



2022 Long Lake AIS Survey

Aquatic Invasive Species Surveys
Survey Team Report



2022 Long Lake Aquatic Invasive Species Early Detection Survey

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October 2022



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Cover image: Long Lake. Photo by Allen Brown, 2021.

Executive Summary

The purpose of this monitoring effort was to fully inspect and survey the areas of Long Lake that were previously surveyed in 2016 and subsequently managed for variable leaf milfoil between the years 2017-2019. We deployed a crew of six field technicians in three motorized watercraft and one canoe to survey the entire littoral zone of Long Lake and Jennings Pond. Our crew also collected generalized data on native species presence on the waterbody. We found occurrence of variable leaf milfoil in several bays around Long Lake as well as in Jennings Pond. These occurrences correspond with beds of variable leaf milfoil documented from the 2016 survey performed by Adirondack Watershed Institute. Two new beds of variable leaf milfoil were recorded in Jennings Pond. In general, the cover class (plant density) of variable leaf milfoil seems to be less than when surveyed in 2016, however, due to data limitations relating to the survey design performed in 2016, we cannot directly compare bed size between the two surveys. This limitation was known a priori to performing the survey in 2022.



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Overview

We performed an aquatic invasive species (AIS) survey on Long Lake between July 18-20, 2022. We deployed three motor boats and a canoe to complete the littoral zone survey for aquatic invasive species (AIS), including zooplankton tows, rake tosses, and top-down visual surveys. We performed a thorough top-down survey of the entire littoral zone of the lakes to delineate single plants as well as beds of any aquatic invasive species, but with a special emphasis on delineating beds of variable leaf milfoil. We have created maps that show our boat paths, the historic plant beds surveyed by Adirondack Watershed Institute in 2016 that contained variable leaf milfoil, and current delineations of variable leaf milfoil that we found this year. We kept the bed numbers the same as they were denoted in 2016 so that variable leaf milfoil plant densities within those historic beds could be compared directly to our 2022 survey.

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

- Surveyed for AIS in the waterbody described above
- Delineated any AIS infestations (beds and single points if smaller than a bed)
- Created a basic map of the lakes surveyed in GIS, email and printable format
- Listed native species encountered (generally) within the waterbody, but not for individual beds or areas.
- Produced this abbreviated report of the described survey effort

NOTE: *This project did not include mapping beds of native species. We only show presence within the entire lake.*

Additional details about the survey

The goal of this survey was to delineate the extent of the growth of variable leaf milfoil. This species was last surveyed in 2016 by Adirondack Watershed Institute (AWI), and we performed a follow-up survey to see how dispersed this species is in Long Lake in 2022. While we cannot tell if beds grew or shrunk in size compared to the 2016 survey (because the 2016 survey did not delineate beds of variable leaf milfoil), we were able to compare the density of beds in each area where invasive plants were present in 2016. For this report, we have created detailed bed delineations of variable leaf milfoil encountered and labeled them for comparison to plant beds mapped out in the 2016 survey. This allows us to compare the 2016 survey with the 2022 survey. This is not perfect, but it is the best we can do to compare the old data with the new.

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 for data collection, three motor boats and a canoe, and a Lowrance HDS 7 Live sonar unit

with transducer. All data and observations were recorded using ESRI's Collector for ArcGIS application. Surveys were attempted by motorboat when possible, and when not possible, by canoe.

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, 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. The sonar guidance allowed us to sample areas with plant growth more carefully. 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.

If an AIS infestation was discovered an occurrence point was dropped in ESRI Field Maps and the entire bed was mapped out with an assessment polygon. The occurrence point contains information such as the date, observer, and the species. After we recorded an occurrence point, we mapped out an assessment polygon by visually estimating or by physically circumnavigating the plant bed while recording the boat's position with GPS. Based upon how much AIS was observed on the rake toss, we then assigned a percent cover of the invasive plant bed to each assessment polygon. This allows us to measure changes in acreage, percent cover and placement in the waterbody 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.

Results

Variable leaf milfoil was the only invasive plant species found in Long Lake during our survey. We were able to delineate beds as well as individual plants of variable leaf milfoil and these bed and point data can be compared to those measured in the 2016 survey. These data can be reviewed in the Data Tables section below.

Data Tables

The following data tables provide data for each plant bed where we mapped areas with variable leaf milfoil. We were able to label beds to correspond to 2016 surveys so that data could be compared directly. Points where individual variable leaf milfoil plants were found are not listed in the tables. These data points can be viewed on the maps. The first table below is a plant list of the native and invasive plants found during our time on the water performing the survey.

Table 1: The following aquatic plant species were recorded during our survey of Long Lake. Variable leaf milfoil was the only aquatic invasive species recorded.

Common Name	Scientific Name
slender water-nymph	<i>Najas flexilis</i>
Richardson's pondweed	<i>Potamogeton richardsonii</i>
yellow water-lily	<i>Nuphar lutea</i>
little floatingheart	<i>Nymphoides cordata</i>
American white waterlily	<i>Nymphaea odorata</i>
common pipewort	<i>Eriocaulon aquaticum</i>
water lobelia	<i>Lobelia dortmanna</i>
quillworts	<i>Isoetes sp.</i>
small waterwort	<i>Elatine minima</i>
floating bur-reed	<i>Sparganium fluctuans</i>
swollen bladderwort	<i>Utricularia</i>
American cranberry	<i>Vaccinium macrocarpon</i>
spoonleaf sundew	<i>Drosera intermedia</i>
slender water-nymph	<i>Najas flexilis</i>
clasping-leaved pondweed	<i>Potamogeton perfoliatus</i>
ribbon-leaved pondweed	<i>Potamogeton epihydrus</i>
little floatingheart	<i>Nymphoides cordata</i>
variable leaf milfoil	<i>Myriophyllum heterophyllum</i>

Table 2: Changes in variable leaf milfoil cover class within historically surveyed plant beds in Long Lake. Bed numbers correspond with the historic 2016 plant survey. Note that historic plant beds encompassed areas larger than where variable leaf milfoil likely occurred and contained additional plant species. Also note that density classes used differed between 2016 and 2022. Beds 37 and 81 are affected by this change in class distinction.

Bed Number	2016 Cover Class	2022 Cover Class	Years of harvest	Pounds harvested	Days of harvesting	Change
1	<5%	Absent				
3	<5%	5-25%				
6	Absent	<5%				
7	<5%	<5%	2017, 2018, 2019	10,902	19	Similar
8	>50%	Absent				
9	>50%	5-25%				
14	Absent	Absent	2019	170	2	Similar
23	<5%	Absent				
31	26-50%	<5%	2017, 2018, 2019	4,429	12	Decreased
35	6-15%	Absent				
37	6-15%	5-25%	2017, 2018, 2019	15,168	15	Similar
39	6-15%	<5%	2019	31	1	Decreased
43	6-15%	Absent				
56	6-15%	Absent	2018, 2019	66	2	Decreased
57	26-50%	Absent	2017, 2018, 2019	3,637	16	Decreased
59	6-15%	Absent				
62	<5%	Absent				
65	6-15%	Absent				
66	6-15%	Absent				
70	16-25%	Absent	2018, 2019	474	2	Decreased
79	16-25%	Absent				
81	6-15%	5-25%				

	Higher Cover Class		Harvest Data
	Lower Cover Class		Decreased AIS Cover Class

Table 2.1: Cover class recording differences between Adirondack Research and Adirondack Watershed Institute. Classes used in 2022 by Adirondack Research are more standard and correspond with statewide databases.

Adirondack Research Cover Classes	Adirondack Watershed Institute Cover Classes
Absent	Absent
<5%	<5%
5-25%	6-15%
5-25%	16-25%
26-50%	26-50%
>50%	>50%

Table 3: Beds of variable leaf milfoil recorded in 2016. Bed numbers correspond with the maps as well as with beds surveyed in 2016.

Variable Leaf Milfoil					
Bed	Size (Acres)	Size (Sq. Ft.)	% Cover	Latitude	Longitude
3	5.85	254,986	5-25%	-74.414182	43.990954
6	0.30	13,141	<5%	-74.37736	44.035471
7	9.38	408,609	<5%	-74.405952	44.000975
9	19.82	863,553	5-25%	-74.401184	44.002595
10	0.25	10,688	<5%	-74.400241	44.005128
12	1.17	50,829	<5%	-74.391572	44.010741
31	N/A	N/A	<5%	-74.423257	43.974538
37	3.93	171,152	5-25%	-74.392565	44.000904
39	N/A	N/A	<5%	-74.381976	44.008202
81	6.34	276,109	5-25%	-74.454371	43.953145
84	0.07	2,912	5-25%	-74.424151	43.970028
85	2.51	109,164	51-75%	-74.421301	43.968573
Asian Clam		Spiny Waterflea			
Present (Y/N)		Present (Y/N)			
No		No			

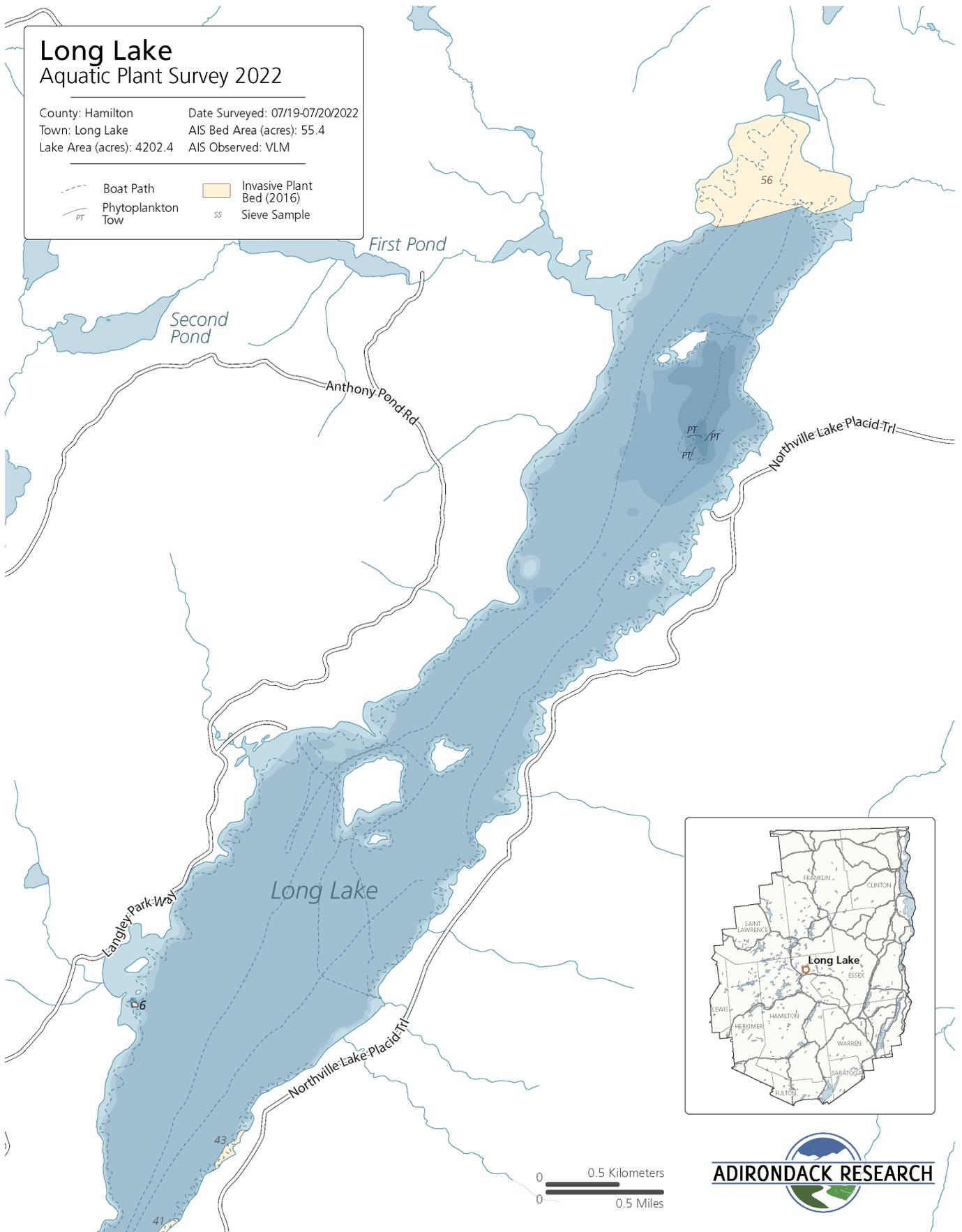
Maps

The maps included in this report have been created using publicly accessible data showing roads and lake boundary. 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. The bathymetric data shown on the following maps were interpolated by Adirondack Research using sonar data collected during our survey of the lake. The bathymetry is accurate only where you also see our boat paths. Depths in the center of the lake, in areas where our boat did not pass, have the potential to be inaccurate.

Long Lake Aquatic Plant Survey 2022

County: Hamilton Date Surveyed: 07/19-07/20/2022
 Town: Long Lake AIS Bed Area (acres): 55.4
 Lake Area (acres): 4202.4 AIS Observed: VLM

-  Boat Path
-  Invasive Plant Bed (2016)
-  Phytoplankton Tow
-  Sieve Sample



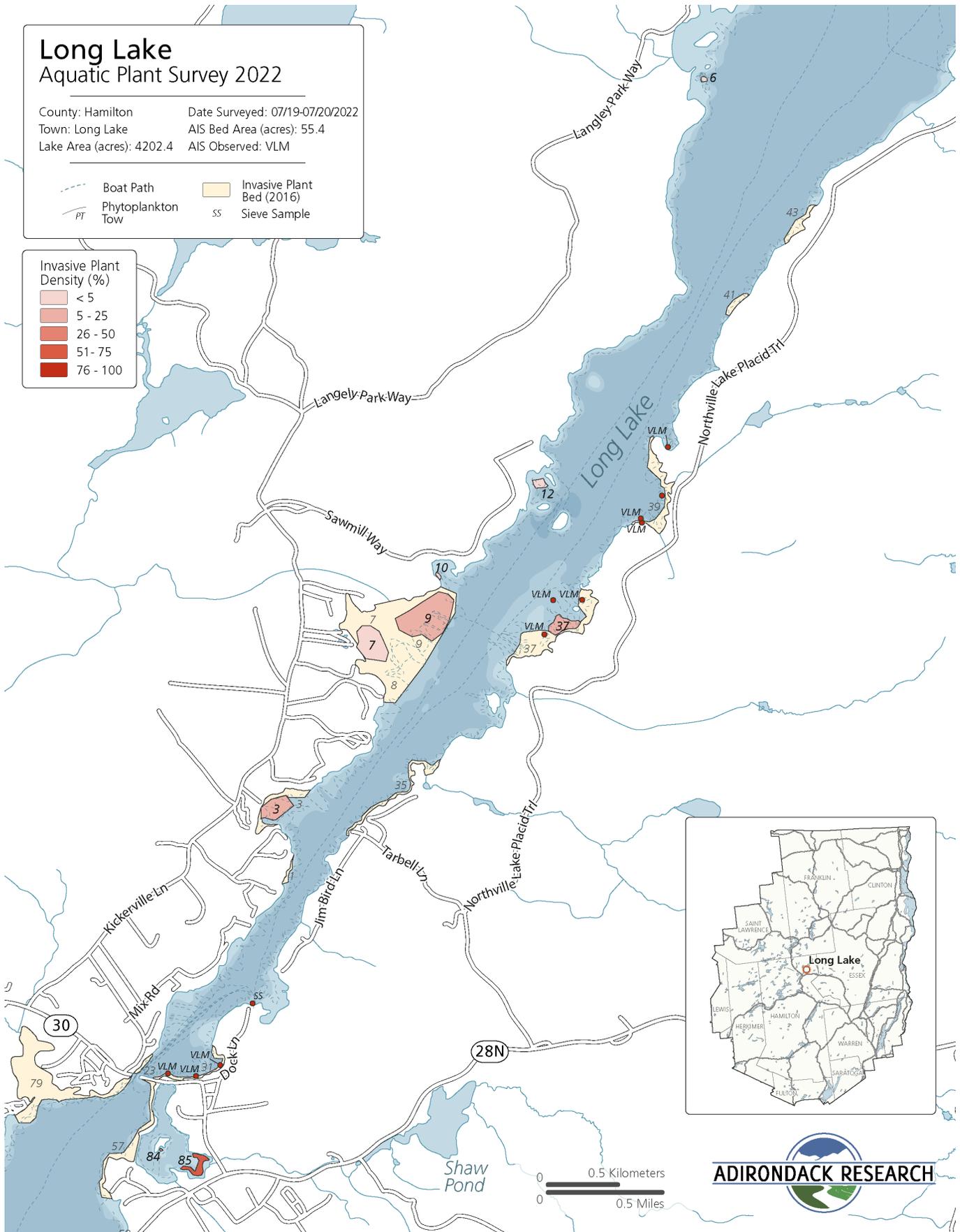
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Invasive Plant Density (%)

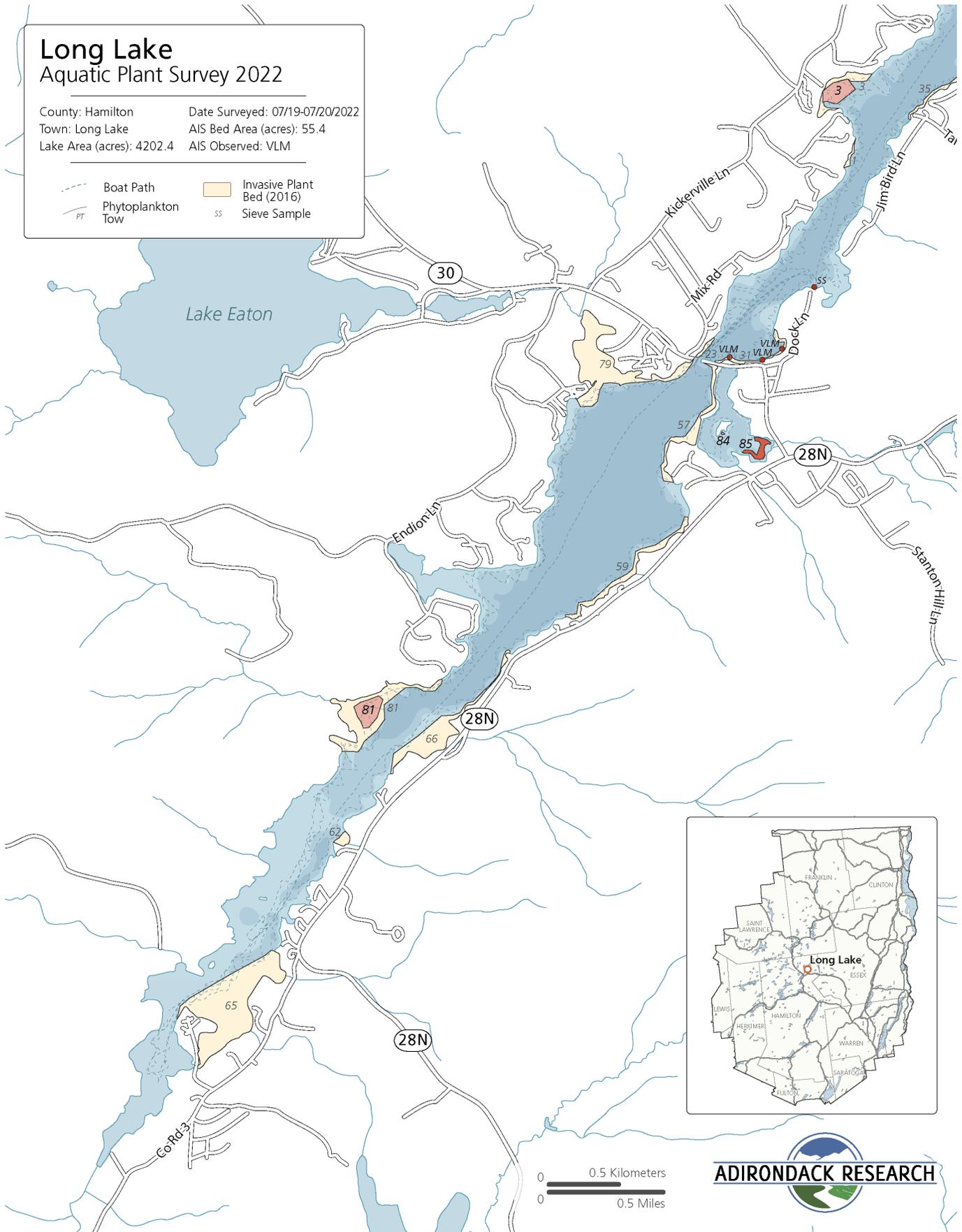
-  < 5
-  5 - 25
-  26 - 50
-  51 - 75
-  76 - 100



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-  Invasive Plant Bed (2016)
-  Sieve Sample



Data and Research Limitations

We collected sonar data from this survey and we processed the data in a third-party lake characteristic mapping program called ReefMaster. The bathymetry shown in the included maps are from this data, however because of our time and scope limitations, we are able to provide bathymetry only in the shallow areas of the lake where our survey boats passed. The middle deeper portions of the lake are not accurately mapped with bathymetric detail.

The other important data limitation with this study is that we cannot directly compare the extend (size) of the current variable leaf milfoil beds in 2022 with those observed by AWI in 2016. This is because AWI delineated larger beds that contained multiple aquatic plant species, including but not limited to variable leaf milfoil. Because of this difference in survey methodologies, we cannot show how large of an area variable leaf milfoil beds comprised. There may be additional data available from harvesting reports that could show a more detailed comparison, however that was not part of the scope of this project.

Recommendations

We recommend performing AIS surveys every 2-3 years, or more often if active management is occurring. Continuous monitoring will allow lake managers to document changes in AIS density and extent, but it will also allow lake managers to notice any normal year-to-year variation in plant growth and abundance. Natural variation can be used as part of an assessment of management effort by understanding how much changes in plant bed extent or density is based upon management versus normal year-to-year variation in growth.



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