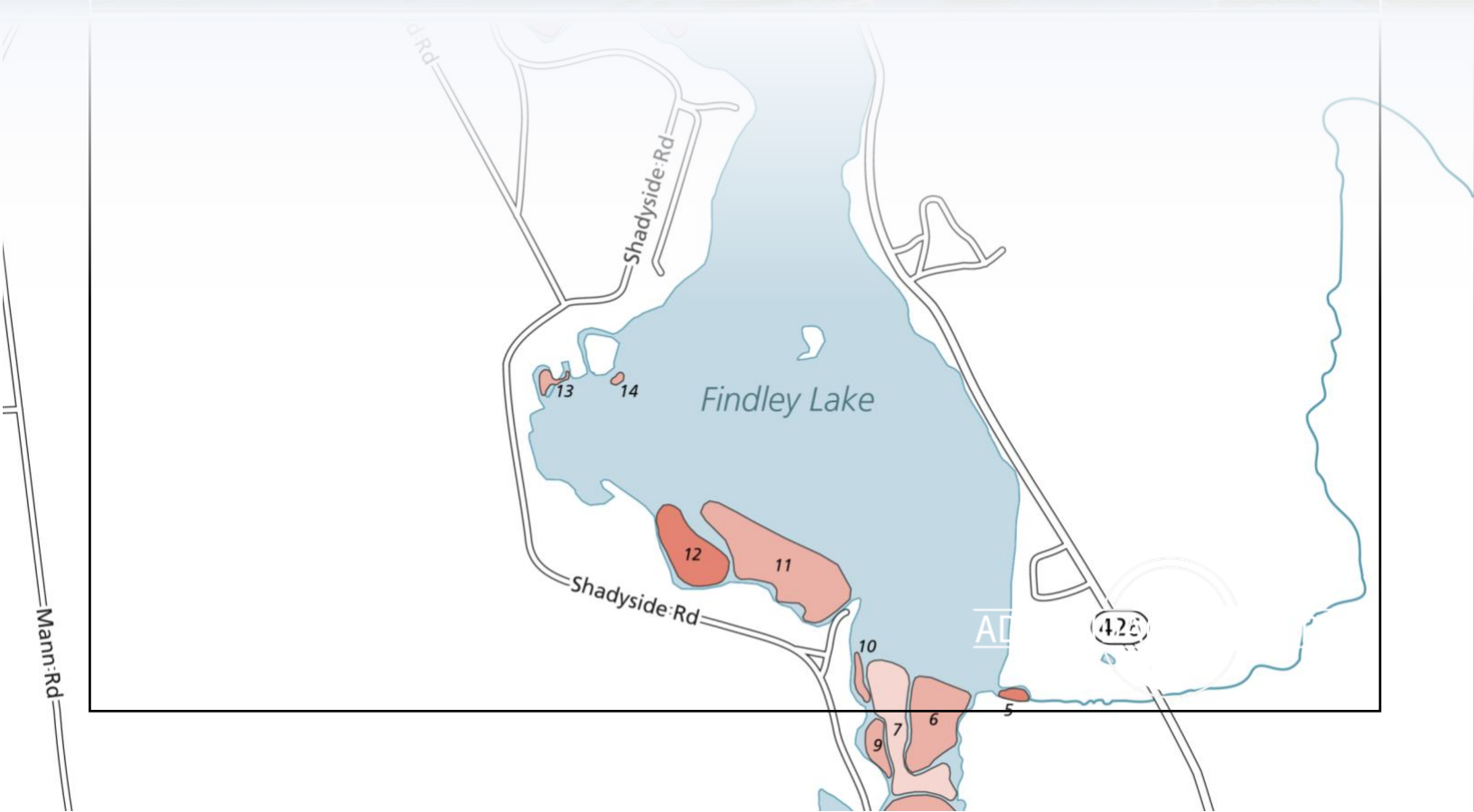




# 2023 Findley Lake AIS Survey

Aquatic Invasive Species Surveys  
Survey Team Report



# 2023 Findley Lake Aquatic Invasive Species Survey

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**Cover image:** Justin Wolford and Tucker Wells surveying Findley Lake, September 2023. Photo by Ben Fergus

## Executive Summary

The purpose of this effort was to perform a point intercept survey in preparation for submitting a permit to the DEC for management of Eurasian watermilfoil (*Myriophyllum spicatum*) using the herbicide ProcellaCOR EC.

We surveyed 163 stations (sample points). Our survey design and methodologies followed the DEC 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 163 stations.

Eurasian watermilfoil was documented at a total of 91 of the 163 stations (55.8%). One other invasive species was detected, *Potamogeton crispus* (curly-leaf pondweed) was also detected at 2 stations. Fourteen other native species were documented.



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## Overview

We performed an aquatic invasive species (AIS) and native aquatic plant species survey for Findley Lake in Chatauqua County on the dates of September 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> 2023. This survey was completed in preparation for The Findley Lake Association applying to the DEC for a permit to use the herbicide ProcellaCOR EC for the control of an aquatic pest (AQV).

The Findley Lake Association is planning to apply for a permit to use ProcellaCOR EC in 2024 to manage Eurasian watermilfoil (*Myriophyllum spicatum*). We conducted the surveys and created maps and data tables of the survey results for this 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](http://www.adkres.org).

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

- Survey 163 stations in the entirety of the 316 -acre waterbody over a 3-day period with two crew members using a motorboat.
- Survey and identify all native plant species at point intercept survey stations within a survey design to meet DEC 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 16 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.
- Produced this report of the described survey effort.

## Methods

Below is a description of the survey methods used while surveying the lake. We've included a brief description of the equipment used, our pre- and post-cleaning procedure for all of our equipment, 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, and a Lowrance HDS 7 GPS and sonar unit. All data and observations were recorded using ESRI's Field Maps 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.

### Sampling Techniques

The littoral zone typically encompasses the area from shoreline to a depth of about 15 feet. We utilized publicly available bathymetric to determine the survey extent. We then evenly distributed 163 points around the lake for sampling.

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

**Table 1:** Density class descriptions. 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.

## Results

The team surveyed 163 sites on September 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> 2023: detecting two invasive species (Eurasian watermilfoil), and *Potamogeton crispus* (curly-leaf pondweed). The team also detected 13 native species. Table 2 provides a summary of all aquatic vegetation detected in Findley 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 for Findley Lake 2023. Coverage class was recorded for each of these and are displayed in Table 4.

Common Name	Scientific Name	# of stations	% Occurance
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	91	55.8
Curly-leaf pondweed	<i>Potamogeton crispus</i>	2	1.2
Bladderwort	<i>Utricularia macrorhiza</i>	1	0.6
Coontail	<i>Ceratophyllum demersum</i>	61	37.4
Elodea	<i>Elodea spp.</i>	27	16.6
Flat-stemmed pondweed	<i>Potamogeton compressus</i>	2	1.2
long-leaf pondweed	<i>Potamogeton nodosus</i>	1	0.6
Low watermilfoil	<i>Myriophyllum humile</i>	2	1.2
Nitella	<i>Nitella spp.</i>	12	7.4
Northern watermilfoil	<i>Myriophyllum sibiricum</i>	12	7.4
Robbins pondweed	<i>Potamogeton robbinsii</i>	7	4.3
Sago pondweed	<i>Stuckenia pectinata</i>	6	3.7
Slender naiad	<i>Najas flexilis</i>	8	4.9
Water celery	<i>Vallisneria Americana</i>	51	31.3
White waterlily	<i>Nymphaea alba</i>	10	6.1

Below are the results for each species' density class distributions for Findley Lake.

#### Bladderwort spp.

Bladderwort was detected at a single station with a moderate density class (n=1, 100.0%).

#### Coontail

Of the 61 stations that coontail was detected at, the most common was trace density class (n=22, 36.1%), followed by sparse density class (n=21, 34.4%), moderate density class (n=12, 19.7%), dense density class (n=5, 8.2%), and highly-dense density class (n=1, 1.6%).

#### Curly-leaf pondweed

Of the 2 stations that curly-leaf pondweed was detected at, it was only found at trace density class (n=2, 100.0%).

#### Elodea spp.

Of the 27 stations that Elodea spp. was detected at, the most common was sparse density class (n=16, 59.3%), followed by moderate density class (n=5, 18.5%), trace density class (n=4, 14.8%), and dense density class (n=2, 7.4%).

#### Eurasian watermilfoil

Of the 91 stations that Eurasian watermilfoil was detected at, the most common was sparse density class (n=44, 48.4%), followed by trace density class (n=27, 29.7%), moderate density class (n=13, 14.3%), dense density class (n=6, 6.6%), and highly-dense density class (n=1, 1.1%).

#### Flat-stem pondweed

Of the 2 stations that flat-stem pondweed was detected at, it was only found at trace density class (n=2, 100.0%).

#### Long-leaf pondweed

Of the 1 station that long-leaf pondweed was detected at, it was only found at trace density class (n=1, 100.0%).

#### Low water-milfoil or Hybrid milfoil

Low water-milfoil was detected at two stations at sparse density class (n=1, 50.0%) and trace density class (n=1, 50.0%). Note that this was our best ID, but it is also possible that this is a hybrid of northern water-milfoil and Eurasian watermilfoil. For the purpose of this report, it is listed as low water milfoil throughout.

#### Nitella

Of the 12 stations that nitella was detected at, the most common was sparse density class (n=9, 75.0%), followed by moderate density class (n=2, 16.7%), and trace density class (n=1, 8.3%).

#### Northern water-milfoil

Of the 12 stations that northern water-milfoil was detected at, the most common was trace density class (n=6, 50.0%), followed by sparse density class (n=4, 33.3%), and moderate density class (n=2, 16.7%).



#### Robbins pondweed

Of the 7 stations that Robbin's pondweed was detected at, the most common was sparse density class (n=3, 42.9%), followed by moderate density class (n=2, 28.6%), and trace density class (n=2, 28.6%).

#### Sago pondweed

Of the 6 stations that sago pondweed was detected at, the most common was sparse density class (n=3, 50.0%), followed by dense density class (n=1, 16.7%), moderate density class (n=1, 16.7%), and trace density class (n=1, 16.7%).

#### Slender naiad

Of the 8 stations that slender naiad was detected at, the most common was sparse density class (n=6, 75.0%), followed by moderate density class (n=1, 12.5%), and trace density class (n=1, 12.5%).

#### Water Celery

Of the 51 stations that water celery was detected at, the most common was sparse density class (n=28, 54.9%), followed by trace density class (n=14, 27.5%), moderate density class (n=8, 15.7%), and dense density class (n=1, 2.0%).

#### White water lily

Of the 10 stations that white water lily was detected at, the most common was moderate density class (n=4, 40.0%), followed by dense density class (n=3, 30.0%), and sparse density class (n=3, 30.0%).

**Table 3:** Station number, and depth that Eurasian watermilfoil was recorded, along with its abundance and the total species richness at that point.

Station #	Depth	Abundance	Species richness
1	5.3	26-50	2
2	8.7	5-25	2
3	8.4	26-50	2
4	7	<5	1
5	4.9	26-50	3
7	2.5	<5	3
11	3.7	5-25	3
12	4.7	<5	2
14	2.5	5-25	3
15	4.2	<5	2
17	5.1	5-25	1
18	3.8	<5	2
19	2	5-25	2
20	0.5	<5	2
22	4.1	5-25	4
24	2.2	5-25	3
25	4.1	5-25	2
26	2.9	5-25	2
27	4.3	<5	2
30	10.6	<5	1
31	15.6	<5	1
45	9.2	5-25	2
49	10.8	<5	1
52	6.5	<5	3
59	2.7	<5	3
60	1.7	26-50	5
62	1.5	5-25	1
64	1.7	5-25	4
66	1.5	5-25	4
67	1.5	5-25	4
68	1	5-25	4
69	1	5-25	3
71	1.5	5-25	2
72	1.5	26-50	2
75	0.7	51-75	4
76	1	51-75	3
77	1.2	51-75	4
78	2.9	5-25	5
82	4.8	<5	1
83	3.9	26-50	6
85	7.7	5-25	3
86	8.5	5-25	2
87	6.6	<5	3
88	6.1	26-50	2
89	6.6	<5	1
90	6	5-25	2
91	2.3	<5	2
92	3.4	5-25	4
93	3	5-25	3
94	3.1	5-25	4

Table 3. Continued

Station #	Depth	Abundance	Species richness
95	5.3	<5	1
96	5.1	26-50	3
97	2.7	<5	2
98	1.5	51-75	3
99	2	26-50	3
100	4.4	5-25	2
101	6.2	<5	1
102	4.2	<5	1
103	5.5	<5	1
104	4.2	5-25	1
105	4.4	<5	3
106	5.5	5-25	1
121	9.1	5-25	1
122	4	26-50	2
123	3.9	<5	2
126	3.3	26-50	4
129	5.8	51-75	2
130	4	76-100	2
131	6.9	51-75	2
133	7.1	5-25	2
134	4.4	5-25	3
135	6.3	26-50	2
136	6.3	5-25	2
138	8	5-25	2
139	5.7	5-25	3
140	7.2	<5	2
145	7.3	<5	3
148	6.5	5-25	1
150	3.3	5-25	4
151	3.5	<5	2
152	3	26-50	2
153	5.5	<5	4
154	4.7	5-25	1
155	4	5-25	2
156	5.9	5-25	1
157	7.1	5-25	2
158	6.1	5-25	3
159	6.9	5-25	2
160	4.1	5-25	3
161	3.4	5-25	2
162	3.5	5-25	3

**Table 4. Abundance of Species by Site – Findley Lake 2023**

Station Number	Depth	Eurasian watermilfoil	Curly-leaf pondweed	Water celery	Coontail	Nitella spp.	Northern watermilfoil	Elodea	Slender naiad	Saggo pondweed	Flat-stemmed pondweed	Bladderwort	White water-lily	Robbins pondweed	Long-leaf pondweed	Low watermilfoil	Species Richness	Overall Rare Abundance
1	5.3	D		S													2	26-50
2	8.7	M		T													2	5-25
3	8.4	M			S												2	26-50
4	7	T															1	<5
5	4.9	M			M												2	26-50
6	8.2				T												1	<5
7	2.5	T		T	T												3	<5
8	9.1				T												1	<5
9	1.5																0	0
10	5.9				S												1	5-25
11	3.7	S		T	S												3	5-25
12	4.7	T								T							2	<5
13	3			T				T									2	5-25
14	2.5	S		S		S											3	5-25
15	4.2	T			T												2	<5
16	3.2				T												1	<5
17	5.1	S															1	5-25
18	3.8	T			T												2	<5
19	2	S								S							2	5-25
20	0.5	T		T													2	<5
21	2.6				T	T										T	3	<5
22	4.1	S						S		S						S	4	5-25
23	3				S	S											2	5-25
24	2.2	S		S	S												3	5-25
25	4.1	S			S												2	5-25
26	2.9	S				S											2	5-25
27	4.3	S		T													2	<5
28	3.7			T													1	<5
29	8.2																0	0
30	10.6	T															1	<5
31	15.6	T															1	<5
32	26.5																0	0
33	16.2																0	0
34	9.8																0	0
35	29.9																0	0
36	10.8																0	0
37	10.1																0	0
38	7.3			T	T		T	T									4	<5
39	20.5																0	0
40	19.3																0	0
41	12.4																0	0
42	12.6																0	0
43	20.1																0	0
44	22.4																0	0
45	9.2	T					T										2	5-25
46	12																0	0
47	11.1																0	0
48	20.6																0	0
49	10.8	T															1	<5
50	11.8																0	0

Table 4 continued

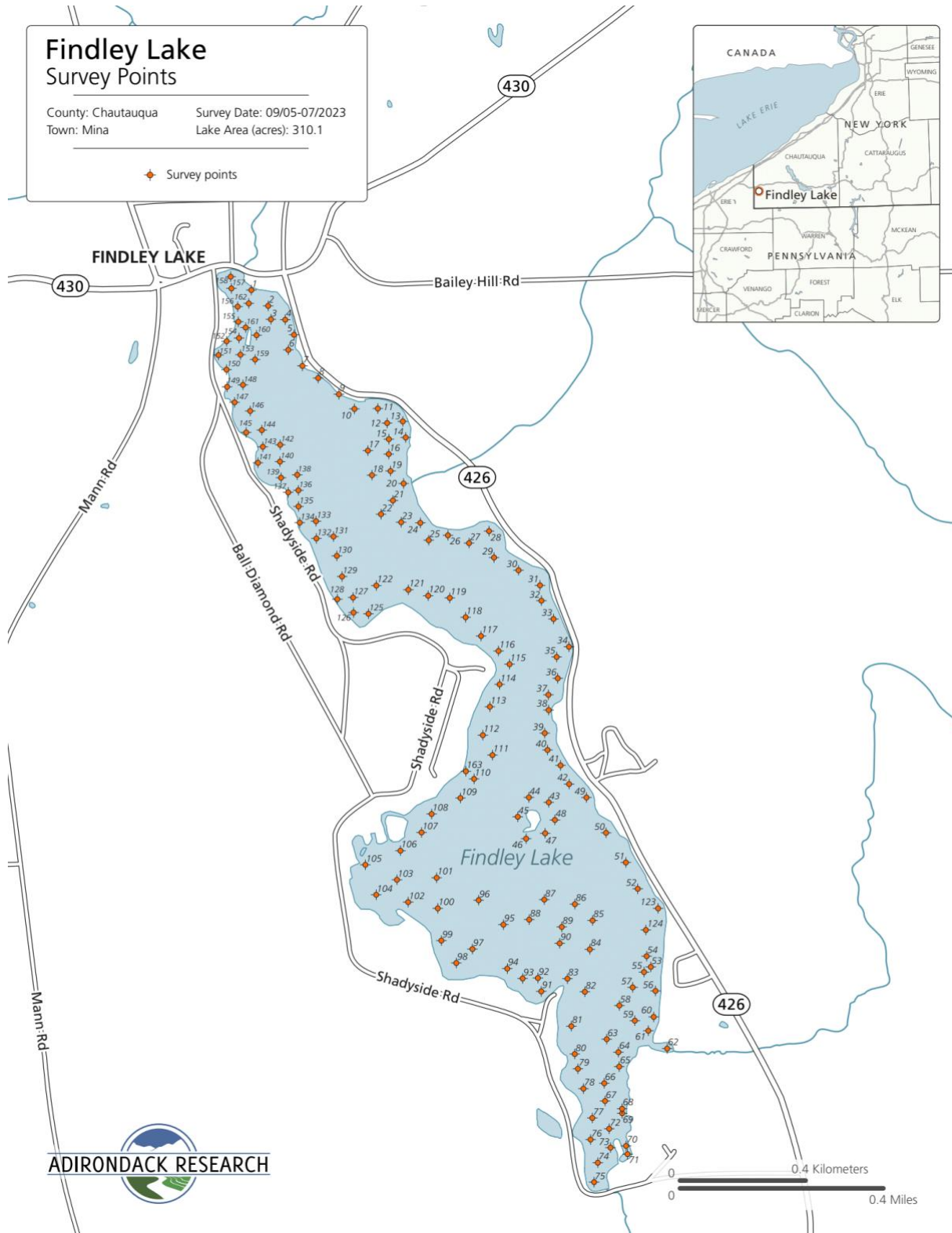
Station Number	Depth	Eurasian watermilfoil	Curly-leaf pondweed	Water celery	Coottail	Najas spp.	Northern watermilfoil	Elodea	Slender naiad	Sago pondweed	Flat-stemmed pondweed	Bladderwort	White water-lily	Robbins pondweed	Long-leaf pondweed	Low watermilfoil	Species Richness	Overall Rare Abundance
51	13.1																0	0
52	6.5	T			T		T										3	<5
53	3.5	T		T							T						3	<5
54	4.9				T												1	<5
55	4.6			T													1	<5
56	3		T						T		T						3	<5
57	4.5			M	T		T										3	5-25
58	4			T				S									2	5-25
59	2.7	T		T	T												3	<5
60	1.7	T		T	S			S	T								5	26-50
61	1.3			T		T											3	5-25
62	1.5	M						T									1	5-25
63	2.9			T	T	S											3	5-25
64	1.7	T		T	T			T									4	5-25
65	1			T	S		T						S				4	26-50
66	1.5	S		T	S				T								4	5-25
67	1.5	T		T				T	S								4	5-25
68	1	T			S	T							S				4	5-25
69	1	T			S								S				3	5-25
70	1.5				S			T					T				3	26-50
71	1.5	T			S												2	5-25
72	1.5	S											S				2	26-50
73	1.8				S								S				2	5-25
74	1.5				S							T	S				3	26-50
75	0.7	S			M			T					S				4	51-75
76	1	M			M								S				3	51-75
77	1.2	M		T	M					T							4	51-75
78	2.9	S		T				S	S	T							5	5-25
79	3			S	T			T	T								4	5-25
80	3.2			S				T									2	5-25
81	3.4			S	S			S									3	26-50
82	4.8	T															1	<5
83	3.9	T		T	M		T	M						S			6	26-50
84	6.1		T														1	<5
85	7.7	T						T						S			3	5-25
86	8.5	S						T									2	5-25
87	6.6	T						T						T			3	<5
88	6.1	M			T												2	26-50
89	6.6	T															1	<5
90	6	S						S									2	5-25
91	2.3	M						T									2	<5
92	3.4	T		S			T		T								4	5-25
93	3	T		S		S											3	5-25
94	3.1	T					T	T	T								4	5-25
95	5.3	T															1	<5
96	5.1	T		S						T							3	26-50
97	2.7	T			T												2	<5
98	1.5	S						M					S				3	51-75
99	2	S						M						T			3	26-50
100	4.4	M		S													2	5-25

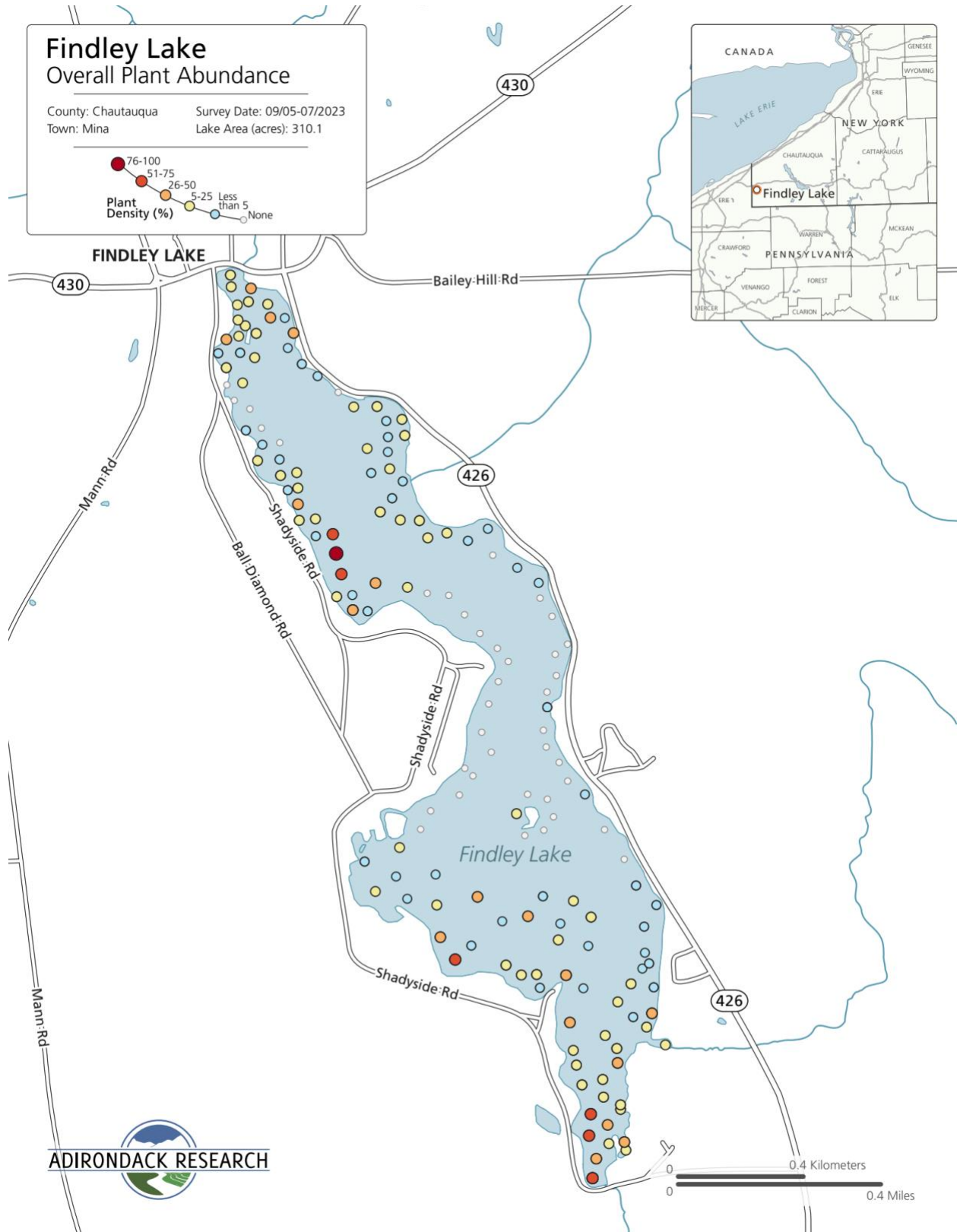
Table 4 continued

Station Number	Depth	Eurasian watermilfoil	Curly-leaf pondweed	Water celery	Coontail	Najas spp.	Northern watermilfoil	Elodea	Slender naiad	Sago pondweed	Flat-stemmed pondweed	Bladderwort	White water-lily	Robbins pondweed	Long-leaf pondweed	Low watermilfoil	Species Richness	Overall Rare Abundance
101	6.2	T															1	<5
102	4.2	T															1	<5
103	5.5	S															1	<5
104	4.2	M															1	5-25
105	4.4	T		T	T												3	<5
106	5.5	S															1	5-25
107	12.8																0	0
108	15.9																0	0
109	23.4																0	0
110	23.6																0	0
111	28.3																0	0
112	27.7																0	0
113	25.5																0	0
114	19.5																0	0
115	33.8																0	0
116	25.8																0	0
117	21.7																0	0
118	19.6																0	0
119	14.5																0	0
120	10.6																0	0
121	9.1	M															1	5-25
122	4	S			S												2	26-50
123	3.9	T													T		2	<5
124	5.3				T		T										2	<5
125	4.1			S	T		T										3	<5
126	3.3	T		T	S	M											4	26-50
127	5.4				T												1	<5
128	4			S										S			2	5-25
129	5.8	M			M												2	51-75
130	4	T			HD												2	76-100
131	6.9	T			D												2	51-75
132	5.8			S	T												2	<5
133	7.1	S						T									2	5-25
134	4.4	T		T										S			3	5-25
135	6.3	S			M												2	26-50
136	6.3	S						S									2	5-25
137	3.7				T			T						T			3	<5
138	8	S			S												2	5-25
139	5.7	S		S	S												3	5-25
140	7.2	S			T												2	<5
141	3.1			S	S												2	5-25
142	10.5																0	0
143	5.8			T													1	<5
144	18.5																0	0
145	7.3	T		T	T												3	<5
146	21.6																0	0
147	7.3																0	0
148	6.5	M															1	5-25
149	3.1																0	0
150	3.3	S		T		S	S										4	5-25
151	3.5	S			T												2	<5
152	3	M				S											2	26-50
153	5.5	S		T	T		T										4	<5
154	4.7	M															1	5-25
155	4	M		T													2	5-25
156	5.9	S															1	5-25
157	7.1	S			M												2	5-25
158	6.1	S		S	T												3	5-25
159	6.9	S			S												2	5-25
160	4.1	M		T	S												3	5-25
161	3.4	S		T													2	5-25
162	3.5			T	T												2	5-25
163	11.4																0	0

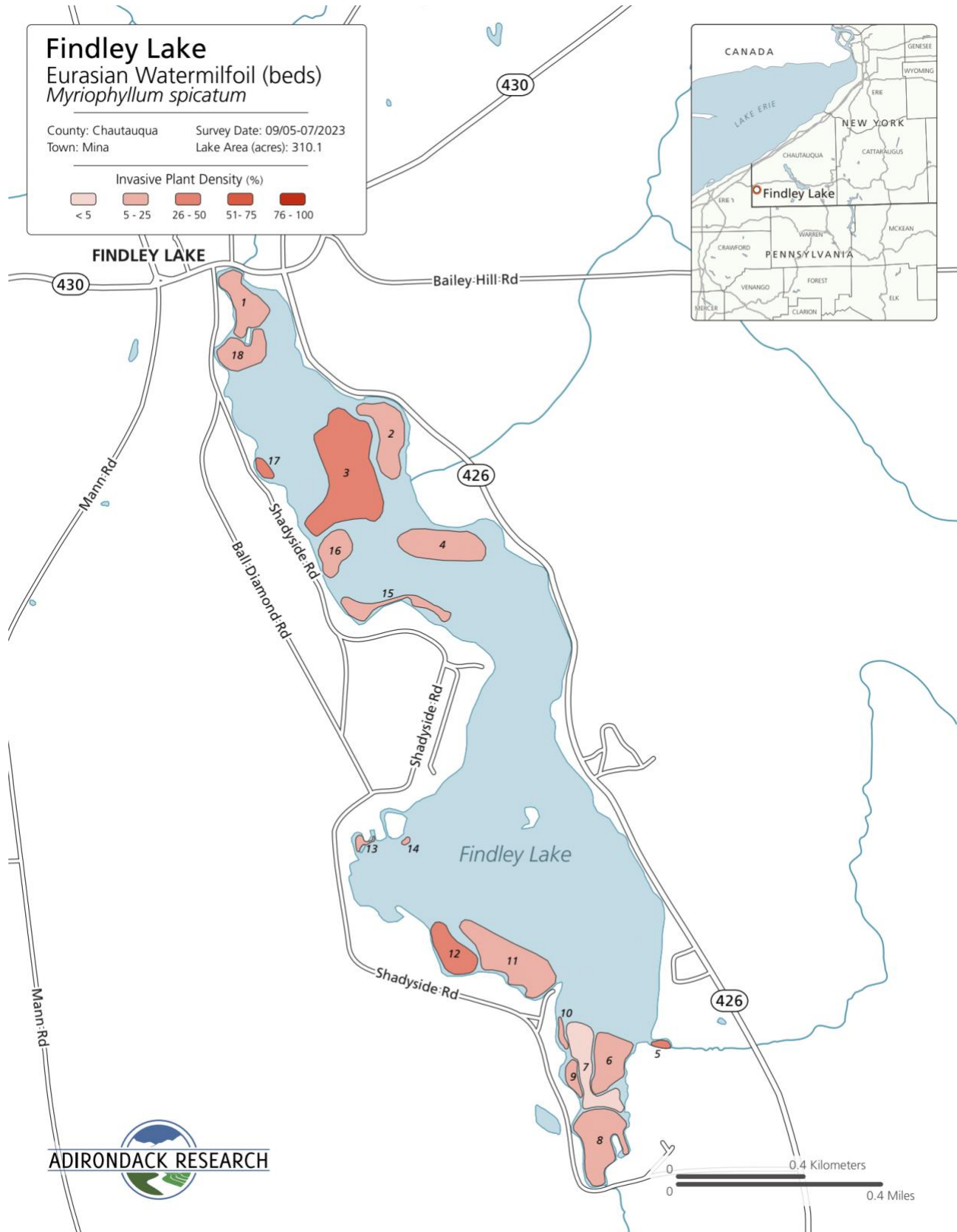
## Maps

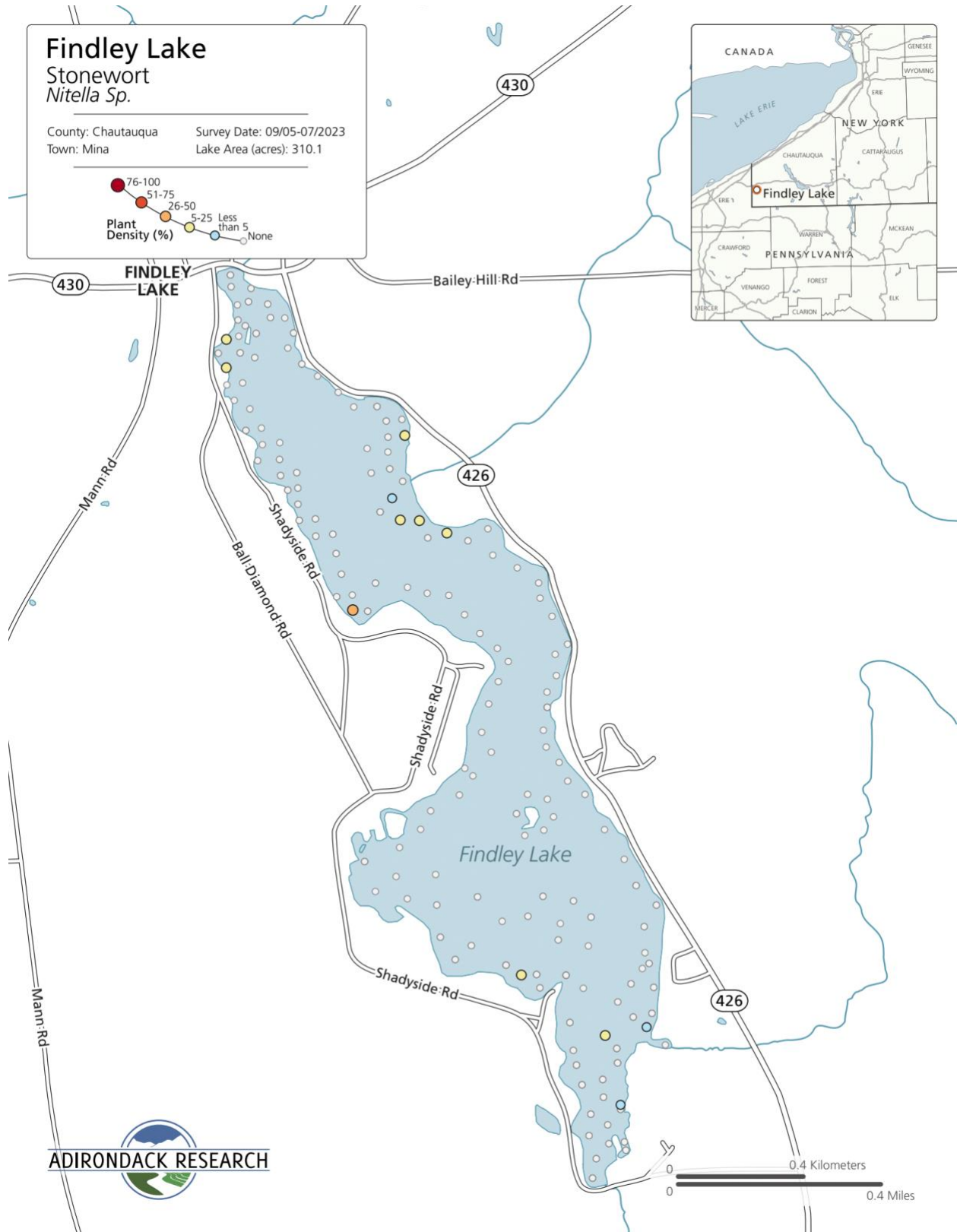
The following maps show the survey stations, overall plant abundance, Eurasian watermilfoil beds, as well as the plant density classes for each species across all survey points.

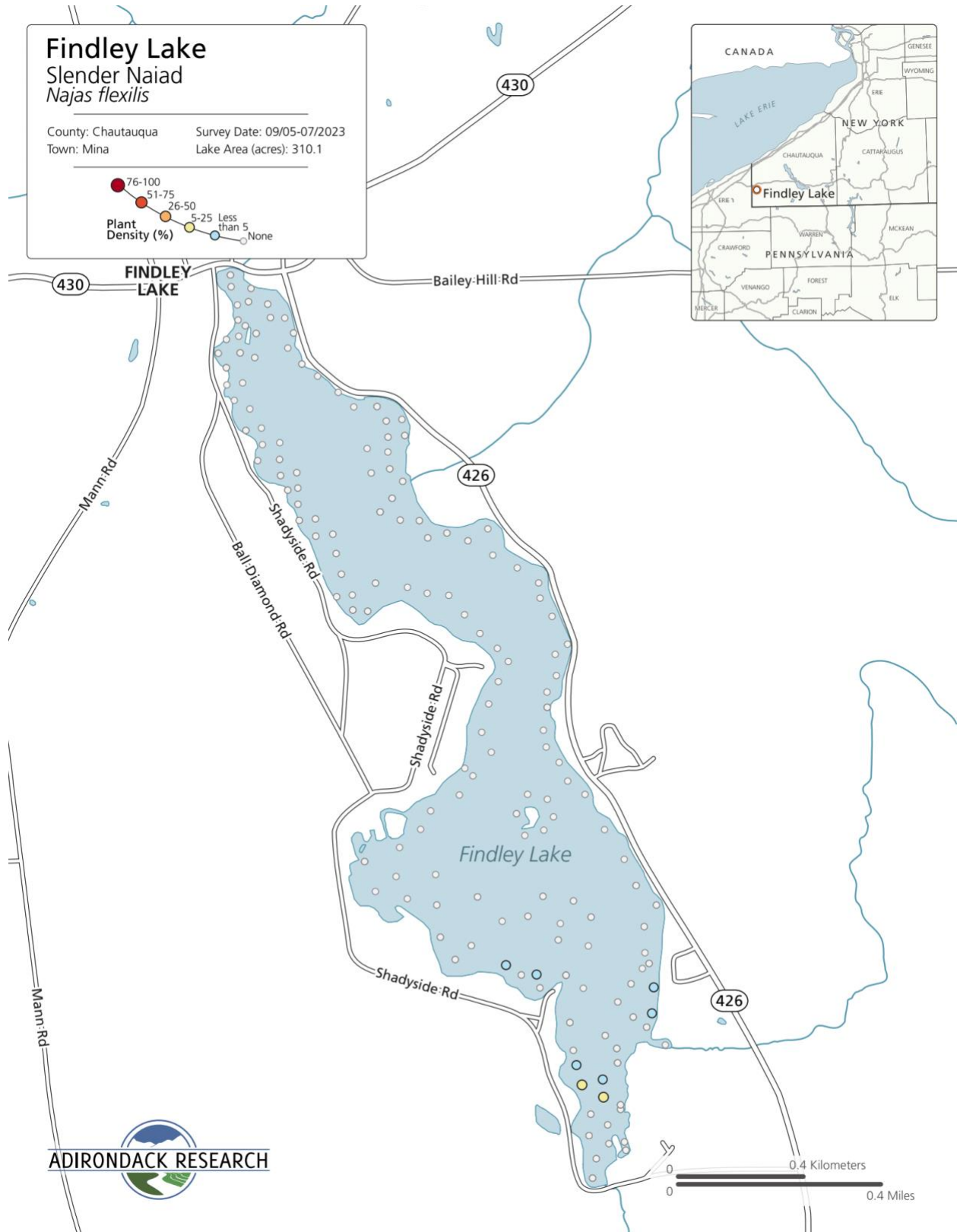


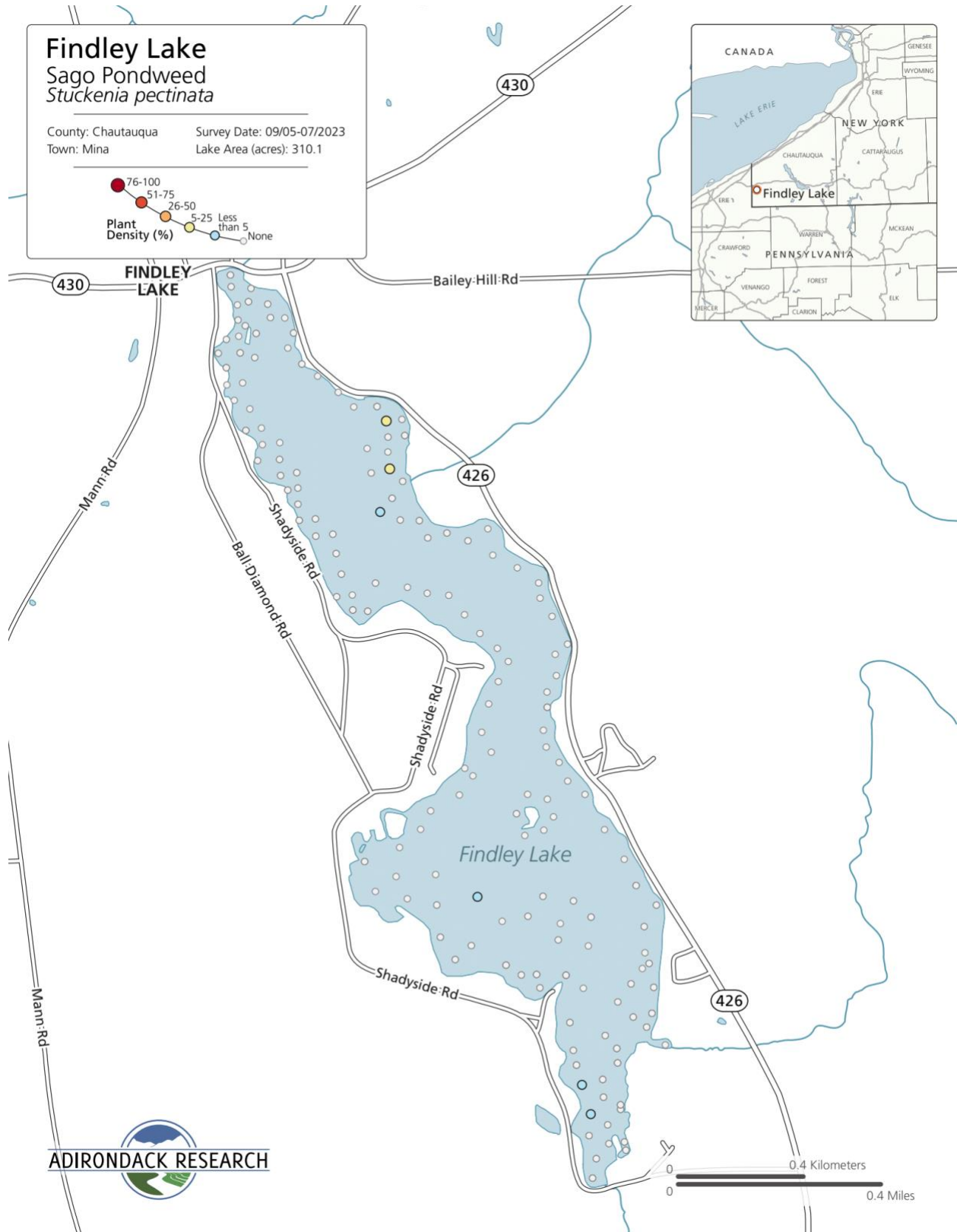


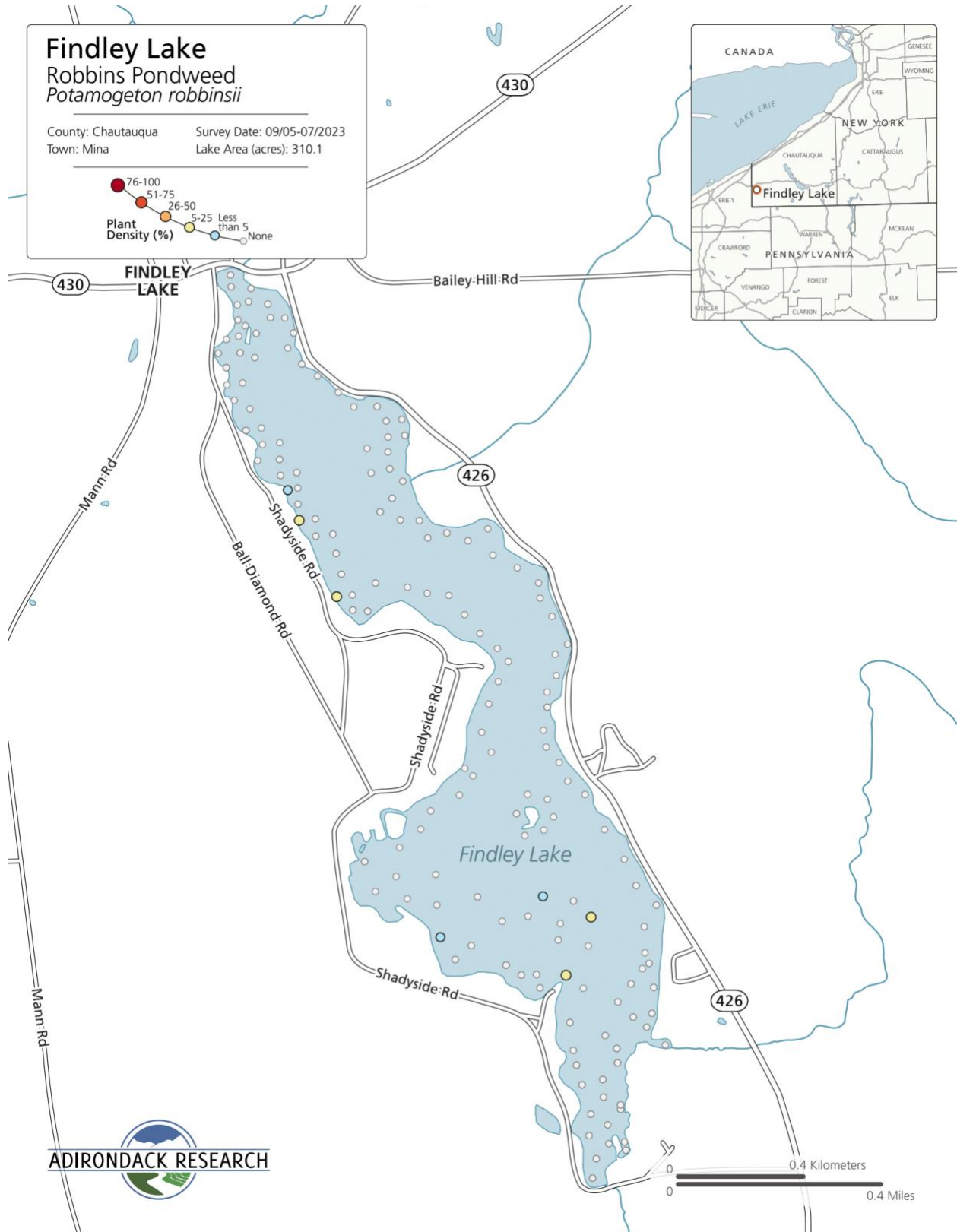


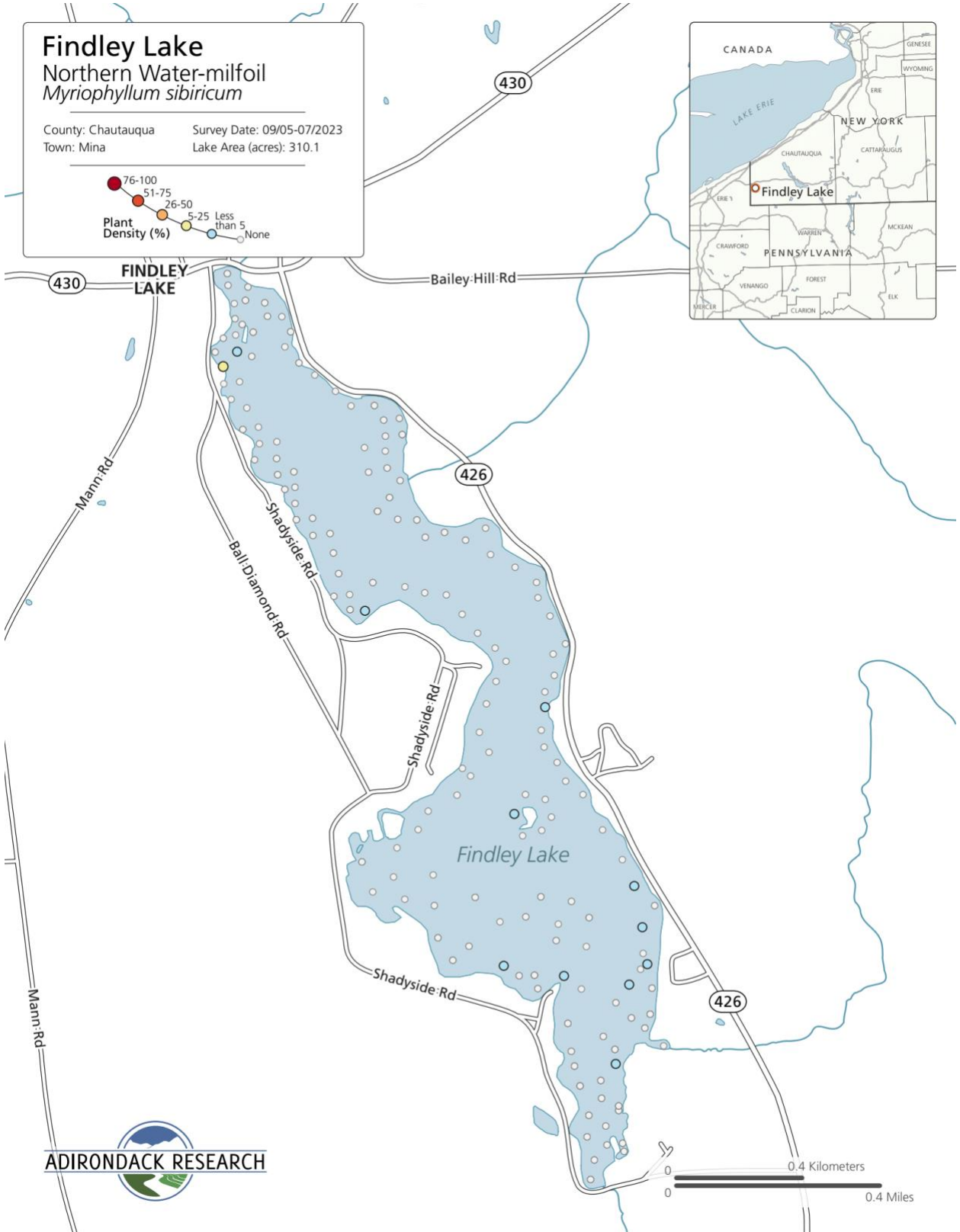


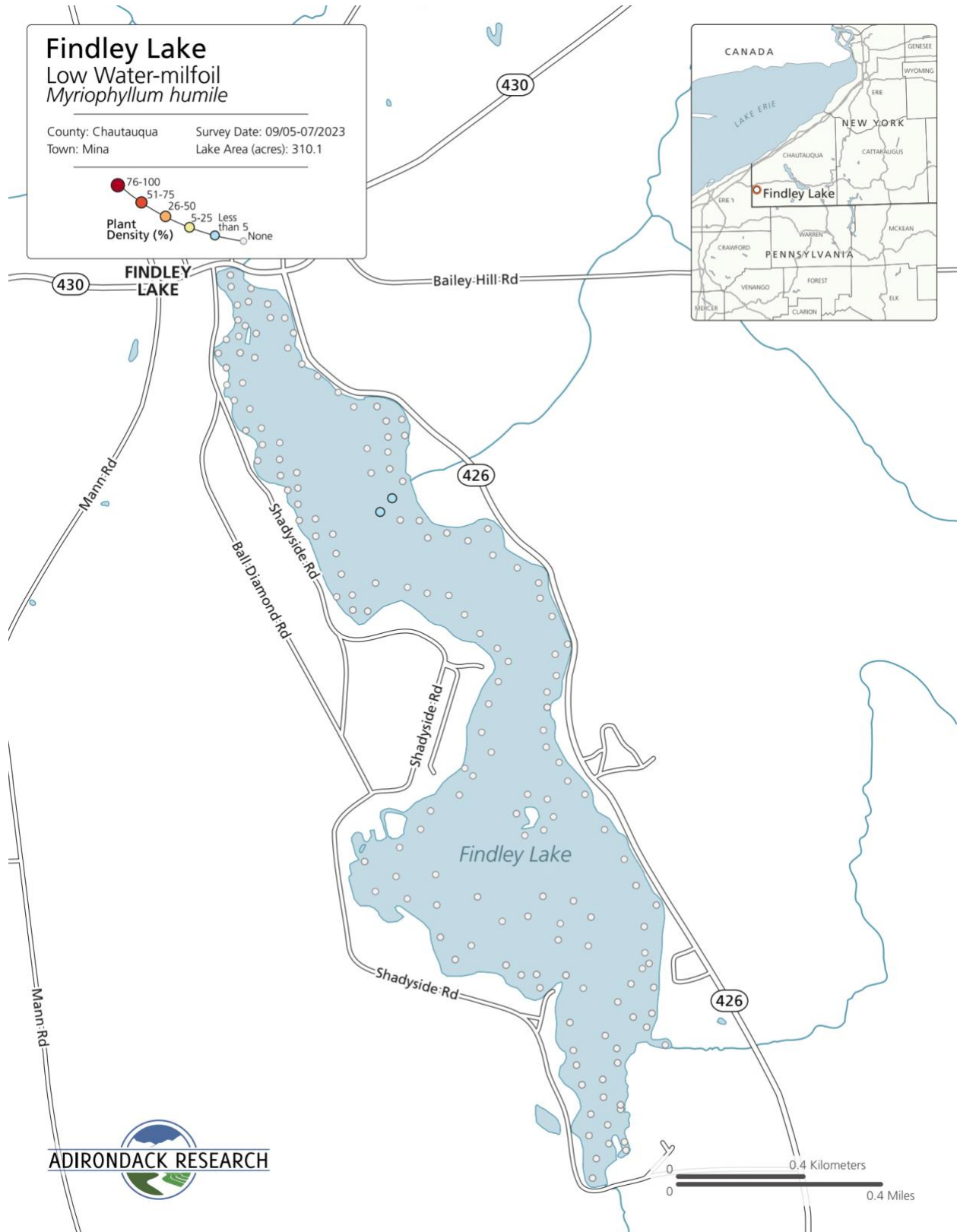


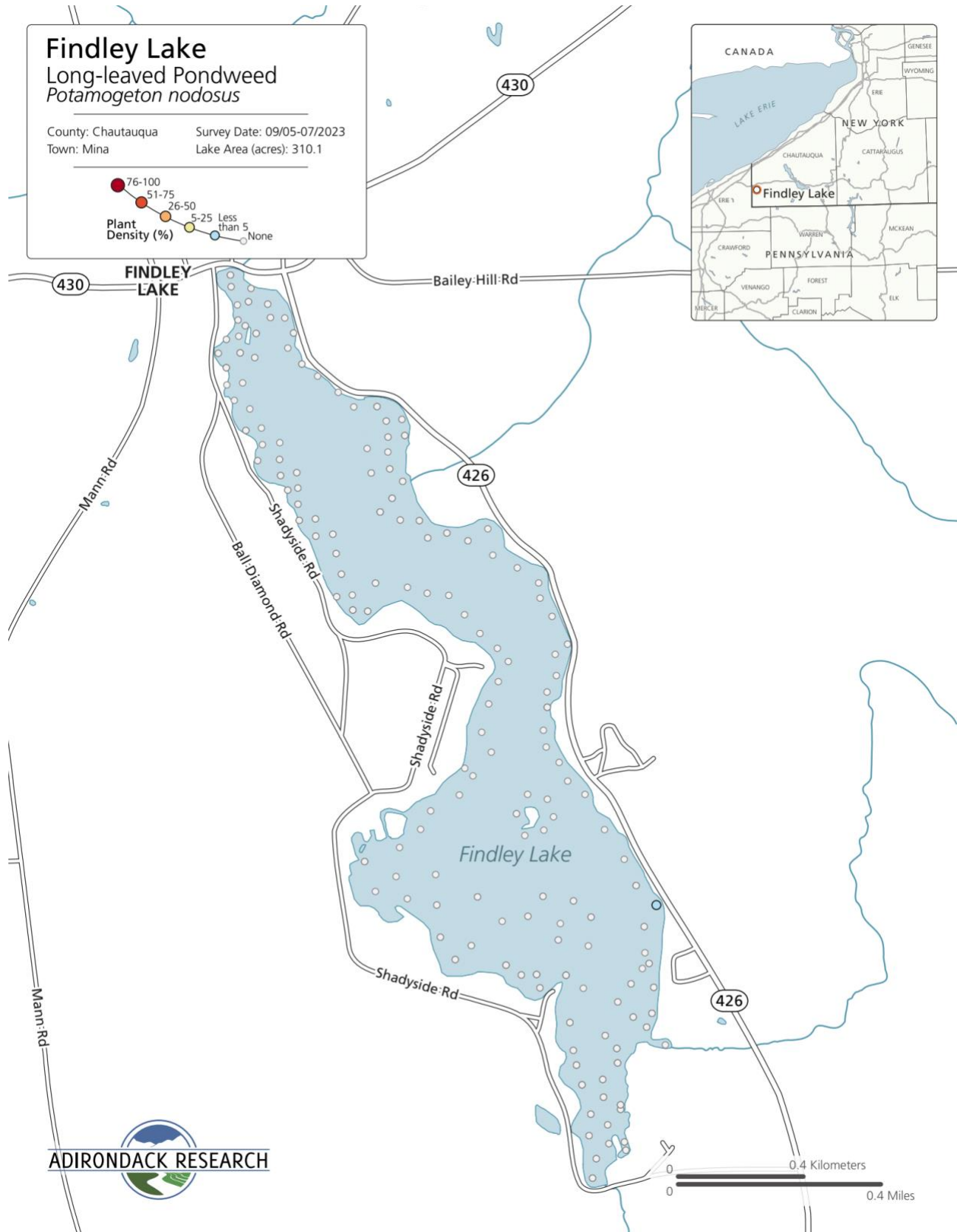












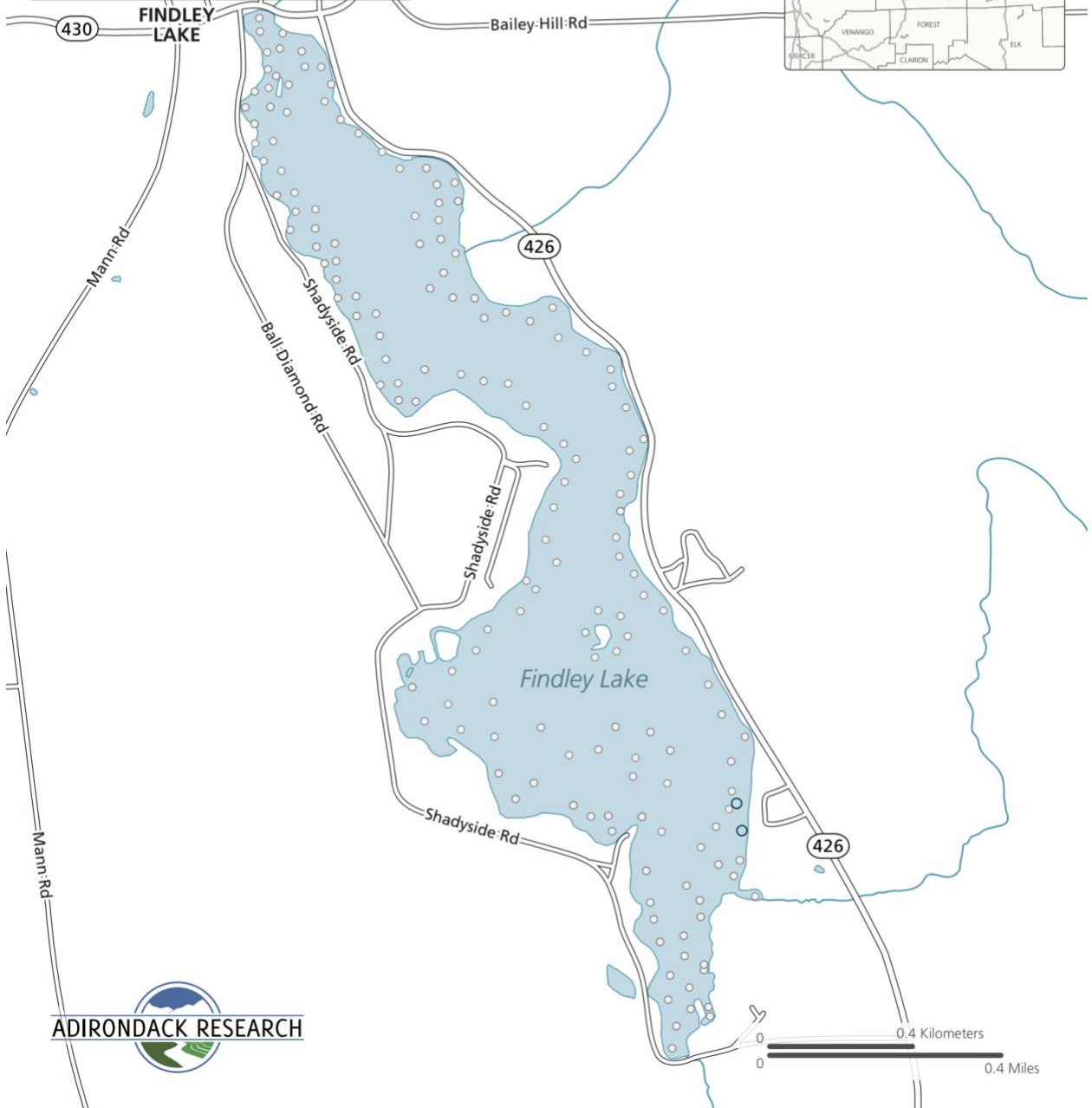
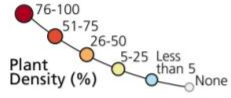


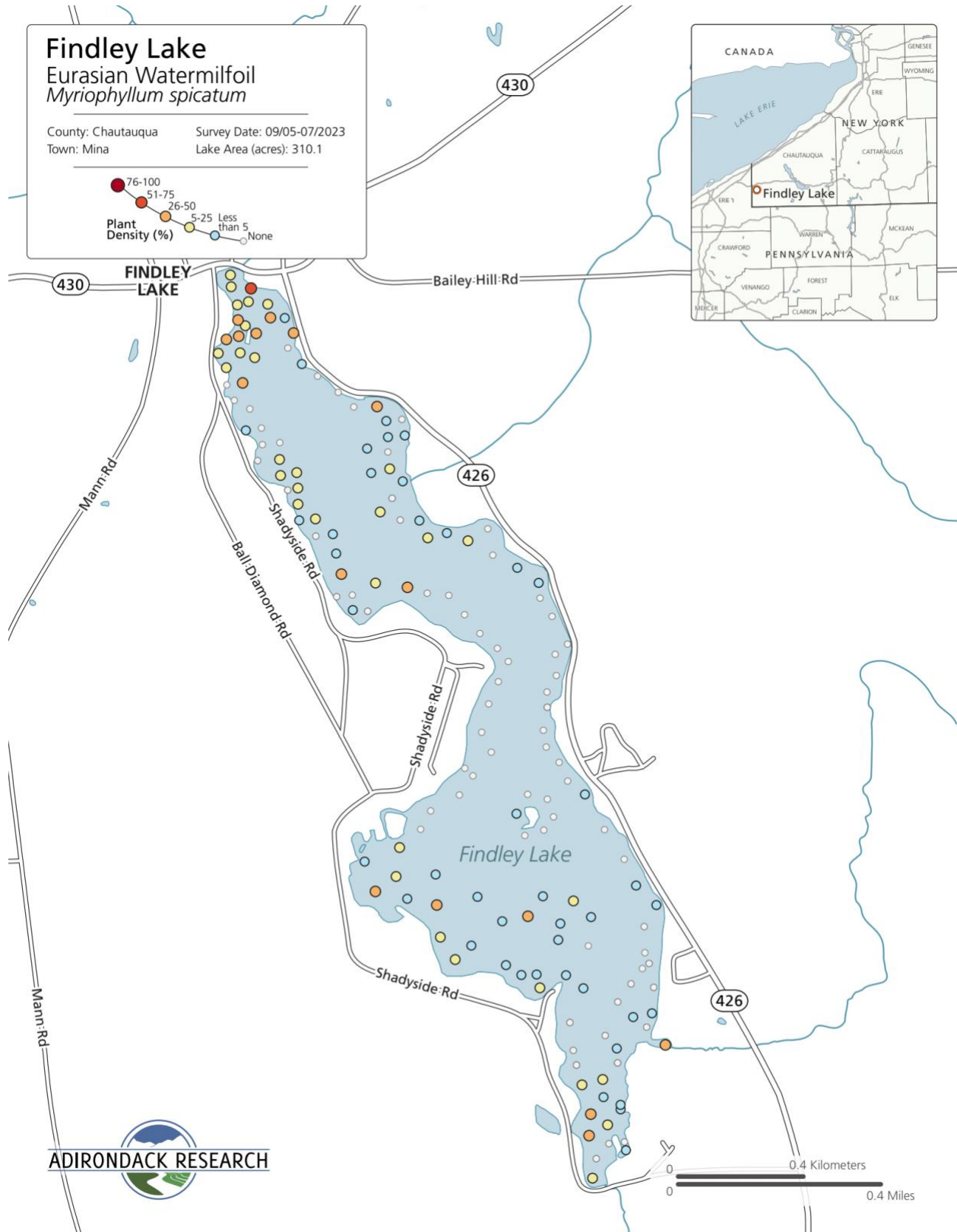
# Findley Lake

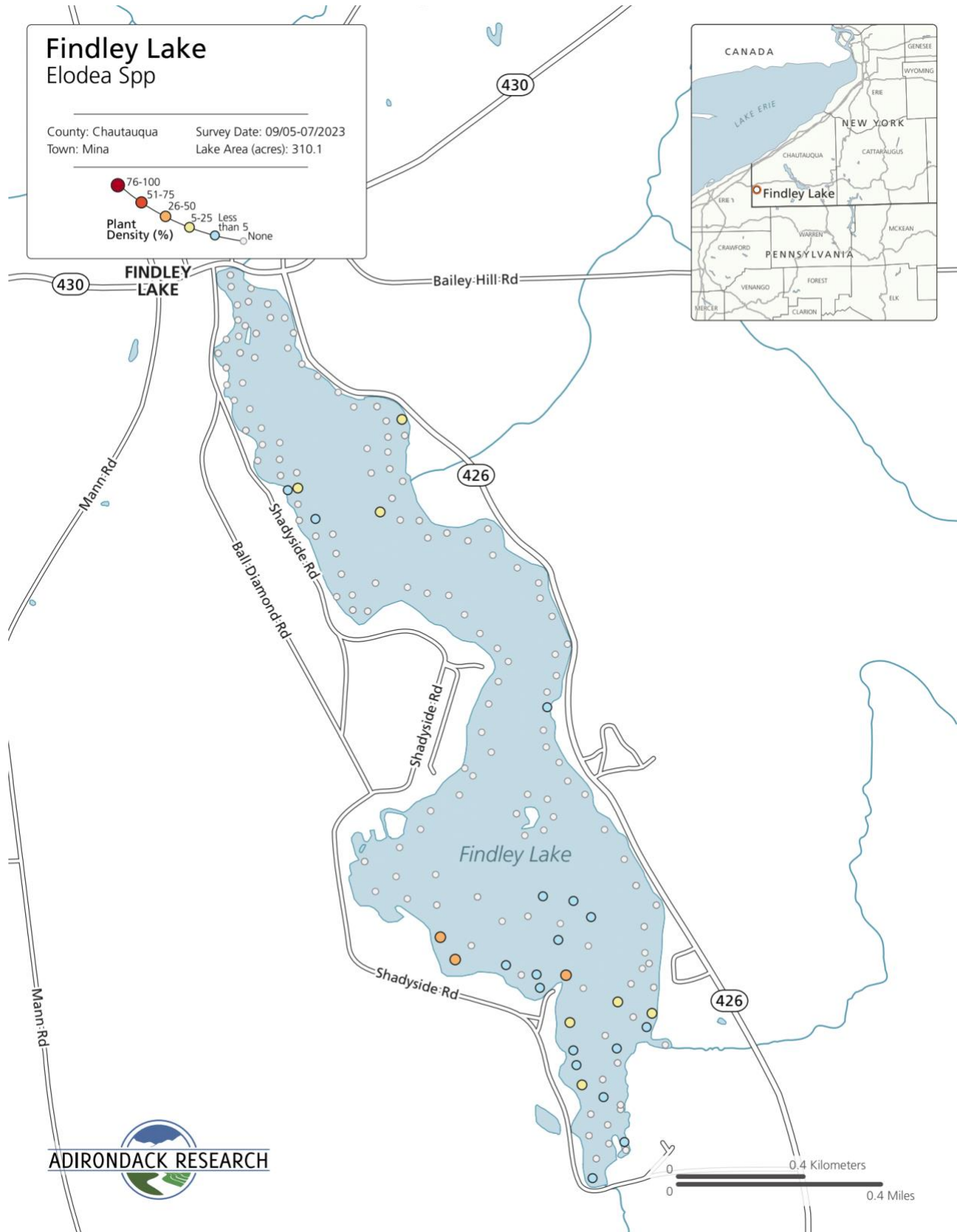
## Flat-stem Pondweed

*Potamogeton zosteriformis*

County: Chautauqua      Survey Date: 09/05-07/2023  
Town: Mina                      Lake Area (acres): 310.1





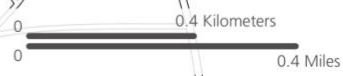
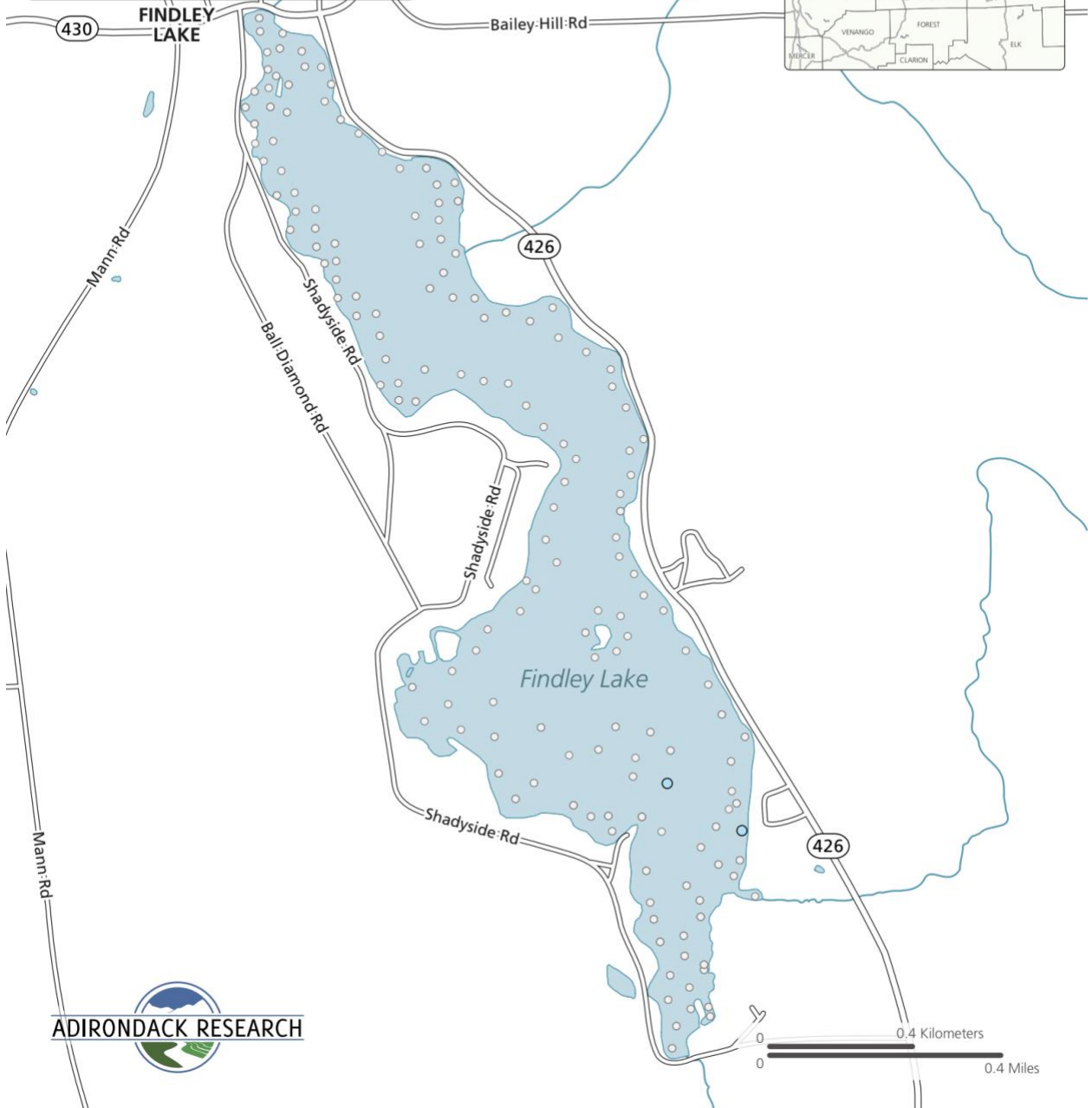
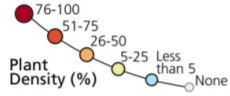


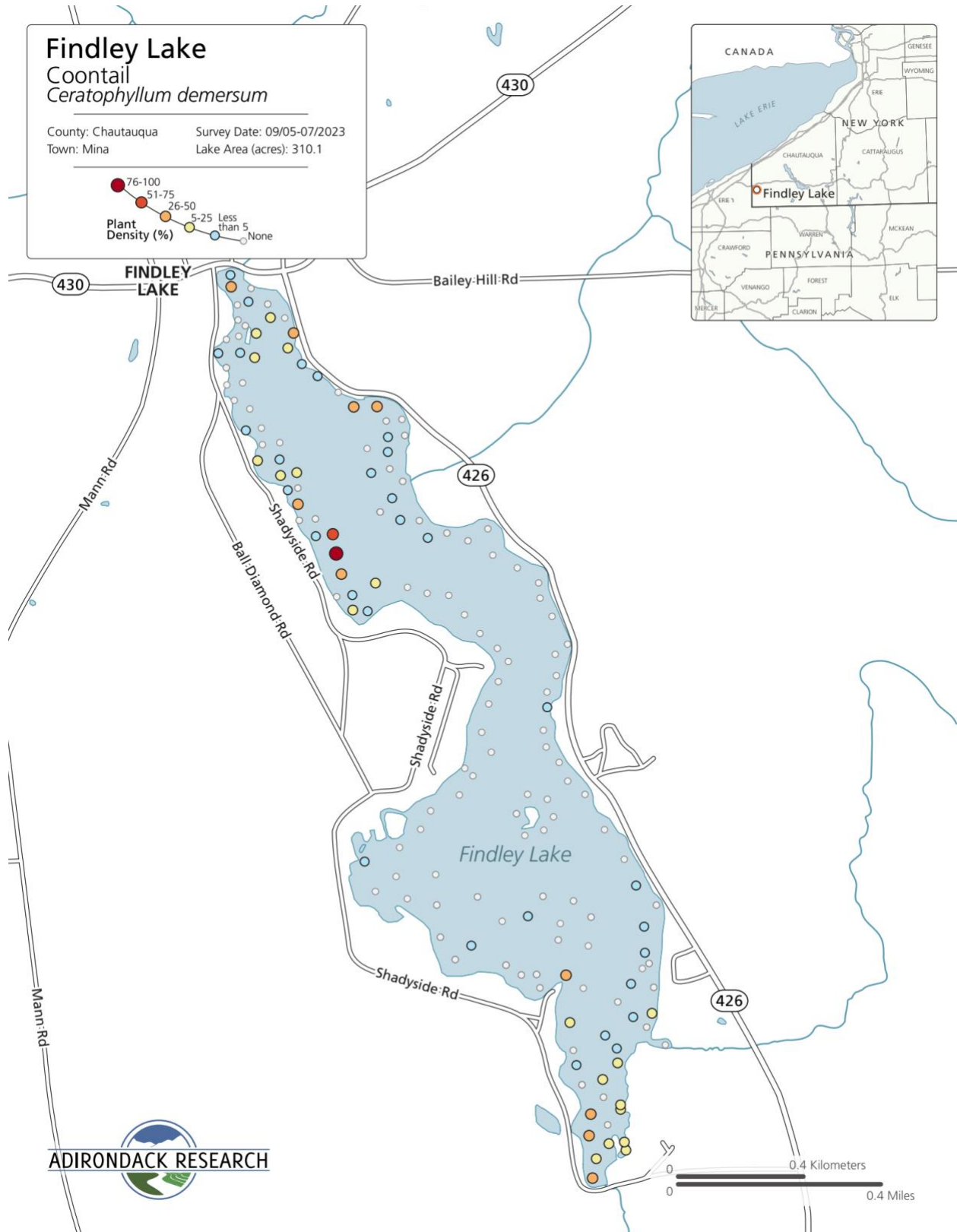
# Findley Lake

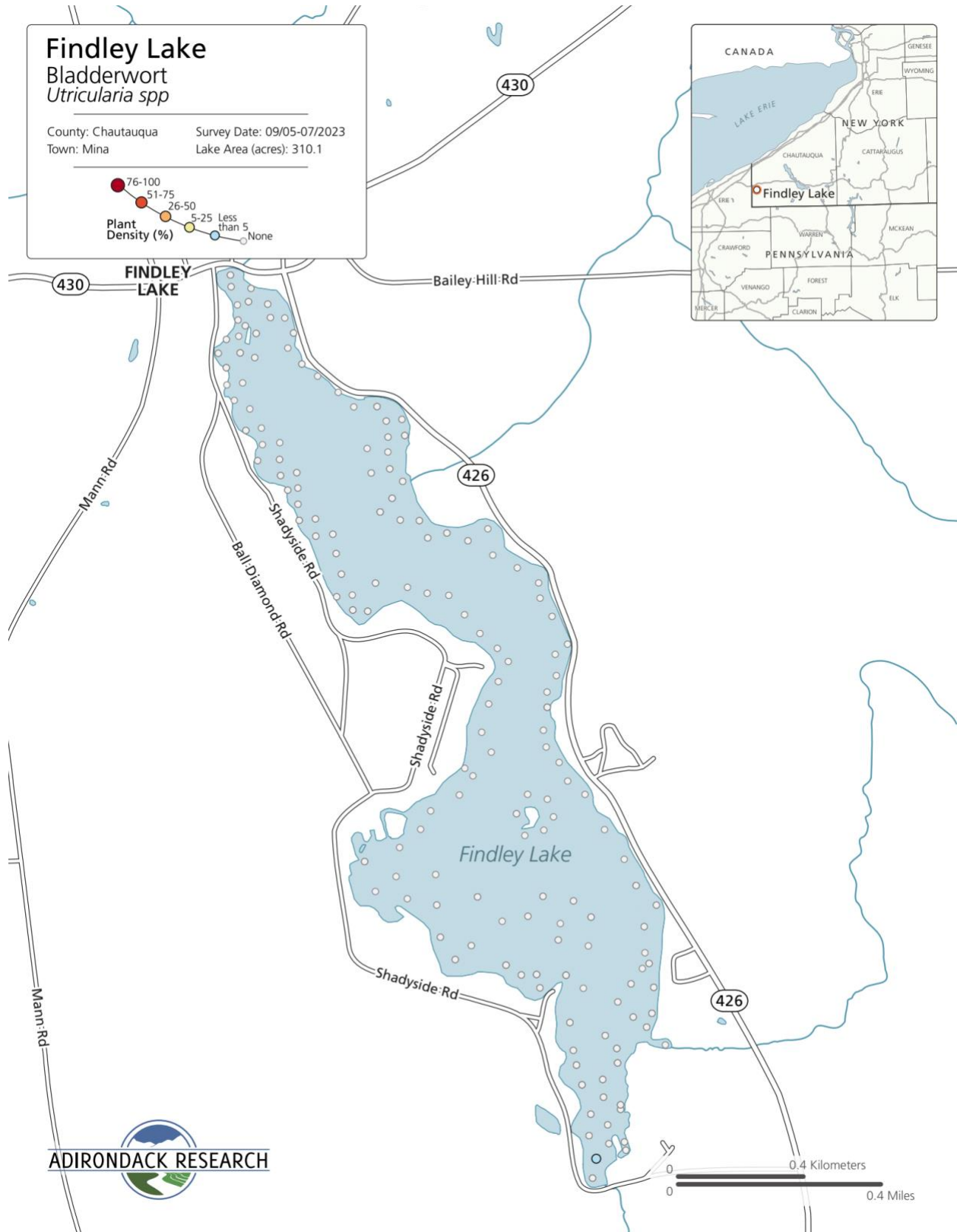
## Curly-leaf Pondweed

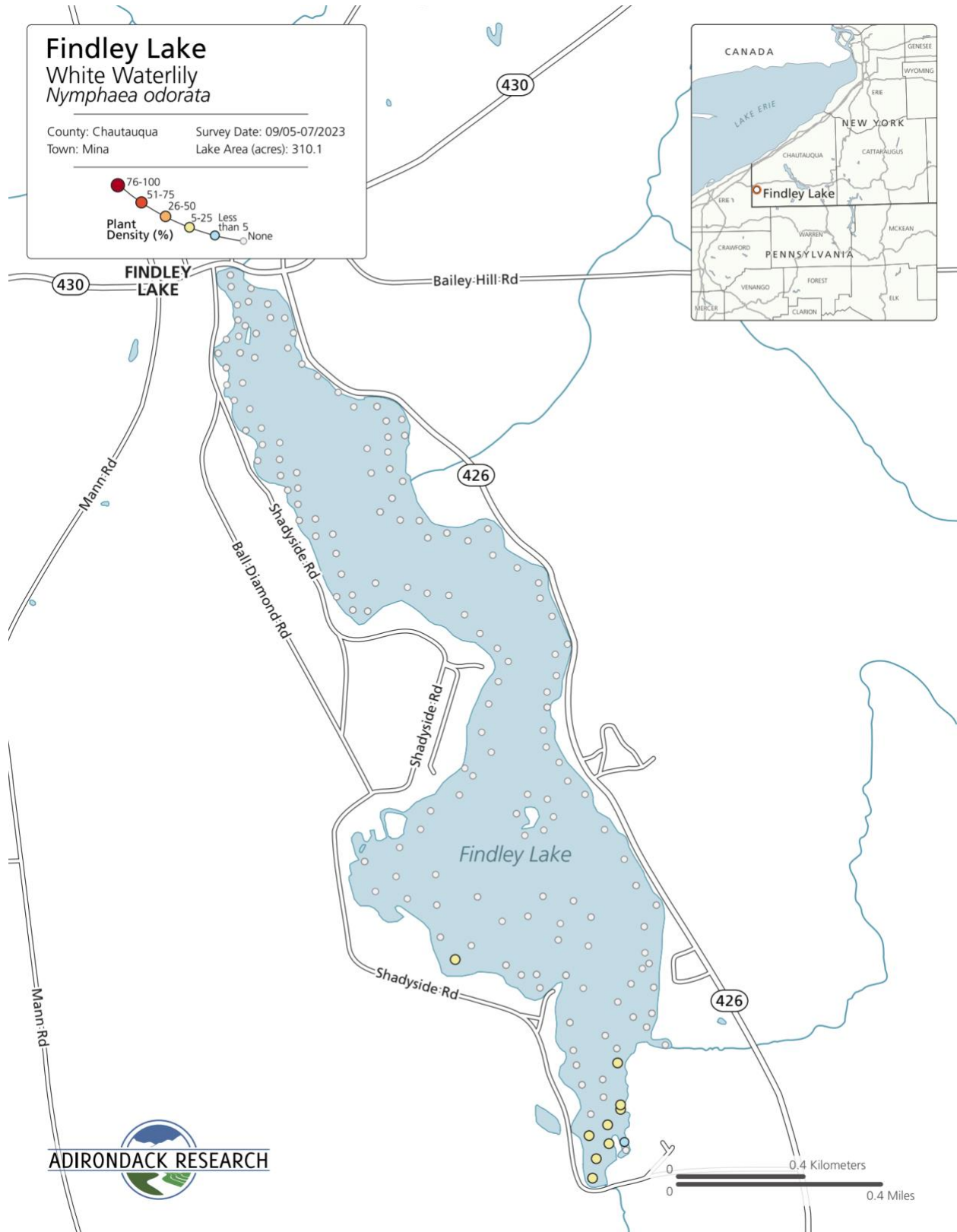
*Potamogeton crispus*

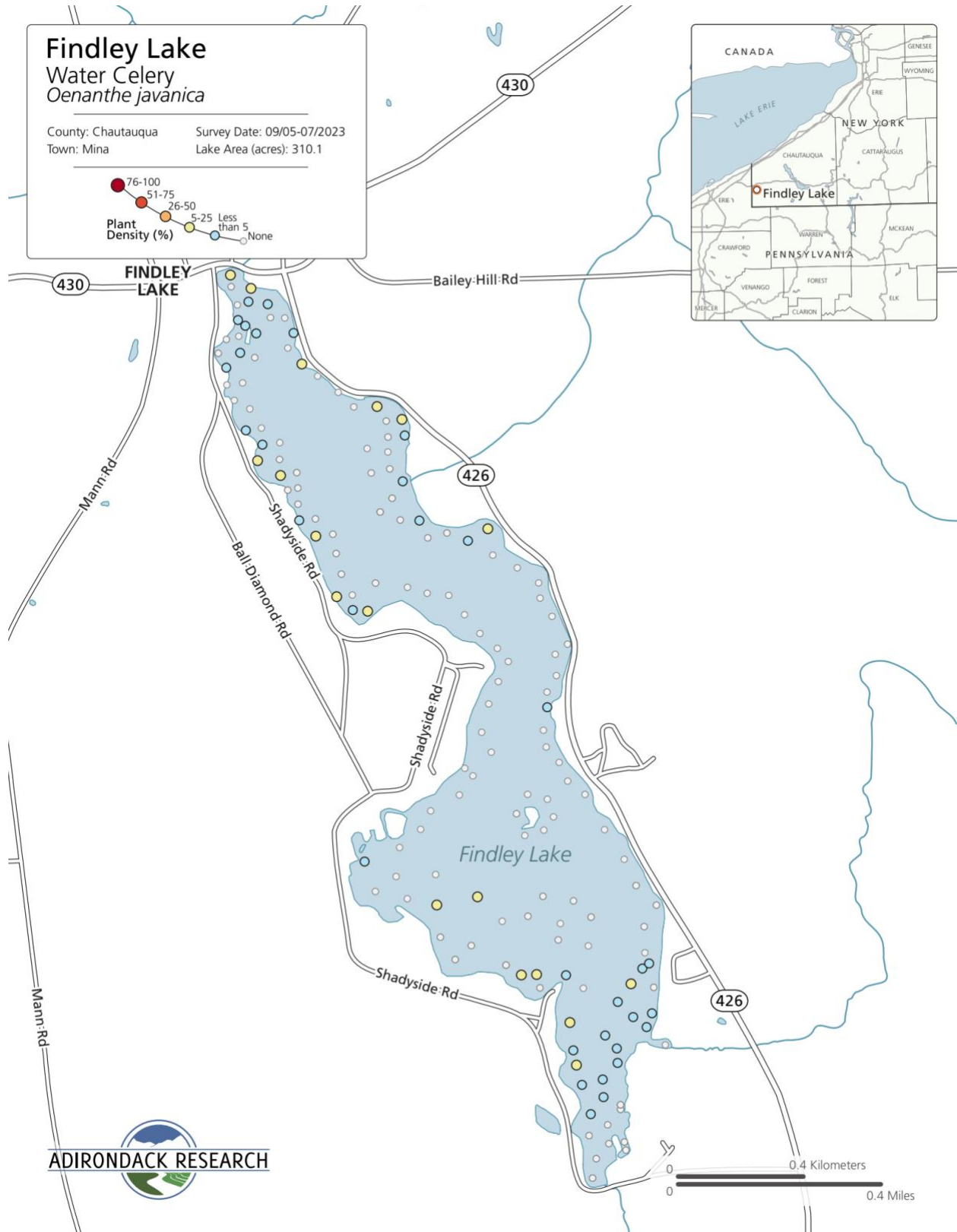
County: Chautauqua      Survey Date: 09/05-07/2023  
Town: Mina                      Lake Area (acres): 310.1















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