Survey

Aquatic Invasive Species Surveys
Survey Team Report



ADIRONDACK RESEARCH

2023 Brant Lake Aquatic Invasive Species Survey

Written by:
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Adirondack Research
August 2023

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Cover image: Photo by Tucker Wells.

Executive Summary

The purpose of this monitoring effort was to fully inspect and survey the areas of the lake that fall within the littoral zones and that are at risk to invasive species establishment, with special attention to Eurasian watermilfoil. Our goal was to document the current beds of Eurasian watermilfoil so that a comparison can be made with past and future surveys. By carrying out these surveys the crew also ensured that the waterbody is currently free of other aquatic invasive species. In the case that any new invasive species was found our crew would have mapped out any and all invasive plant beds.

Table of Contents

Methods

Below is a description of the survey methods used while surveying your lake. We've included a brief description of the equipment used, our cleaning procedure for all of our equipment before accessing your lake, and a description of our survey techniques.

Equipment

Equipment used while completing the Aquatic Invasive Species (AIS) survey of the lake consisted of double-sided rakes for collecting plan samples from under the water, an iPad 4 mini that is cellular-enable for data collection and GPS tracking, a motor boat(s) or canoe(s), and a Lowrance HDS 7 Live sonar unity with transducer. All data and observations are recorded using ESRI's Collector for ArcGIS application – a mapping and data processing software. These tools allow us to accurately map our travel path and delineate any invasive plant beds (if found).

Cleaning

As our team is frequently moving from one water body to another, specific precautions were taken to ensure that all equipment used was decontaminated and free of AIS before and after entering your lake. This is done by thoroughly washing and decontaminating all of our equipment using a high-pressure washer with hot water (120-160 degrees Fahrenheit).

Monitoring Techniques

While out on the waterbody our crew focused on surveying the littoral zones around the lake for aquatic plants. The littoral zone typically encompasses the area from shoreline to a depth of about 15 feet. The team surveyed the littoral zone in a zig-zag pattern searching for plant beds employing both visual observation and regular rack tosses informed by sonar output. Given the active milfoil harvesting on Brant Lake, we chose targeted sections over surveying the whole lake as advised by the client. Our procedure was to survey around milfoil hazard buoys that were placed along the southern and northern end of the lake. Sonar guidance allowed us to target sample areas with plant growth where over the water visibility is impaired. All plants retrieved by rake toss or seen by visual inspection were identified to the best of our abilities (usually to the species level, but sometimes to genus). Our team is highly trained in identifying both native and invasive aquatic plants and survey to the standards up held by the Adirondack Park Invasive Plant Program (APIPP). In addition to this, we carry several aquatic plants guides such as, the "Maine Field Guide to Invasive Aquatic Plants and their common native look-alikes" by Lake Stewards of Maine for aiding in onsite identification.

Given our variety of mapping equipment, we are able to accurately map any AIS infestations immediately upon discovery. If an AIS infestation had been discovered an occurrence point would have been dropped in ESRI Collector and the entire bed would have been mapped out with an assessment polygon. The occurrence point contains information such as the date, who

made the observation, species, and photos. After the occurrence point gets collected and assessment polygon would be mapped out by circumnavigating the exterior of the plant bed while recording our position with GPS. Based upon how much AIS was observed on the rake toss a percent cover of the invasive plant bed is assigned to each assessment polygon. As the assessment polygon and occurrence points are marked with GPS points changes in acreage, percent cover and placement in the waterbody can be tracked over time.

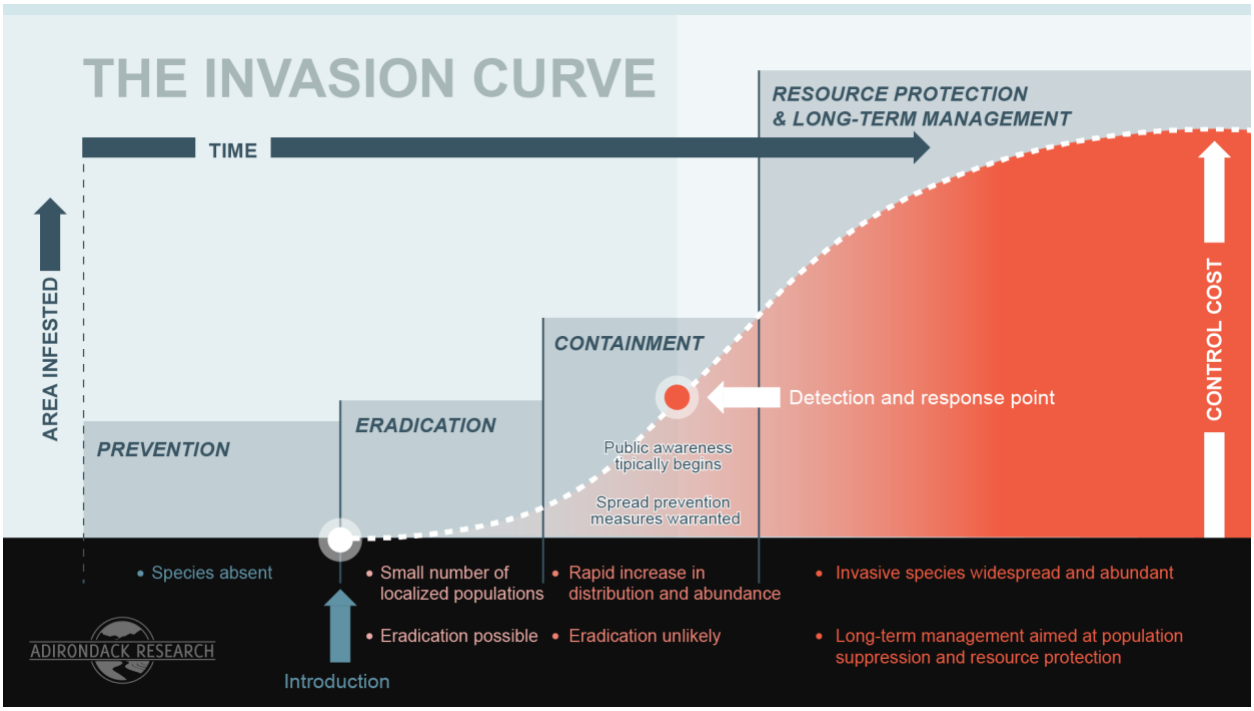
Invasive plant species (if found) and native species that were discovered over the course of the survey were identified, recorded and noted in the Results section of this report.

Data and Research Limitations

We collected sonar data from this survey, but we did not process the data in a third-party lake characteristics mapping program such as C-Map BioBase or ReefMaster. Sonar has been processed in the past during surveys conducted for the Adirondack Park Invasive Plant Program.

Recommendations

We recommend performing yearly early detection surveys. There currently is only one invasive species present in the waterway. Eurasian watermilfoil. However, data supports that the earlier a detection of AIS on a body of water, the quicker and most effectively a management strategy can be devised. We recommend surveying for other AIS yearly.



Conclusions

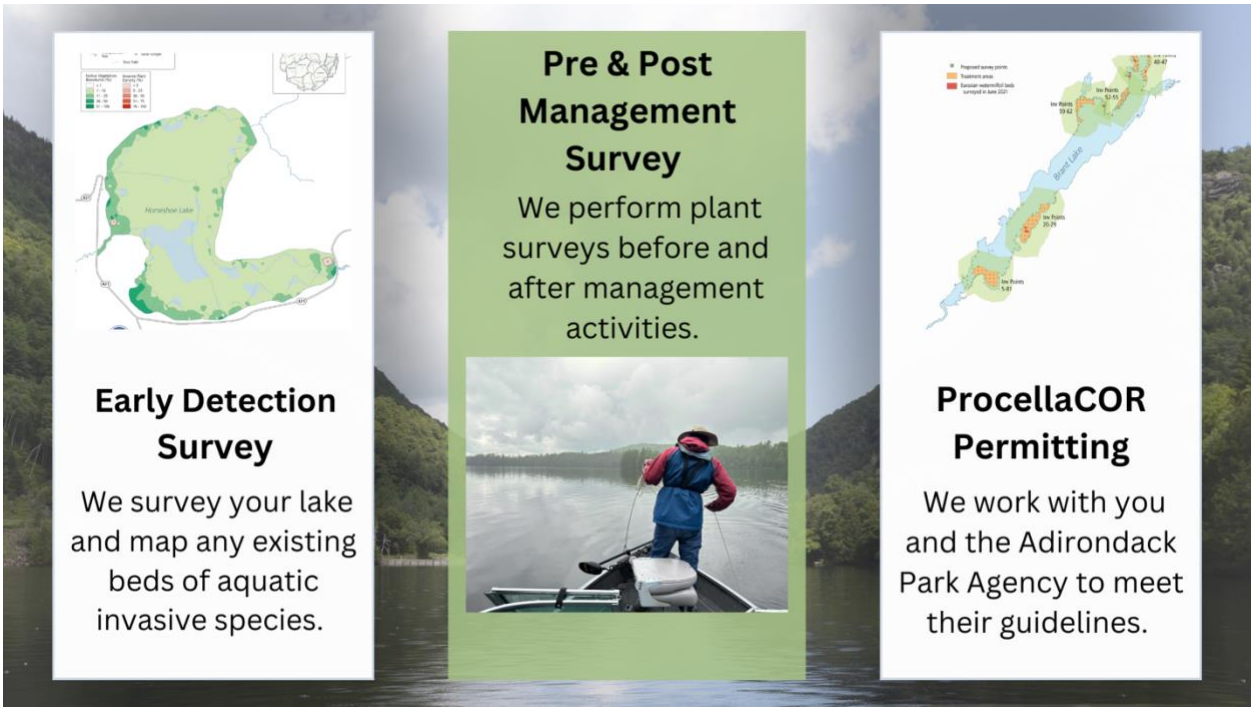
Our survey concluded that Eurasian watermilfoil (*Myriophyllum spicatum*) is the only known invasive species on Brant Lake. The locations of Eurasian watermilfoil beds were consistent with previous years' surveys.

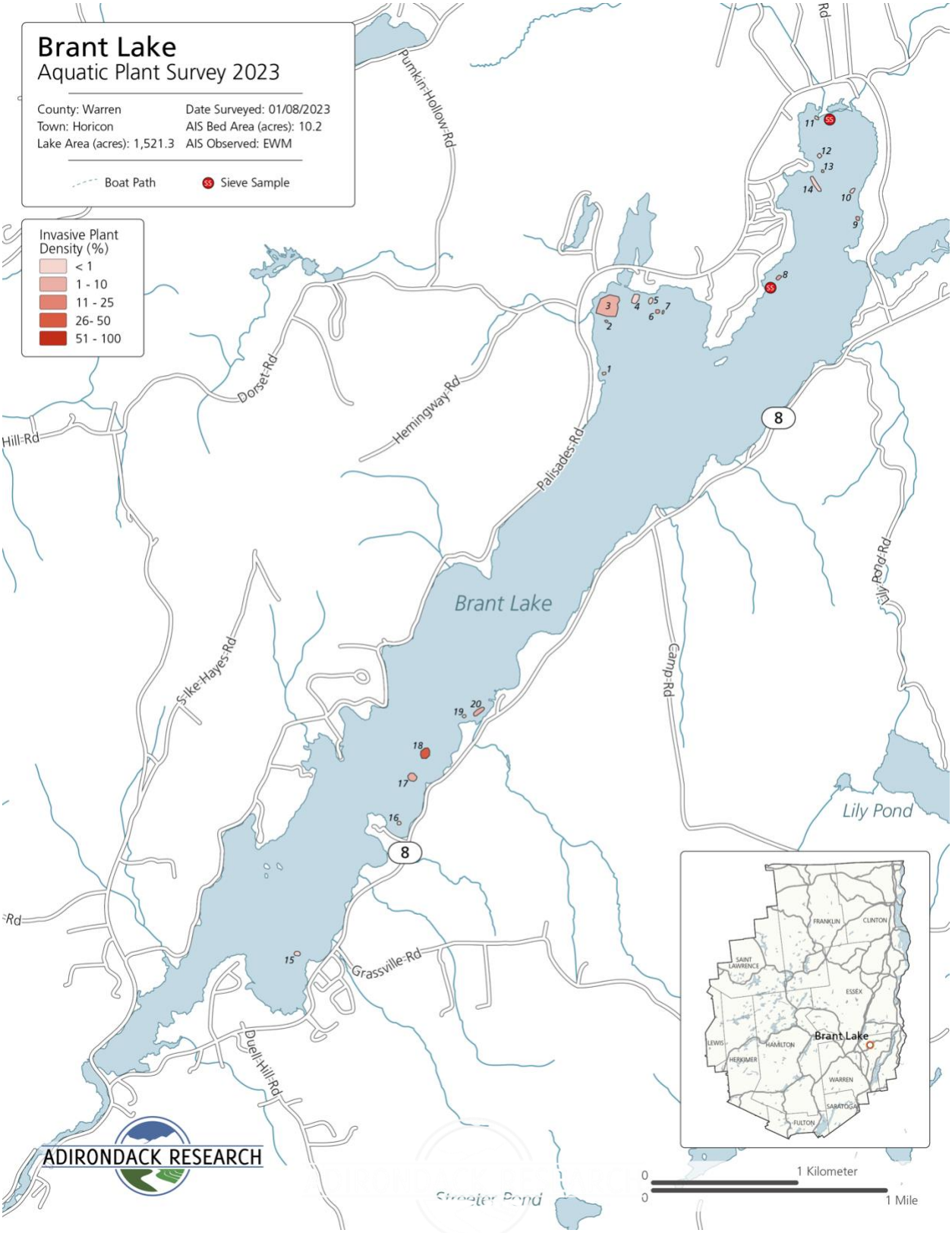
Maps

The map included in this report has been created using publicly accessible data showing roads and lake boundary. When available, we also include publicly accessible bathymetry data from the NYS DEC. If found, invasive plant beds are also shown on the included map. Raw sonar data files from our survey can be supplied to you if requested. The dotted line on the maps shows our survey path this year.

Other services we offer

In addition to Early Detection Survey's, Adirondack Research also offers Pre and Post management surveys to determine the effectiveness and success of AIS management work conducted on a waterbody. Also offered is the ProcellaCOR Permitting Survey. ProcellaCOR is an herbicide used to treat AIS such as Eurasian Watermilfoil. A survey of aquatic species is required for a permit to be issued.




Brant Lake
Aquatic Plant Survey 2023
County: Warren
Town: Horicon
Lake Area (acres): 1,521.3
Date Surveyed: 01/08/2023
AIS Bed Area (acres): 10.2
AIS Observed: EWM
Boat Path
Sieve Sample
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Pumpkin Hollow Rd
Dorset Rd
Hill Rd
Hemingway Rd
Palisades Rd
Brant Lake
Strike Hayes Rd
Camp Rd
Lily Pond Rd
Lily Pond
Grassville Rd
Duell Hill Rd
8
Stroster Pond
FRANKLIN
CLINTON
SAINT LAWRENCE
ESSEX
LEWIS
HAMILTON
HERKIMER
WARREN
SARATOGA
FULTON
Brant Lake
ADIRONDACK RESEARCH
0
1 Kilometer
0
1 Mile