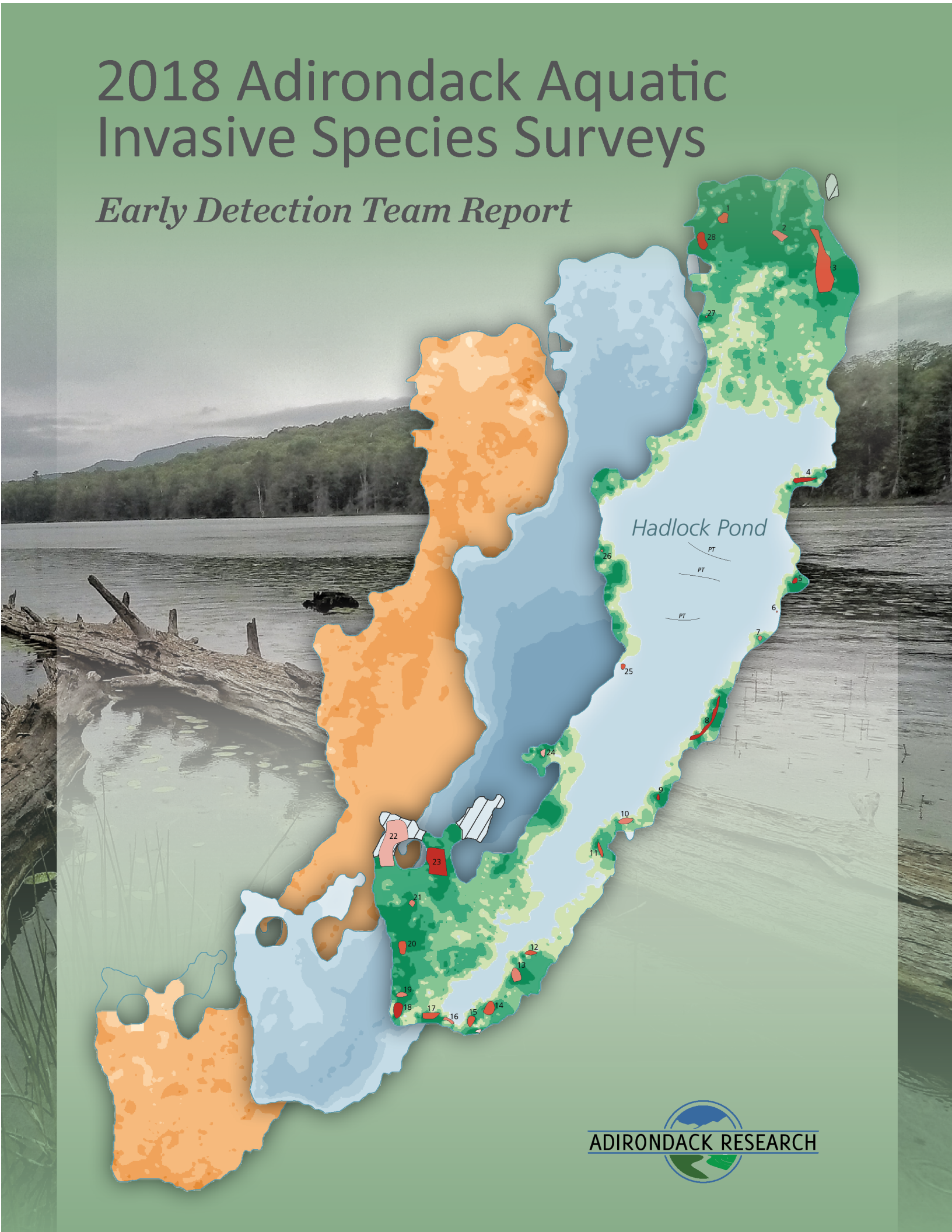
2018 Adirondack Aquatic Invasive Species Surveys

Early Detection Team Report



ADIRONDACK RESEARCH

2018 Adirondack AIS Surveys

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Adirondack Research

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Background Cover image: Oliver Pond, Essex County, July 2018.

Executive Summary

Invasive species are any kind of living organism that is not native to an ecosystem and causes some sort of ecological, human health or socio-economic harm. For nearly two decades, the Adirondack Park Invasive Plant Program (APIPP) and its partners have documented the distribution and spread of invasive species throughout the jurisdictional boundaries of the Adirondack Partnership for Regional Invasive Species Management (PRISM). In 2018, Adirondack Research, a private research company constituted APIPP's Adirondack Aquatic Invasive Species (AIS) Early Detection Team. The team surveyed prioritized lakes and ponds in the southeastern Adirondacks and used data collected in the field to produce individualized maps documenting AIS distribution, vegetation biovolume, bottom sediment hardness and bathymetry.

We are presenting the results of this year's work along with recommendations for continuing and adapting the survey strategy deployed to enhance APIPP's early detection and rapid response capabilities and ongoing efforts to address AIS impacts in the Adirondacks.

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Acknowledgments

APIPP, a program of the Adirondack Chapter of The Nature Conservancy, is one of eight PRISMs in New York State whose mission is to protect the Adirondack region from the negative impacts of invasive species. APIPP contracted Adirondack Research during the 2018 field season to conduct AIS early detection surveys in the southeastern portion of the Adirondack PRISM. Field work, data collection and the compilation of the narrative, maps and materials included in this report were conducted by Janelle Hoh, Zoey Varin and Dr. Ezra Schwartzberg, who constituted APIPP's Adirondack AIS Early Detection Team. Project planning and lake prioritization was conducted by Erin Vennie-Vollrath, APIPP's AIS Project Coordinator. This project was advanced by APIPP, under contract with Adirondack Research, with funding provided by New York State's Environmental Protection Fund as administered by the New York State Department of Environmental Conservation.

Photo 2 (above): *Field Assistant Zoey Varin retrieving a rake toss from East Caroga Lake, Fulton County.*

Photo 1 (below): *Project Manager Janelle Hoh during training week on Lake Colby, Franklin County.*

Special Thank You.

Completion of this project would not have been possible without the following members of lake associations, businesses and other agencies: Gene Centi, Caroga Lake; Iain and Duncan Walker, Stoner Lake; Jay Pierz, Pleasant Lake; Rolf Tiedemann, Eagle Lake; Gene Merlino, Lake Luzerne Town Supervisor; Joe Loszynski, Hadlock Pond; Rose O'Boyle, Lake Forest; Ed Bus, Pine Point Motel & Cabins on Lake Vanare; and Bruce France, Friends Lake. We are grateful for their role in protecting many of these important Adirondack lake ecosystems.

Introduction

Since 2002, APIPP has surveyed 398 Adirondack lakes and ponds and found nearly 75% to be free of AIS. Since 2015, APIPP has deployed an AIS Early Detection Team to enhance survey capacity and gather additional lake characteristic data to inform lake vulnerability assessments and future AIS management efforts in the Adirondack PRISM. By deploying an Early Detection Team, new infestations can be quickly recognized and appropriate management actions taken before significant impacts are observed.

Photo 3: *Invasive brittle naiad found in Hadlock Pond, Washington County.*

The Early Detection Team's annual AIS surveys rotate through three distinct regions encompassed by the Adirondack PRISM. Region 1, which was revisited in 2018 (See Figure 1 below), constitutes waterbodies in the Upper Hudson, South Lake Champlain, Sacandaga and Mohawk watersheds. Region 2 covers the Raquette, Black, Oswegatchie, and Grass watersheds. Region 3 covers North Lake Champlain, Ausable River, Saranac River, St. Regis, Salmon, Chateaugay and Great Chazy watersheds. These watersheds all exist within the Adirondack PRISM boundary. The regions were divided in such a way to balance resources across the ~7 million-acre Adirondack PRISM and increase efficiency in surveying the numerous Adirondack lakes and ponds therein.

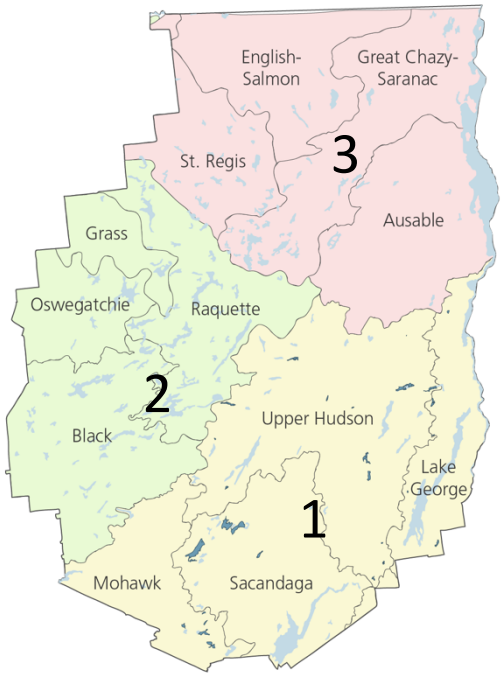


Figure 1: *Regions of yearly AIS survey programs.*

Historically, APIPP's AIS Early Detection Team has performed aquatic vegetation surveys and rapid response management on any new, isolated aquatic invasive plant infestations discovered. Starting in 2018, the Team began using the Lowrance ELITE-7Ti Chartplotter and C-Map BioBase cloud processing and GIS automation platform (www.biobasemaps.com) to map vegetation biovolume, bottom hardness and bathymetry as part of standard protocol. Images and data captured on the Lowrance ELITE-7Ti Chartplotter were uploaded to the BioBase web interface and then post-processed to create the maps displayed in this report. This information will be used to perform invasive species vulnerability assessments to better prioritize and allocate resources for future early detection surveys.

Objectives

The primary objective of the AIS Early Detection Team was to detect and delineate any new or existing aquatic invasive plant or animal infestations within prioritized lakes. The secondary objective was to deploy the Lowrance ELITE-7Ti system to map the vegetation beds, contour lines and bottom hardness of a select set of those lakes to gather important baseline data on plant distribution and other physical parameters that influence aquatic species invasion. In 2018, complete BioBase surveys were completed for four of the 31 lakes surveyed.

Photo 4: *A Eurasian watermilfoil bed in Bartlett Pond, Essex County in 2018.*

Table 1: *List of lakes surveyed in 2018.*

Lake Name	County	Date Surveyed	Watershed	Complete BioBase	Last Year Surveyed
East Caroga Lake	Fulton	6/19/18	Mohawk	No	2015
West Caroga Lake	Fulton	6/19/18	Mohawk	No	2015
East Stoner Lake	Fulton	6/20/18	Mohawk	Yes	2009
Courtney Pond	Essex	6/26/18	Lake Champlain	Yes	Never Surveyed
Bartlett Pond	Essex	6/27/18	Lake Champlain	No	1998
Oliver Pond	Essex	6/27/18	Upper Hudson	No	2008
Green Lake	Fulton	7/2/18	Mohawk	No	2015
Pleasant Lake	Fulton	7/3/18	Mohawk	No	2017
Putnam Pond	Essex	7/9/18	Lake Champlain	No	2015
Eagle Lake	Essex	7/10/18	Upper Hudson	No	2015
Paradox Lake	Essex	7/11/18	Upper Hudson	No	2015
Harris Lake	Essex	7/18/18	Upper Hudson	No	2016
Lake Durant	Hamilton	7/26/18	Upper Hudson	No	2016
Wakely Pond	Hamilton	7/26/18	Mohawk	No	2017
Lake Luzerne	Warren	7/30/18	Upper Hudson	No	2016
Loon Lake	Warren	7/31/18	Upper Hudson	Yes	2013
Hadlock Pond	Washington	8/6/18	Lake Champlain	Yes	2014
Lake Forest	Warren	8/7/18	Upper Hudson	No	2015
Lake Vanare	Warren	8/7/18	Upper Hudson	No	2015
Viele Pond	Warren	8/7/18	Lake Champlain	No	Never Surveyed
Friends Lake	Warren	8/7/18	Upper Hudson	No	2015
Sacandaga Lake	Hamilton	8/15/18	Sacandaga	No	2017
Lake Pleasant	Hamilton	8/16/18	Sacandaga	No	2017
North Pond	Warren	8/21/18	Lake Champlain	No	2007
Balfour Lake	Essex	8/23/18	Upper Hudson	No	2011
Edgecomb Pond	Warren	8/23/18	Lake Champlain	No	Never Surveyed
Mason Lake	Hamilton	8/27/18	Upper Hudson	No	2015
Piseco Lake	Hamilton	8/28/18	Sacandaga	No	2017
Lake Algonquin	Hamilton	8/30/18	Sacandaga	No	2015
Canada Lake	Fulton	9/5/18	Mohawk	No	2017
Pine Lake	Fulton	9/5/18	Mohawk	No	2015

Lake Selection and Prioritization

Region one lakes and ponds included in the Early Detection Team's 2018 surveys were selected by APIPP's AIS Project Coordinator, Erin Vennie- Vollrath, and were prioritized using existing AIS distribution and monitoring data as well as based on whether they were accessible by motorized or non-motorized watercraft.

The following outlines the parameters used to select and prioritize lakes for survey in 2018. All lakes have either a public access point or some other form of motorized or non-motorized watercraft access.

Priority 1

- have never been monitored for AIS
- have only been partially monitored for AIS in the past three years

Priority 2

- have not been professionally monitored in the past three years

Priority 3

- were last professionally monitored for AIS in 2016

Priority 4

- are monitored annually for AIS by volunteers
- were last professionally monitored for AIS in 2017

Photo 5: *Crewmember Zoey Varin launching the boat at Hadlock Pond. The Keep Invasive Species Out flag was useful for letting others on the lakes know why our team was there.*

Photo 6: *Courtney Pond, Essex County. 2018 was the first year this pond was surveyed for AIS.*

Methods

Equipment

Equipment used during this project consisted of a double-sided rake toss, handheld extendible rubber fishing nets, plankton nets, sediment sieves, a Lowrance ELITE-7Ti Chartplotter, a BlueTooth GPS antenna and a GoPro camera. Data and observations were recorded on an iPad 4 mini using The Nature Conservancy's Invasive Plant Mobile Monitoring System (IPMMS), an Esri Collector for ArcGIS application. Surveys were completed using a side console motorboat and, when necessary, a Kevlar canoe.

Since the team was accessing multiple waterbodies over the course of each week, specific precautionary measures were taken to guarantee all equipment was decontaminated and free of any AIS. Equipment was decontaminated using the Adirondack AIS Prevention Program's free boat wash and decontamination services located throughout the Adirondack Park. The team visited a total of eight different decontamination stations, multiple times, over the course of the summer. High pressure and hot water were used to kill any organisms, native or invasive, present on equipment after each lake survey.

Photo 7: *Our research vessel on Lake Pleasant, Hamilton County.*

The specific equipment that was decontaminated by professional decontamination technicians included: motorboat hull, trailer, motor lower unit and bilge; canoe and paddles; plankton net and detachable PVC sieve and cap end; brass sediment sieve; ropes; and all jars and containers.

Photo 8: *Staff training on native and invasive aquatic vegetation identification.*

Plant Surveys and Identification

The littoral zone of each lake was surveyed for aquatic plants by the Early Detection Team from shoreline to a depth of about 15 feet, although the water depth and distance from shore varied between lakes. Some lakes were completely comprised of littoral zone. The team surveyed in a zig-zag search pattern, using visual detection from the surface in combination with the sonar output from the Lowrance unit. Once a plant bed was located, rake tosses were conducted to retrieve and identify plants that could not be confirmed through visual detection alone.

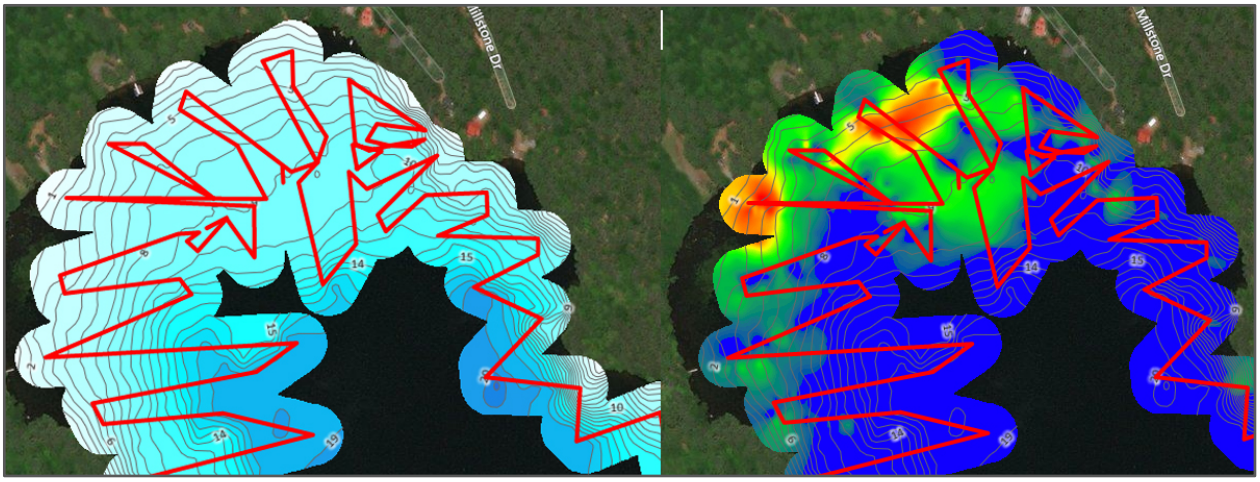


***Figure 2**: Images from BioBase showing the team's track overtop contour lines (left) and biovolume (right). Data represented here were collected from the north end of Friends Lake, Warren County.*

All plants retrieved, invasive and native, were identified using the field guides: "Aquatic Plants of the Upper Midwest" by Paul M. Skawinski and/ or "Maine Field Guide to Invasive Aquatic Plants and Their Common Look Alikes" by the Maine Center for Invasive Aquatic Plants and Maine Volunteer Lake Monitoring Program. If an AIS infestation was detected, an occurrence point was marked in its approximate center using the IPMMS. The occurrence feature classifies which species is present and contains unique naming and attribute information for the specific infestation. After an occurrence was entered, the team collected an assessment polygon for the infestation. An assessment polygon was mapped by circumnavigating the exterior boundary of both new and historic infestations to document changes in acreage and percent cover over time.

***Photo 9:** Identifying native plants using multiple field guides, including the Maine Field Guide to Invasive Aquatic Plants (pictured).*

Native plants identified were also recorded and noted for this report. However, complete lists of native plants and their abundance in each lake were not recorded. Much of this information is included in APIPP's 2015 AIS early detection team report which also conducted work in region one and incorporated native plant surveys.

Photo 10: *Technician Zoey Varin retrieving a rake from Lake Algonquin to confirm Eurasian watermilfoil*

Relative percent cover class estimates for each invasive plant bed were recorded in IPMMS using the following ranges: 0, <1, 1-10, 11-25, 26-50, 51-100%. Cover classes are defined in the following table and are based on the scale developed by the U.S. Army Corps of Engineers and further developed by Paul Lord and Bob Johnson from Cornell University

Table 2: *Plant cover class scale.*

Cover Class	Description
0	No vegetation present; zero plants
<1	Trace (1-2 stems)
1-10	Sparse (3-6 stems)
11-25	Low Density
26-50	Medium Density (Rakeful; no visible rake tines)
51-100	High Density (Difficult to bring to boat)

Photo 11: *(Below) Rakes returned with Eurasian watermilfoil from Lake Algonquin, Hamilton County. The image on the left shows 1-10 or sparse and the image on the right shows 11-25 or low density.*

Animal Surveys and Identification

Two methods were utilized to survey for aquatic animal species. 2mm sediment sieves were used at shorelines with coarse, sandy substrates to search for aquatic invasive mollusks. Seven samples were taken at each location using a ray pattern method (See map below and inset).

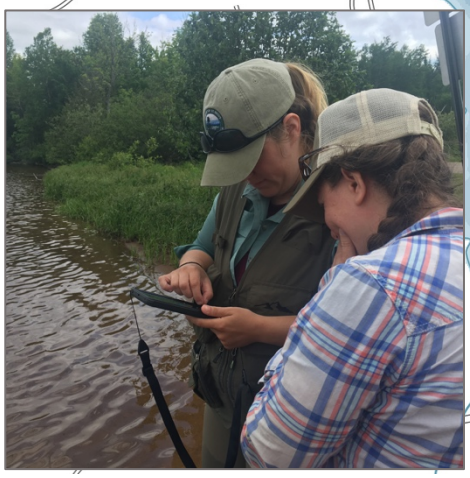


Photo 12: *Erin Vennie-Vollrath and Janelle Hoh using IPMMS ESRI Collector App during the training week.*

Figure 3: *Ray pattern sieve survey method.*

Plankton tows were used to search for aquatic invasive planktonic crustaceans using a 500-micron plankton net at the deepest point of the lake. The plankton tow was dropped off the stationary bow of the boat, released to a depth below the thermocline, and then towed for two minutes at a speed of 2mph behind the motorboat or as fast as possible by canoe, allowing the attached line to lie at a 45-degree angle. The net was then retrieved and samples were placed into Nalgene jars or plain white containers for examination in the field. Any samples that were suspected to contain AIS were filled with ethanol and brought back to the lab for further analysis.

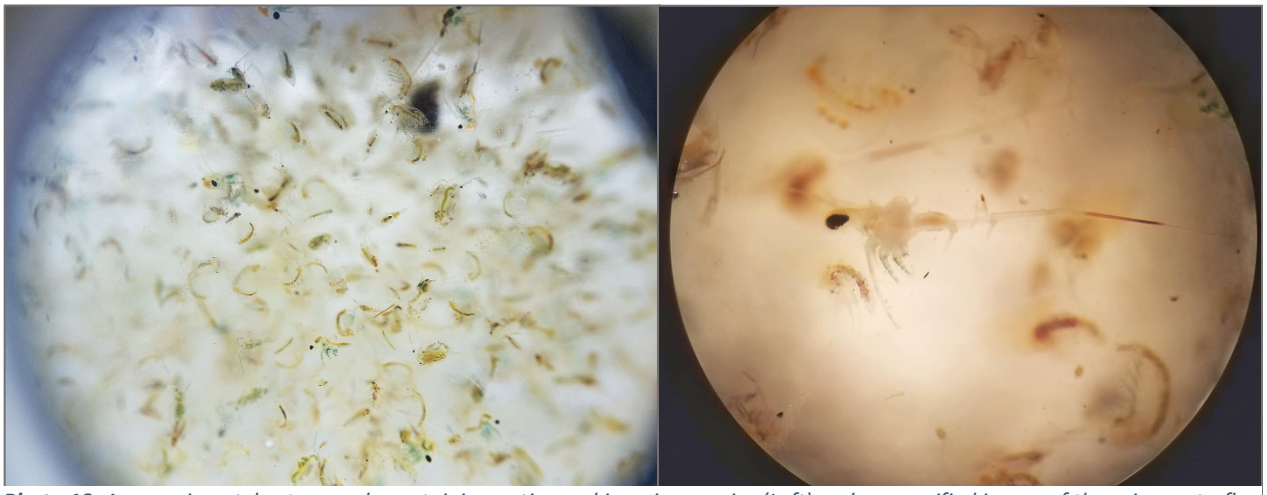


Photo 13: *A macroinvertebrate sample containing native and invasive species (Left) and a magnified image of the spiny waterflea (Right). Samples are from Sacandaga Lake, Hamilton County.*

2015 and 2018 Comparison

APIPP's system of dividing the Adirondack PRISM into three regions and surveying each region on a three-year rotation allows for frequent re-visitation of lakes to accommodate early detection and rapid response as well as opportunity to conduct assessments of trends over time. Lake surveys completed in 2015 provide baseline data for region one. Upon revisiting in 2018, the team was able to implement new protocols using different technologies to increase the amount and types of data collected in the field. By using the Lowrance Chartplotter, IPMMS, and the BioBase platform, detailed maps were produced documenting biovolume, bottom substrate hardness, and lake bathymetry. As defined by BioBase, biovolume represents the percent of the water column occupied by plant matter at each GPS location. Substrate hardness is determined by using the strength of sonar reflectivity to infer whether the bottom is soft, medium or hard. Generally, sound signals reverberate strongly off of hard substrates such as gravel and rocks and weakly off of soft substrates such as muck and mud.

Mapping invasive plant beds using GPS and IPMMS, coupled with biovolume data recorded with BioBase, allowed for accurate delineation of AIS infestations even when located within larger native plant beds.

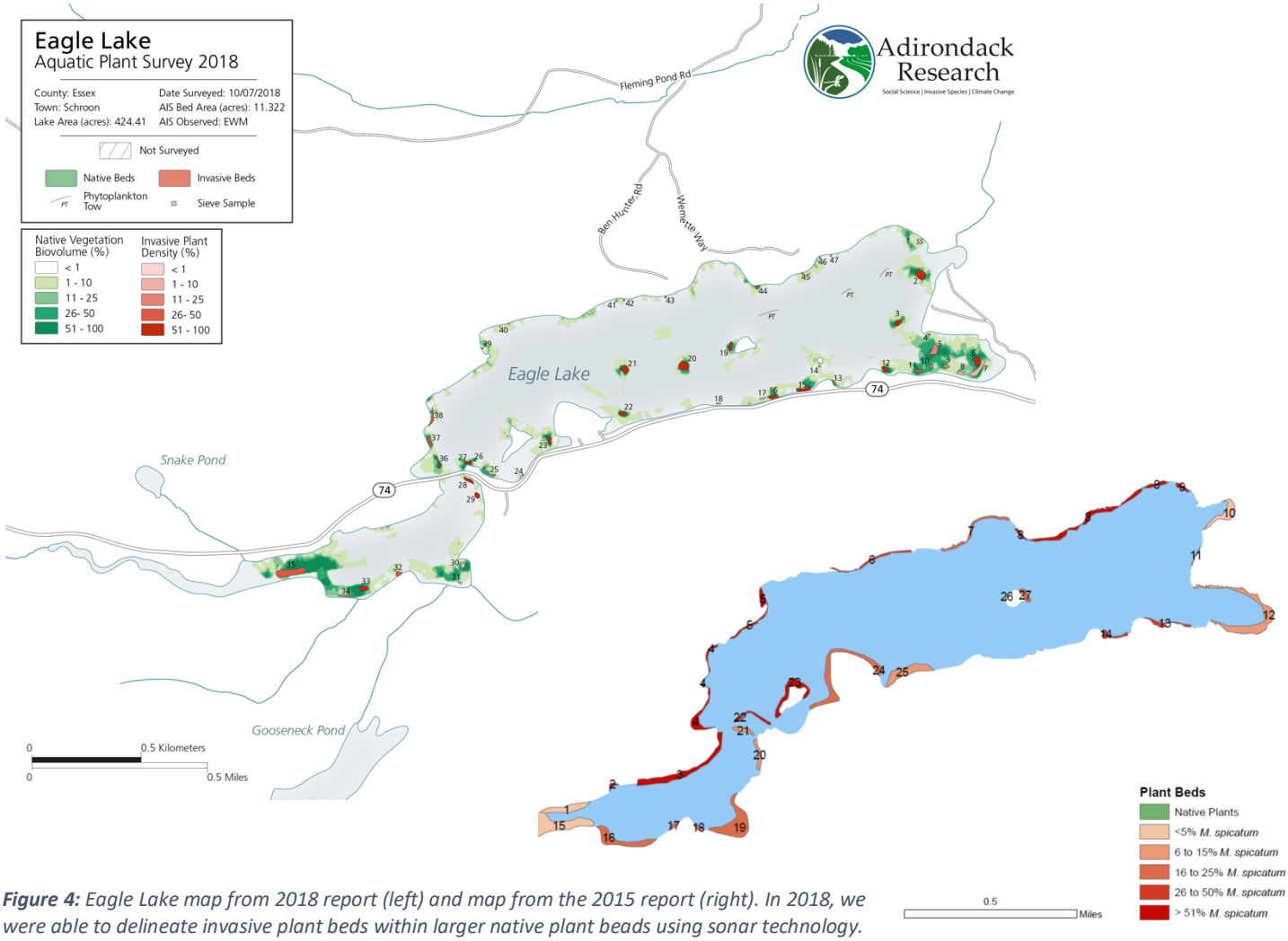


Figure 4: *Eagle Lake map from 2018 report (left) and map from the 2015 report (right). In 2018, we were able to delineate invasive plant beds within larger native plant beads using sonar technology.*

Data Management

To ensure all data collected in the field was safely stored, redundant copies were kept at multiple steps throughout the collection process. Following are the steps taken to store and organize data:

Lowrance Chartplotter

1. Data collected on the Lowrance Chartplotter was saved on 32GB memory cards in the field.
2. Memory cards were changed every two hours to lessen the amount of data lost if a card became corrupted.
3. At the end of each week, data collected from the Lowrance Chartplotter and stored on memory cards were saved on a computer and backed up on a separate external hard drive.
4. Once backed up, data from the Lowrance Chartplotter was uploaded to the BioBase platform and processed. All processed data were then copied onto Adirondack Research's cloud data storage. Chartplotter data was also backed up (third copy) to cloud storage periodically.

Photo 14: *Janelle Hoh using the Lowrance Chartplotter to monitor lake depth and aquatic plant beds.*

ESRI ArcGIS Collector App – Invasive Plant Mobile Monitoring System

1. Esri ArcGIS Collector data were backed up on the Esri server daily or weekly, depending on internet access in the field. All ArcGIS data were uploaded to Adirondack Research's cloud storage in the middle of the field season, then again at the end of the season.

Paper Collection

1. Notes on plant bed location and composition were recorded on paper.
2. Lists of native plants identified were recorded on paper and transcribed to digital form weekly.

GIS

1. Post processed GIS data (lake boundaries, invasive plant bed polygons and associated data, point data from Kriging interpolated biovolume, substrate hardness and bathymetry) were stored as GIS shapefiles in vector and raster format, depending on data source.
2. All GIS shapefiles and attribute tables were packaged and submitted to APIPP with this report.

GIS Data Processing

GIS data were post processed and exported directly from BioBase after Kriging interpolated data. We relied on BioBase to interpolate data to estimate three parameters: vegetation biovolume, substrate hardness and bathymetry. We further post-processed these data (exported in point format) using

subsequent interpolation to achieve the rasterized visualizations of these parameters displayed in the maps included in this report. We checked our interpolation against the visual output available directly from BioBase on their web interface and confirmed that our interpolation methods resulted in identical visualizations of the three parameters mentioned above (See Figure 1 on Page 6 for original and vegetation map of Friends Lake on Page 35). These interpolations are stored as raster images and will need to be further processed if used for GIS-informed risk assessments.

The main uses of our GIS data are to record and track AIS abundance and distribution. We also used our data to create visually appealing lake maps for each of the 31 lakes surveyed. Because AIS presence and abundance data were collected using IPMMS, the original shapefiles recorded during each survey are stored in and are accessible through APIPP's GIS database.

Scheduling and Travel

The team worked 40-hour weeks, spending the majority of time in the field and the rest planning for the following week and uploading data in the office. To increase efficiency and reduce travel costs, lodging near clusters of lakes to be surveyed were selected each week. Lake survey order for the week was determined by distance to lodging, weather, and scheduling with lake associations. Most weeks, one lake was surveyed each day. Occasionally multiple lakes were surveyed in a day or one lake took multiple days to survey.

Results

Between June 19 and September 5, 31 lakes and ponds were surveyed (Table 1). Of these, 15 were documented to be invaded by at least one AIS. Even though roughly half the lakes and ponds surveyed contained AIS, all had been documented as invaded prior to 2018. No newly invaded lakes or ponds were discovered by the early detection team in 2018. The most common AIS detected was *Myriophyllum spicatum* (Eurasian watermilfoil) in 11 lakes and ponds. *Bythotrephes longimanus* (spiny waterflea) was detected in three lakes. *Myriophyllum heterophyllum* (variable-leaf milfoil) and *Najas minor* (brittle naiad) were each detected in one lake or pond. No invasive mollusk infestations were detected.

A total of 172.79 shoreline miles were surveyed. Lakes surveyed ranged in size from 6.29 acres (Courtney Pond, Essex County) to 2805.16 acres (Piseco Lake, Hamilton County).

Approximately 238.16 acres of beds containing invasive plants were mapped, ranging in size from 0.02 acres to 162.07 acres.

Native Vegetation

Below is a list of the common native plant species recorded in each surveyed lake. Comprehensive native plant assessments were not conducted in 2018 since baseline data for region one had already been established in 2015. A more comprehensive list of native plants can be found in APIPP's 2015 report.

	Bullhead Pond Lily	Bur-Reed	Clasping Leaf Pondweed	Common Bladderwort	Common Waterweed	Coontail	Duckweed	Eelgrass	Fern Pondweed	Flat Leaf Bladderwort	Flat Stemmed Pondweed	Floating Leaf Pondweed	Grass Leaved Arrowhead	Illinois Pondweed	Large Leaf Pondweed	Large Purple Bladderwort	Little Floating Heart	Little Headed Spikesedge	Moss	Muskgrass	Naiad	Nitella	Northern Watermilfoil	Pickerel Weed	Pipewort	Quillwort	Slender Watermilfoil	Slender Waterweed	Variable Pondweed	Watershield	White Stemmed Pondweed	White Water Lily
Balfour Lake								*			*			*									*					*			*
Bartlett Pond	*	*																	*									*			*
Canada Lake	*			*	*		*	*			*			*	*	*				*			*					*			*
Courtney Pond	*																											*			*
Eagle Lake					*			*		*									*		*						*	*			
East Caroga Lake								*																				*		*	*	*
East Stoner Lake														*														*			*
Edgecomb Pond																							*								
Friends Lake					*						*			*		*			*		*		*		*			*			
Green Lake		*								*														*				*			*
Hadlock Pond					*			*				*						*	*		*							*	*		
Harris Lake								*				*	*								*	*	*			*			*		*
Lake Algonquin				*	*		*	*			*									*	*								*	*	*
Lake Durant							*							*										*				*	*		
Lake Forest				*					*				*								*					*	*	*			
Lake Luzerne									*				*							*	*	*						*	*		
Lake Pleasant				*	*		*	*			*		*		*				*		*		*						*		
Lake Vanare				*		*		*				*	*													*	*	*			
Loon Lake	*				*		*	*					*						*		*	*							*		
Mason Lake				*						*				*							*		*						*		*
North Pond													*																*		*
Oliver Pond	*													*															*		*
Paradox Lake	*		*	*				*					*						*										*	*	*
Pine Lake	*			*						*				*	*	*							*						*		*
Piseco Lake				*		*		*	*				*										*						*		*
Pleasant Lake	*							*																				*	*		*
Putnam Pond	*							*																		*			*		*
Sacandaga Lake				*				*	*			*		*		*							*						*		
Viele Pond	*			*										*														*			*
Wakely Pond	*													*		*						*									*
West Caroga Lake																														*	*	*

Data and Research Limitations

Project results were affected by various sources of data error, time limitations and equipment issues. Acknowledging these limitations will provide a more comprehensive analysis of the data and assist with planning for future surveys.

Survey Accessibility

The team used either a canoe or motorboat to complete surveys depending on the accessibility and size of each waterbody. The canoe allowed the team to access lakes with restrictions on motorized usage, whereas the motorboat gave the team opportunity to travel at higher speeds and cover more ground in the same amount of time. There were also limitations associated with each mode of transportation. Lakes and ponds are not always comprised of unobstructed, open water. Many waterbodies surveyed contained downed trees, stumps, rocks, emergent tussocks, mats of floating and submerged plants, or human improvements, such as docks and blocked off swimming areas. These obstacles limited the team's accessibility to areas of surveyed lakes and ponds by both canoe and motorized watercraft. When accessibility was limited, the team maneuvered the vessel as close to the obstacles as possible while ensuring their safety and that of other lake users. The shallow bottom low draft aluminum boat used for this project worked well for these situations, but an outboard motor with electric trim was critical. Even with this setup many areas were still inaccessible by boat. However, submerged vegetation observed beyond the extent of watercraft access was comprised of native species.

As a result of these accessibility limitations, the maps produced for this report may not provide a complete representation of the aquatic vegetation in each lake or pond – especially for shallow areas near shore. Areas unable to be accessed have been identified by hatch marks and labeled "Not Surveyed" in each map's legend.

Technology

Various technologies were deployed over the course of this project to improve survey effectiveness and efficiency. The ArcGIS Collector App and IPMMS ran on an iPad Mini 4 tablet linked via Bluetooth to a Garmin GPS antenna (Garmin GLO). This set up was used to map invasive plant beds and mark locations of plankton tows and sediment sieves, but spatial accuracy was often limited to around 3-16 feet due to terrain and insufficient satellite signals. Therefore, spatial data collected over the course of the project is potentially affected by this 16-foot variance. The team did their best to hold the boat stationary and reduce any drifting of the canoe or motorboat while collecting GPS data. Even with this care, the team had difficulty mapping the area of smaller plant beds.

While APIPP's AIS Early Detection Team has been in existence since 2015, the Lowrance Chartplotter and C-Map BioBase platform were new to survey protocol in 2018. With new technologies comes troubleshooting and periods of trial and error. During the project, the team identified potential sources of error associated with the Lowrance ELITE-7Ti Chartplotter and BioBase platform. First, when navigating through dense beds of vegetation, the sonar was not able to accurately detect the lake or pond bottom to map sediment hardness or bathymetry. Second, when the boat was in less than 2 feet of water, the sonar was not able to detect the bottom. Faster speeds in deeper water also resulted in inaccurate sonar readings. These challenges were addressed by supplementing sonar data with visual and GPS mapping of plant beds as well as by slowing boat speed and maintaining a minimum mapping depth. A limitation of the BioBase platform is that it does not produce vegetation biovolume outputs for areas less than 2.4 feet in depth. The maps of Balfour Lake, Lake Durant and

Pine Lake do not show BioBase data in this report due to the limitations described above. Future deployment of the Lowrance Chartplotter, transducer and BioBase platform will likely improve over time as APIPP and its early detection teams become more familiar with the intricacies and limitations of these technologies.

Survey Thoroughness

The serpentine search pattern used by the team increased the total area surveyed per lake but is not the most comprehensive technique to identify every species in a waterbody. Since the goal of this project was to detect and identify invasive species, documenting overall abundance of native vegetation was not a priority, and therefore, the serpentine search pattern offered the most efficient method to meet project goals. Other survey techniques and methods provide more thorough identification of individual plants, but sacrifice survey efficiency and resource effectiveness. With the serpentine search pattern, not every section of water is covered, but the likelihood of missing invasive plant beds is minimized while significantly increasing survey efficiency and reducing cost. There is the possibility that we missed some small invasive plant beds (or single plants), using the serpentine search pattern, but future repeat surveys will help ensure any missed infestations will be detected while still small and isolated. Survey techniques aside, many other factors can influence survey thoroughness including survey timing, water clarity, weather conditions, etc. These day to day and year to year changes in survey condition may result in minor variations in documented plant species and abundance.

While management of invasive species is important to maintaining the quality of aquatic resources, it does pose a challenge for mapping existing invasive plant beds. The maps produced for this project are intended to be used to inform future surveys and management. If the team surveyed a lake after management had occurred, the resulting maps obviously did not indicate where the invasive plant beds were located. All invasive species distribution data and plant bed location maps produced for this report reflect what was documented the day the lake was surveyed.

At the time of our surveys, management of AIS had already occurred or was occurring on: Paradox Lake, Lake Luzerne, Hadlock Pond, East Caroga Lake and Loon Lake. Future surveys may indicate a spread of AIS plant beds when, in fact, those beds existed historically, but were managed prior to survey in 2018.

Recommendations

Adirondack Research provides the following set of recommendations to improve future project effectiveness and techniques used to detect AIS infestations as they relate to informing management decisions.

Crew Size

Optimal early detection team size is dependent on the project scope of work. If deploying the BioBase platform to produce detailed lake characteristic maps becomes a higher priority, a larger crew will be necessary, as this component of the survey protocol added considerably to the time/resources required to survey each lake. This especially applies to larger lakes and ponds which have more

surface area to map. In 2018, our team of two was able to complete serpentine search surveys for AIS on 31 lakes or ponds, of which only four were completely mapped using BioBase.

Technology

In regards to the BioBase platform, we believe the data and maps produced by this technology will be a tremendous asset to lake associations and communities looking to monitor or manage AIS. For example, the bottom hardness data produced may allow for predictions of lake vulnerability to aquatic invasive plant, or even invasive mollusk establishment. When analyzed against the biovolume data, we may be able to make better informed predictions of where invasive plants are likely to become established and spread.

Yearly Number and Types of Surveys

We recommend surveying all priority lakes within each region every three years. We also recommend performing a complete BioBase survey on 1/3 of the lakes surveyed each year so that after nine years, all priority lakes are surveyed using BioBase.

Conclusions

The 2018 AIS Early Detection Team surveyed 31 lakes and ponds in the southeastern section of the Adirondack PRISM and did not find any new infestations of AIS. Most of the lakes and ponds surveyed this year were previously surveyed in 2015.

The greatest project advancement for the 2018 survey season was the incorporation of new technologies. The BioBase system allowed the team to map aquatic vegetation and lake characteristics in new and compelling ways. This newly acquired data, in combination with the deployment of IPMMS, allowed the early detection team to accurately map invasive plant beds within larger native plant communities. Invasive plant abundance data collected through IPMMS will also allow APIPP to assess infestation expansion or reduction trends over time. APIPP also now has the opportunity to utilize the BioBase data in combination with AIS distribution data to develop risk/vulnerability assessments for individual lakes.

Maps

The following section provides lake survey maps and description narratives of the 31 lakes and ponds surveyed in 2018. Each lake map comprises a vegetation survey area (which documents native plant bed biovolume), invasive plant beds (as delineated by IPMMS), and the locations of phytoplankton tows (PP) and invasive mollusk sieve survey (SS) locations. Four lakes were completely mapped with BioBase and also include bathymetric and bottom hardness composition maps.

Lake Narrative

Balfour Lake

Survey Date: August 23, 2018

Lake Description

Balfour Lake is 90.20 acres. It is located in the town of Minerva, Essex County and lies in the Upper Hudson Watershed. The team launched at the hand launch off of Route 28N.

Aquatic Invasive Plant Presence

No invasive plants were detected.

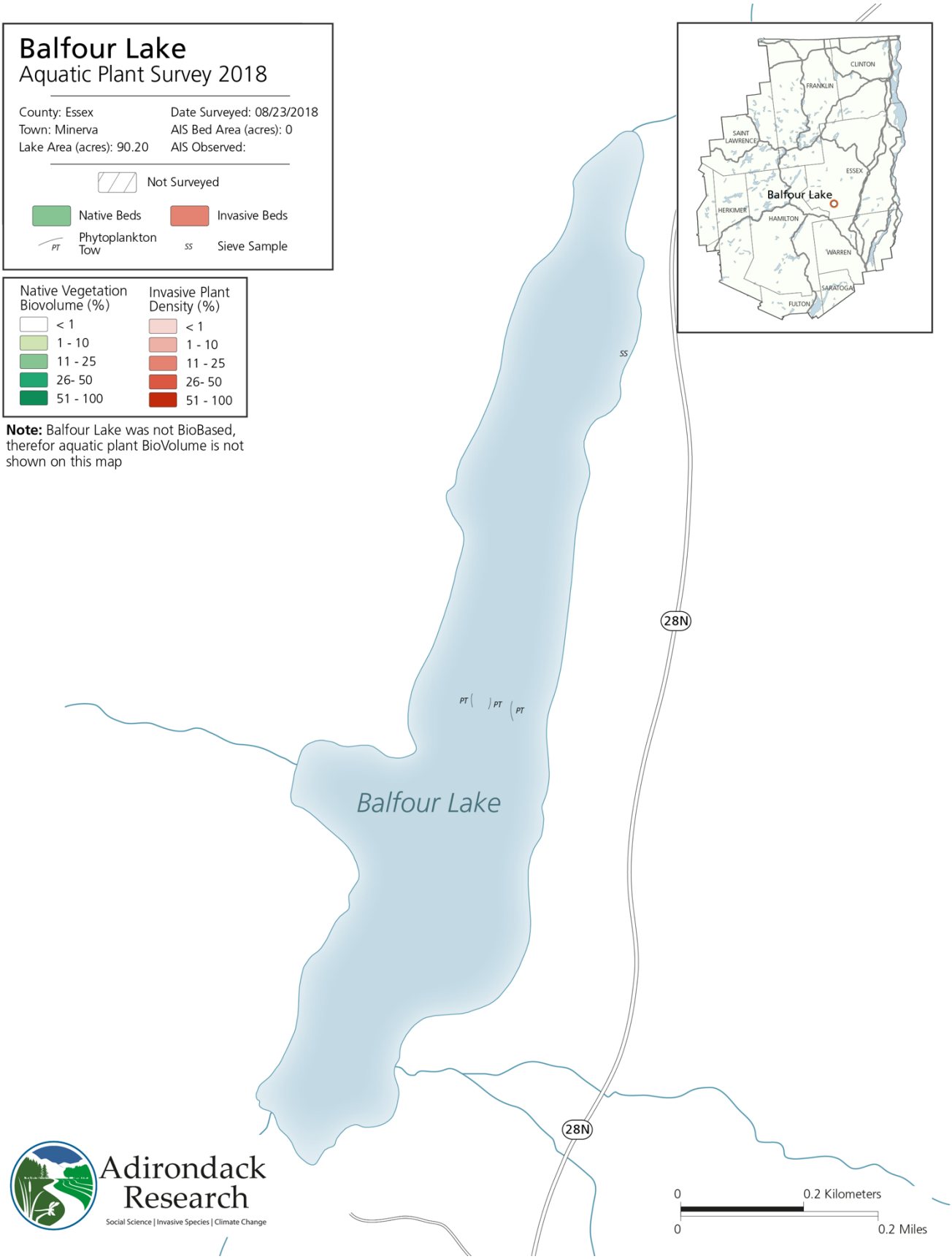
Native Plant Biota

Comprehensive surveys of all native plants found within the lake were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within the lake included *Brasenia schreberi* (watershield), *Eriocaulon* spp., *Nymphaea odorata* (white water lily), *Potamogeton natans* (floating leaf pondweed), *Utricularia purpurea* (large purple bladderwort), and *Potamogeton robbinsii* (fern pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Note: The map of Balfour Lake does not show BioBase data in this report due to the technology limitations described on page 13.


Balfour Lake
Aquatic Plant Survey 2018
County: Essex
Town: Minerva
Lake Area (acres): 90.20
Date Surveyed: 08/23/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Note: Balfour Lake was not BioBased, therefor aquatic plant BioVolume is not shown on this map
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Balfour Lake
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
SS
28N
PT
PT
PT
Balfour Lake
28N
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.2 Kilometers
0
0.2 Miles

Bartlett Pond

Survey Date: June 26 & 27, 2018

Lake Description

Bartlett Pond is 96.18 acres. It is located in the town of Mineville, Essex County and lies in the Lake Champlain watershed. The team launched at the hand launch off of County Highway 7B (Bartlett Pond Road).

Aquatic Invasive Plant Presence

A total of 32 invasive *Myriophyllum spicatum* (Eurasian watermilfoil) plant beds were mapped, with the heaviest concentrations documented at the northern end of the pond.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Alongside the *Myriophyllum spicatum* beds were native pondweed (*Potamogeton*) species, such as *Potamogeton perfoliatus* (clasping leaf pondweed). Abundant in the shallower northeast and northwest bays of the pond were three varieties of floating plant species, including: *Brasenia schreberi* (watershield), *Nymphaea odorata* (white water lily), and *Nuphar variegata* (bullhead pond lily). *Chara* spp., a genus of green algae, was also detected in the pond. This species was found in shallow water where the bottom substrate was soft.

Aquatic Invasive Animal Presence

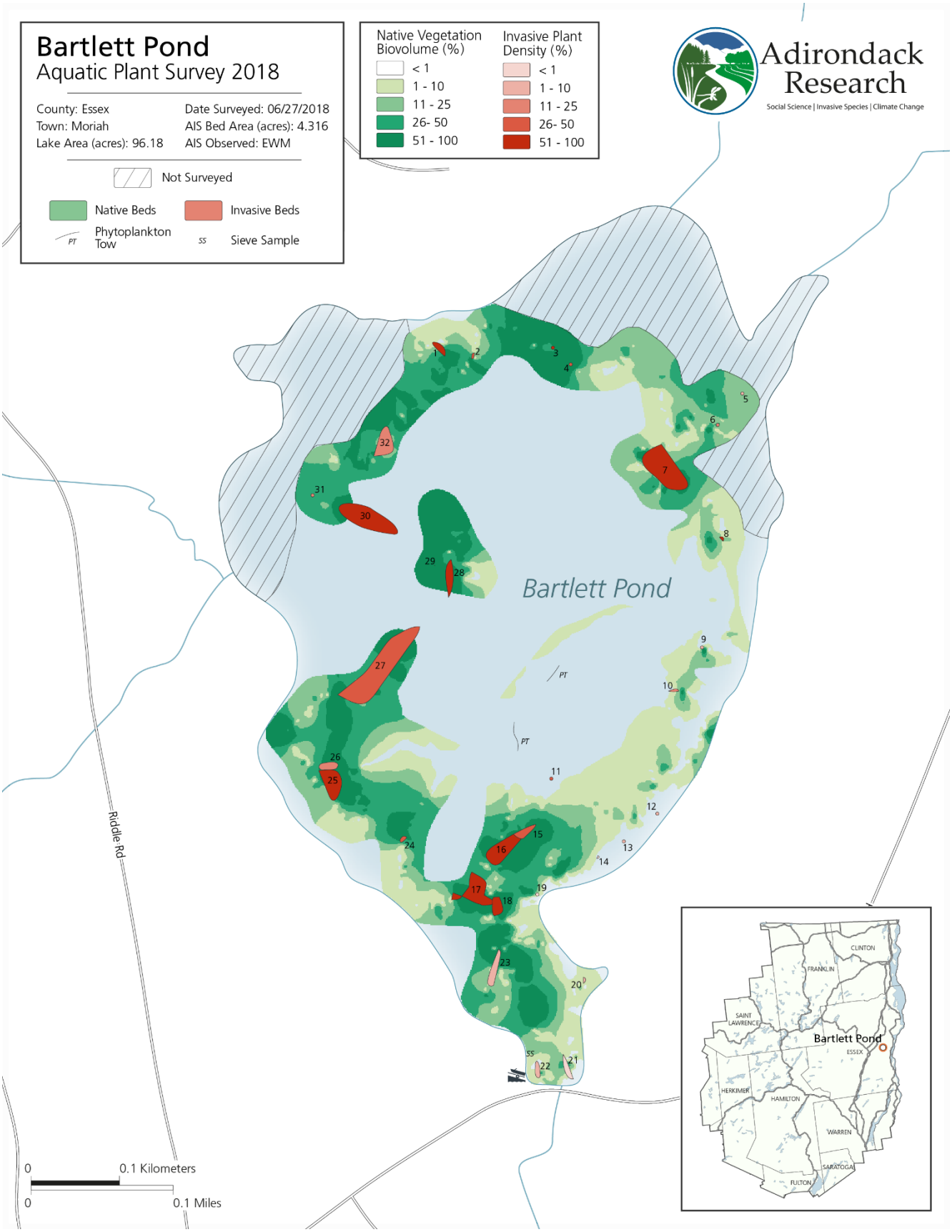
Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	0.06	2726	51 to 100
2	0.01	408	26 to 50
3	0.00079	34	51 to 100
4	0.000073	3	26 to 50
5	0.000111	5	11 to 25
6	0.77	33382	51 to 100
7	0.01	334	51 to 100
8	0.000308	13	1 to 10
9	0.01	621	11 to 25
10	0.001033	45	26 to 50
11	0.000087	4	1 to 10
12	0.000097	4	1 to 10
13	0.003465	151	11 to 25
14	0.08	3453	26 to 50
15	0.34	14800	51 to 100
16	0.000345	15	<1
17	0.22	9376	51 to 100
18	0.21	9060	51 to 100

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
19	0.10	4513	51 to 100
20	0.01	316	1 to 10
21	0.07	3004	11 to 25
22	0.04	1926	1 to 10
23	0.05	2309	1 to 10
24	0.02	865	26 to 50
25	0.29	12731	51 to 100
26	0.09	3775	11 to 25
27	1.20	52170	26 to 50
28	0.13	5749	51 to 100
29	0.000292	13	51 to 100
30	0.59	25533	51 to 100
31	0.000321	14	11 to 25
32	0.23	10146	11 to 25

Asian Clam	Spiny Waterflea
Present (Y/N)	Present (Y/N)
No	No


Bartlett Pond
Aquatic Plant Survey 2018
County: Essex
Town: Moriah
Lake Area (acres): 96.18
Date Surveyed: 06/27/2018
AIS Bed Area (acres): 4.316
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Adirondack Research
Social Science | Invasive Species | Climate Change
Bartlett Pond
Riddle Rd
0
0.1 Kilometers
0
0.1 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON

Lake Narrative

Canada Lake, West Lake, and Green Lake

Survey Date: July 2 & September 5, 2018 (Canada Lake) and July 2, 2018 (Green Lake)

Lake Description

Canada Lake and connected West Lake are 742.64 acres, not including the outlet. They are located in the town of Caroga, Fulton County and lie in the Mohawk Watershed. The team launched at the public launch on West Lake.

Green Lake is 45.36 acres. It is found in the town of Caroga, Fulton County and lies in the Mohawk watershed. The team launched at the public launch on West Lake and accessed Green Lake through the culvert under Route 29A.

Aquatic Invasive Plant Presence

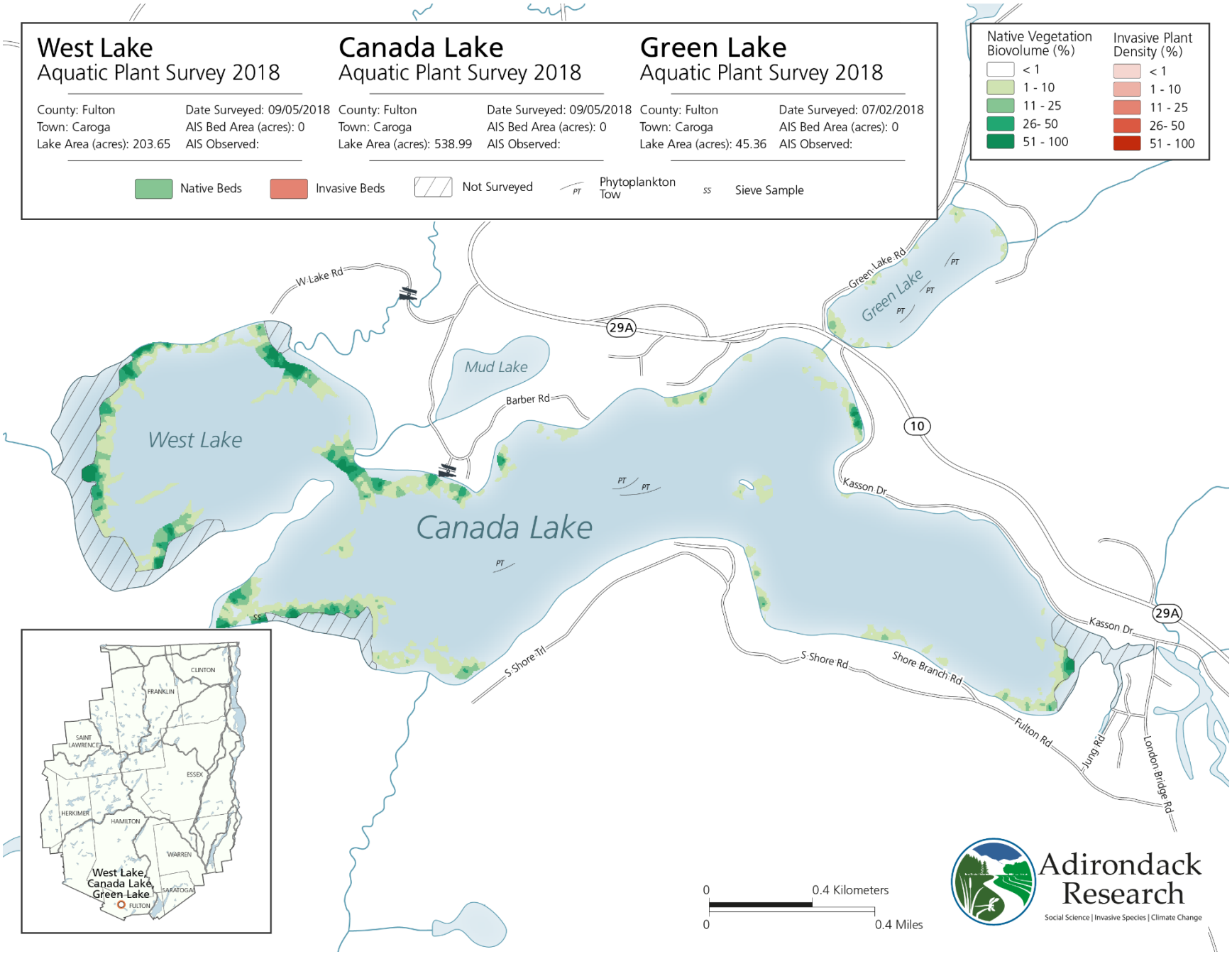
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Among the native plant species in Canada Lake and West Lake were: *Brasenia schreberi* (watershield), *Elodea canadensis* (common waterweed), *Potamogeton amplifolius* (large leaf pondweed), *Potamogeton robbinsii* (fern pondweed), *Nymphaea odorata* (white water lily), *Vallisneria americana* (eelgrass), *Potamogeton natans* (floating leaf pondweed), *Eriocaulon* sp. (pipewort), *Najas* spp. (naiad), *Nymphoides cordata* (little floating heart), *Nuphar variegata* (bullhead pond lily), *Utricularia purpurea* (large purple bladderwort), and *Utricularia vulgaris* (common bladderwort). Aside from small pockets of floating plants in Green Lake, there was little vegetation. The native floating plants found were *Brasenia schreberi* (watershield) and *Nymphaea odorata* (white water lily). *Sparganium* spp. (bur-reed), *Sagittaria graminea* (grass-leaved arrowhead), and *Isoetes* spp. (quillwort) were also detected.

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected. Three plankton tows were done in July and another three were done in September and no invasive plankton was detected.


West Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Caroga
Lake Area (acres): 203.65
Date Surveyed: 09/05/2018
AIS Bed Area (acres): 0
AIS Observed:
Canada Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Caroga
Lake Area (acres): 538.99
Date Surveyed: 09/05/2018
AIS Bed Area (acres): 0
AIS Observed:
Green Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Caroga
Lake Area (acres): 45.36
Date Surveyed: 07/02/2018
AIS Bed Area (acres): 0
AIS Observed:
Native Beds
Invasive Beds
Not Surveyed
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
W Lake Rd
Green Lake Rd
29A
Mud Lake
Barber Rd
West Lake
Green Lake
10
Kasson Dr
Canada Lake
S Shore Trl
S Shore Rd
Shore Branch Rd
Fulton Rd
Jung Rd
London Bridge Rd
29A
Kasson Dr
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
West Lake, Canada Lake, Green Lake
0
0.4 Kilometers
0
0.4 Miles
Adirondack Research
Social Science | Invasive Species | Climate Change

Lake Narrative

Caroga Lake, East

Survey Date: June 19, 2018

Lake Description

East Caroga Lake is 233.50 acres. It is located in the town of Caroga, Fulton County and lies in the Mohawk watershed. The team launched at the Caroga Lake Association launch.

Aquatic Invasive Plant Presence

A total of 12 invasive *Myriophyllum spicatum* (Eurasian watermilfoil) plant beds were mapped. There is active, ongoing *Myriophyllum spicatum* management on East Caroga Lake. At the time of this survey, management was occurring.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Mixed in with the *Myriophyllum spicatum* beds were native pondweed (*Potamogeton*) species, such as *Potamogeton praelongus* (white stemmed pondweed). *Potamogeton robbinsii* (fern pondweed) was also found along the east shore. Abundant in the shallower waters of the west arm of the lake were *Brasenia schreberi* (watershield) and *Nymphaea odorata* (white water lily).

Aquatic Invasive Animal Presence

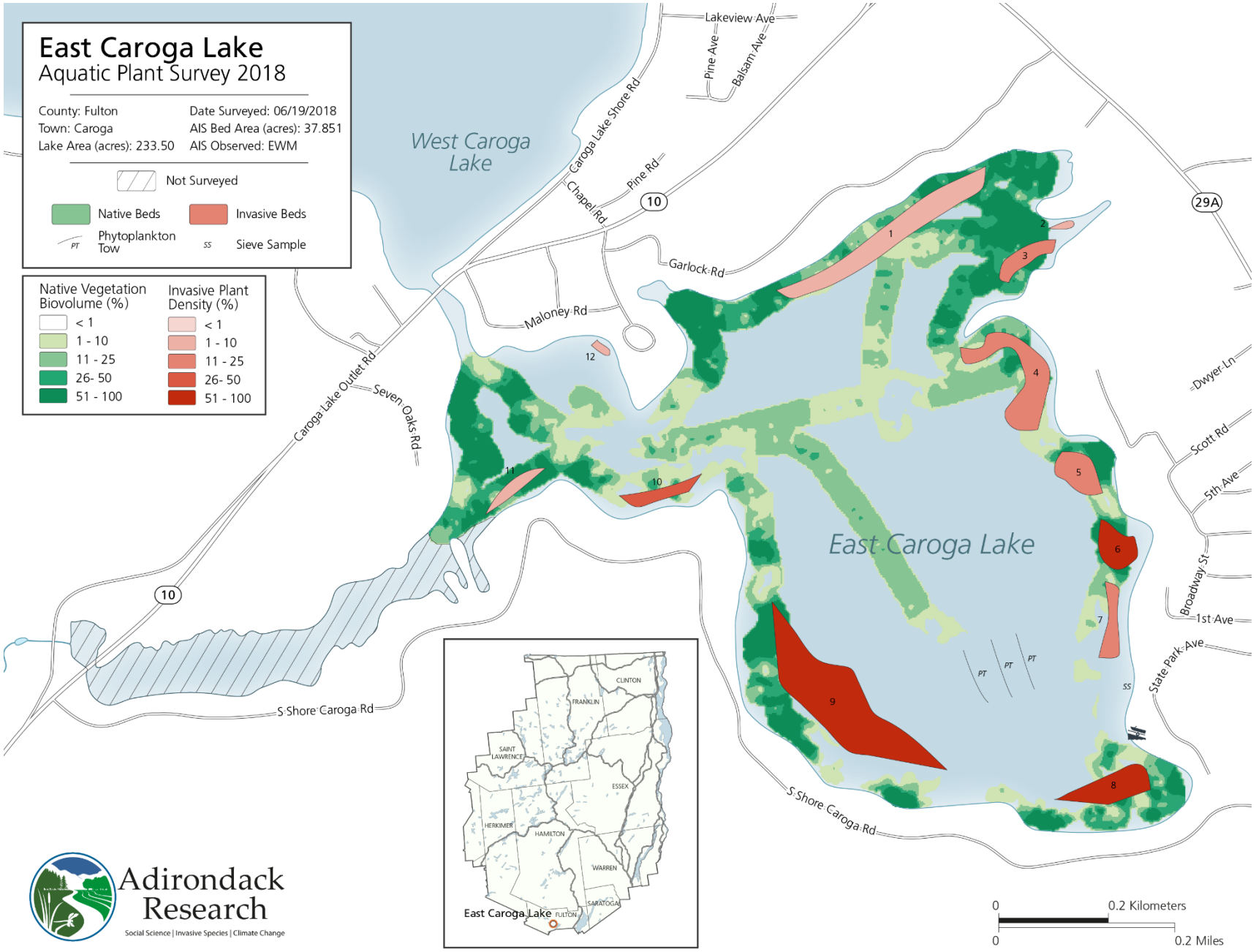
Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	7.07	307,845	1 to 10
2	0.27	11,692	1 to 10
3	1.48	64,487	11 to 25
4	5.04	219,716	11 to 25
5	2.17	94,417	11 to 25
6	2.03	88,574	51 to 100
7	1.54	66,988	11 to 25
8	2.96	129,022	51 to 100

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
9	13.13	572,026	51 to 100
10	1.27	55,180	26 to 50
11	0.69	29,985	1 to 10
12	0.18	7,882	1 to 10

Asian Clam	Spiny Waterflea
Present (Y/N)	Present (Y/N)
No	No


East Caroga Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Caroga
Lake Area (acres): 233.50
Date Surveyed: 06/19/2018
AIS Bed Area (acres): 37.851
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
West Caroga Lake
East Caroga Lake
Lakeview Ave
Pine Ave
Balsam Ave
Caroga Lake Shore Rd
Chapel Rd
Pine Rd
10
29A
Garlock Rd
Maloney Rd
Caroga Lake Outlet Rd
Seven Oaks Rd
S Shore Caroga Rd
Dwyer Ln
Scott Rd
5th Ave
Broadway St
1st Ave
State Park Ave
1
2
3
4
5
6
7
8
9
10
11
12
PT
SS
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
East Caroga Lake
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.2 Kilometers
0
0.2 Miles

Lake Narrative

Caroga Lake, West

Survey Date: June 19, 2018

Lake Description

West Caroga Lake is 318.83 acres. It is located in the town of Caroga, Fulton County and lies in the Mohawk watershed. The team launched at the Caroga Lake Association launch on East Caroga Lake and accessed West Caroga Lake through the culvert under Route 10.

Aquatic Invasive Plant Presence

Different from East Caroga, West Caroga is much deeper and rockier, resulting in a lower abundance of aquatic plants, both native and invasive. A total of 5 invasive *Myriophyllum spicatum* (Eurasian watermilfoil) plant beds were mapped.

Native Plant Biota

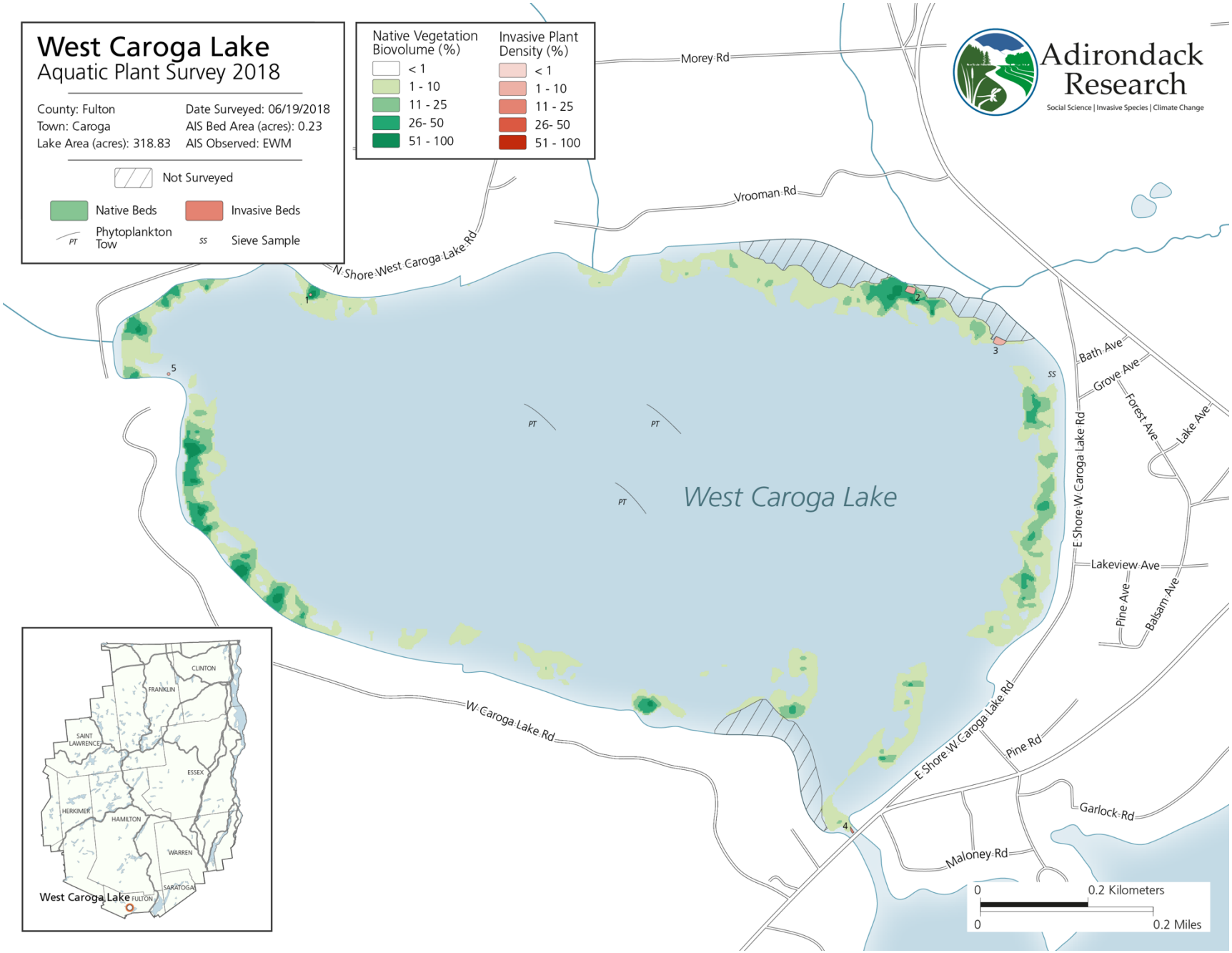
Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. The most abundant native species were *Brasenia schreberi* (watershield) and *Nymphaea odorata* (white water lily). These species were most concentrated in the northwest corner of the lake. The most common submerged plant was *Potamogeton praelongus* (white stemmed pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil				**Asian Clam**	**Spiny Waterflea**
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover	Present (Y/N)	Present (Y/N)
1	0.001035	45	1 to 10	No	No
2	0.08	3,674	1 to 10		
3	0.11	4,603	1 to 10		
4	0.02	845	11 to 25		
5	0.03	1,120	1 to 10		


West Caroga Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Caroga
Lake Area (acres): 318.83
Date Surveyed: 06/19/2018
AIS Bed Area (acres): 0.23
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Adirondack Research
Social Science | Invasive Species | Climate Change
Morey Rd
Vrooman Rd
N Shore West Caroga Lake Rd
West Caroga Lake
Bath Ave
Grove Ave
Forest Ave
Lake Ave
E Shore W Caroga Lake Rd
Lakeview Ave
Pine Ave
Balsam Ave
W Caroga Lake Rd
Pine Rd
Garlock Rd
Maloney Rd
0
0.2 Kilometers
0
0.2 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
West Caroga Lake

Courtney Pond

Survey Date: June 26, 2018

Lake Description

Courtney Pond is 6.29 acres. It is located in the town of North Hudson, Essex County and lies in the Lake Champlain watershed. The team launched at the public hand launch off of Route 9.

Aquatic Invasive Plant Presence

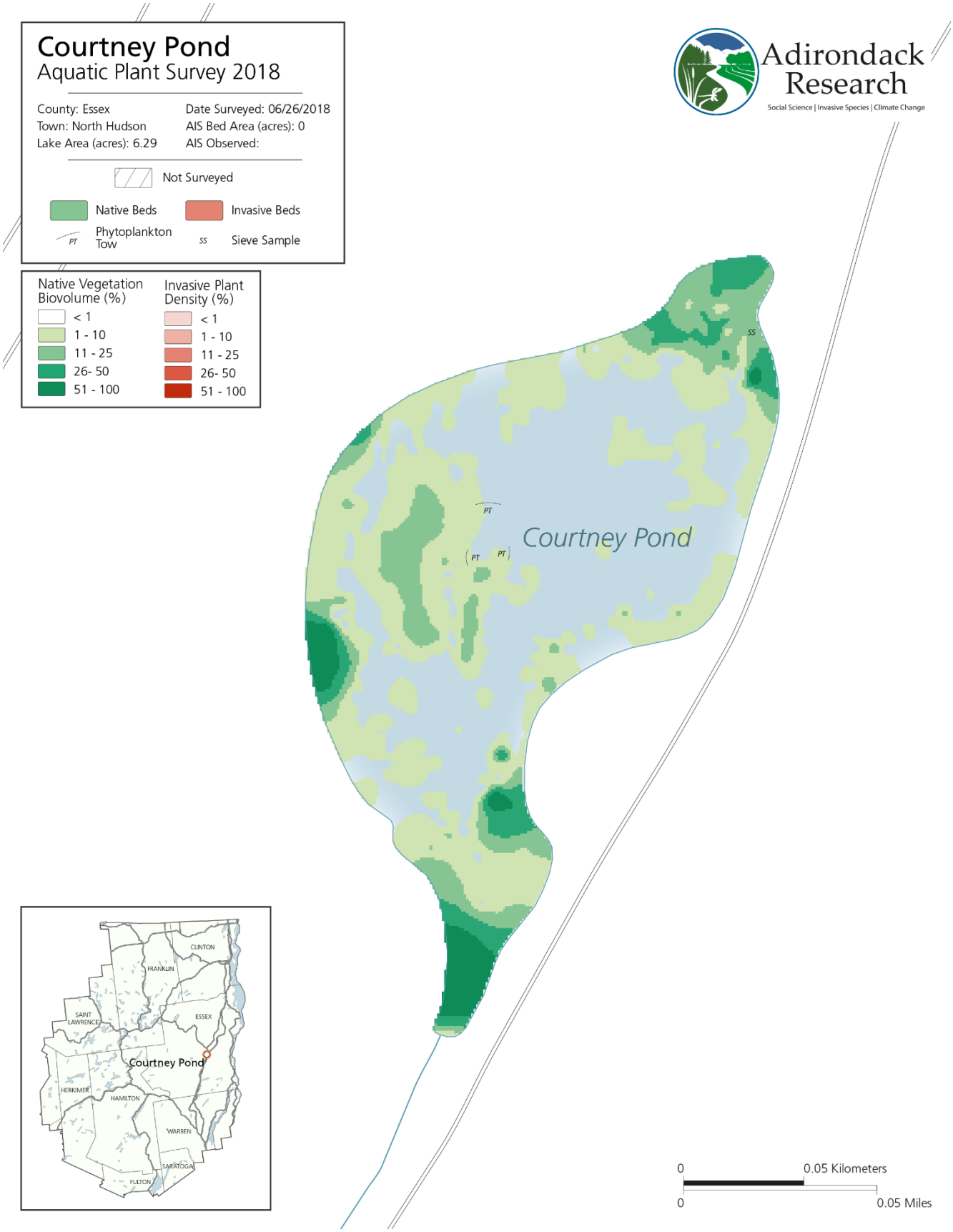
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Courtney Pond is relatively shallow with the exception of a deeper section near the western shore. The southern and eastern shoreline had abundant beds of *Nymphaea odorata* (white water lily), *Brasenia schreberi* (watershield), and *Nuphar variegata* (bullhead pond lily).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Courtney Pond
Aquatic Plant Survey 2018
County: Essex
Town: North Hudson
Lake Area (acres): 6.29
Date Surveyed: 06/26/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Adirondack Research
Social Science | Invasive Species | Climate Change
Courtney Pond
PT
SS
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Courtney Pond
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
0
0.05 Kilometers
0
0.05 Miles

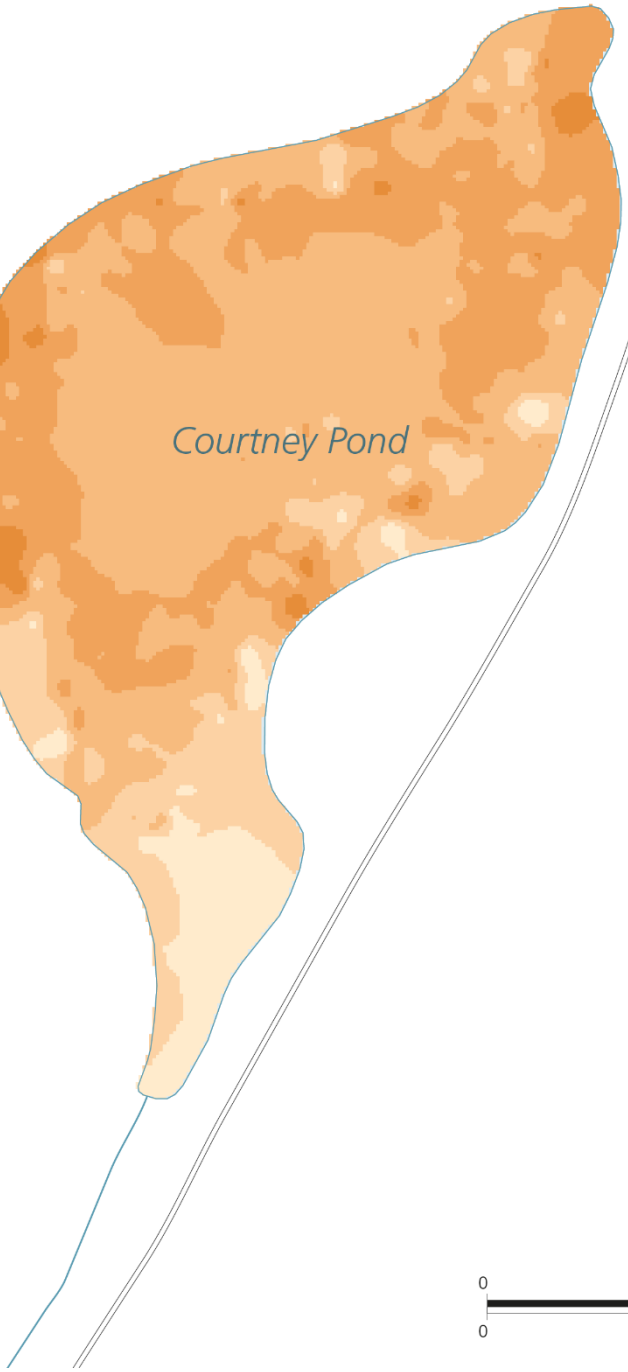
Courtney Pond
Bottom Hardness Survey 2018

County: Essex
Town: North Hudson
Lake Area (acres): 6.29
Date Surveyed: 06/26/2018
AIS Bed Area (acres): 0
AIS Observed:

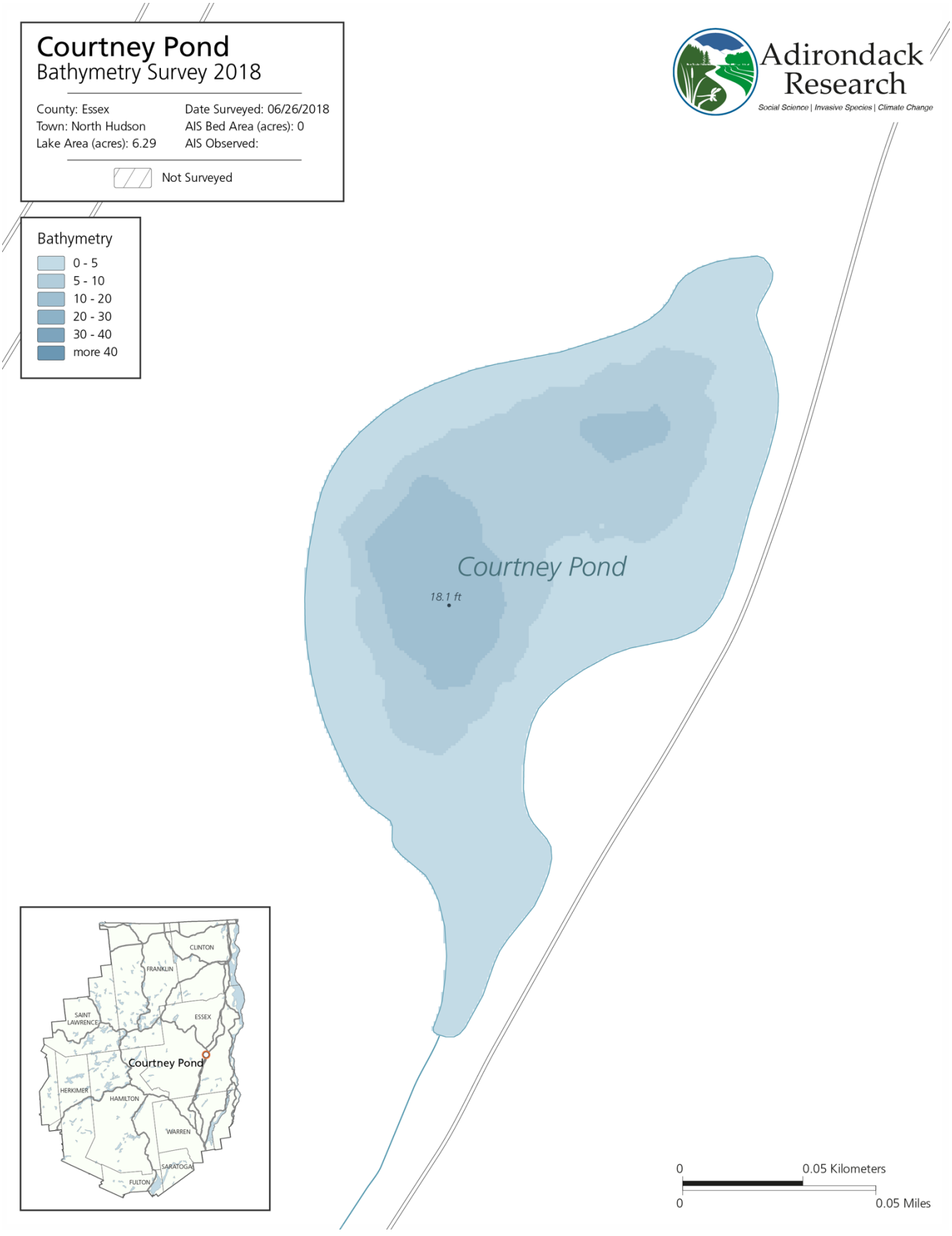
Not Surveyed

Hardness
- 0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5

Adirondack Research
Social Science | Invasive Species | Climate Change



0 0.05 Kilometers
0 0.05 Miles


Courtney Pond
Bathymetry Survey 2018
County: Essex
Town: North Hudson
Lake Area (acres): 6.29
Date Surveyed: 06/26/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Bathymetry
0 - 5
5 - 10
10 - 20
20 - 30
30 - 40
more 40
Adirondack Research
Social Science | Invasive Species | Climate Change
Courtney Pond
18.1 ft
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Courtney Pond
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
0
0.05 Kilometers
0
0.05 Miles

Eagle Lake

Survey Date: July 10, 2018

Lake Description

Eagle Lake is 424.41 acres. It is located in the town of Ticonderoga, Essex County and lies in the Upper Hudson watershed. The team launched at the fishing access site on Route 74.

Aquatic Invasive Plant Presence

A total of 30 invasive *Myriophyllum spicatum* (Eurasian watermilfoil) plant beds were mapped. *Myriophyllum spicatum* was first discovered on Eagle Lake in the 1970's. In the past, the Eagle Lake Property Owners, Inc. has managed the milfoil, which forms several dense mono-cultures around the perimeter of the lake and at atolls away from shore. *Potamogeton crispus* (curly-leaf pondweed) is another known invasive species in Eagle Lake, though none was detected during this survey. *Potamogeton crispus* has a unique biology that may factor into detection. It is usually one of the first plants to emerge each spring, and by mid-June or July the plants typically have died off for the season.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. An abundance of plant life still persists in the lake despite the presence of *Myriophyllum spicatum*. Some species found were: *Elodea canadensis* (common waterweed), *Chara* spp., *Potamogeton zosteriformis* (flat stem pondweed), *Potamogeton robbinsii* (fern pondweed), *Potamogeton gramineus* (variable pondweed), *Nitella* spp., and *Brasenia schreberi* (watershield).

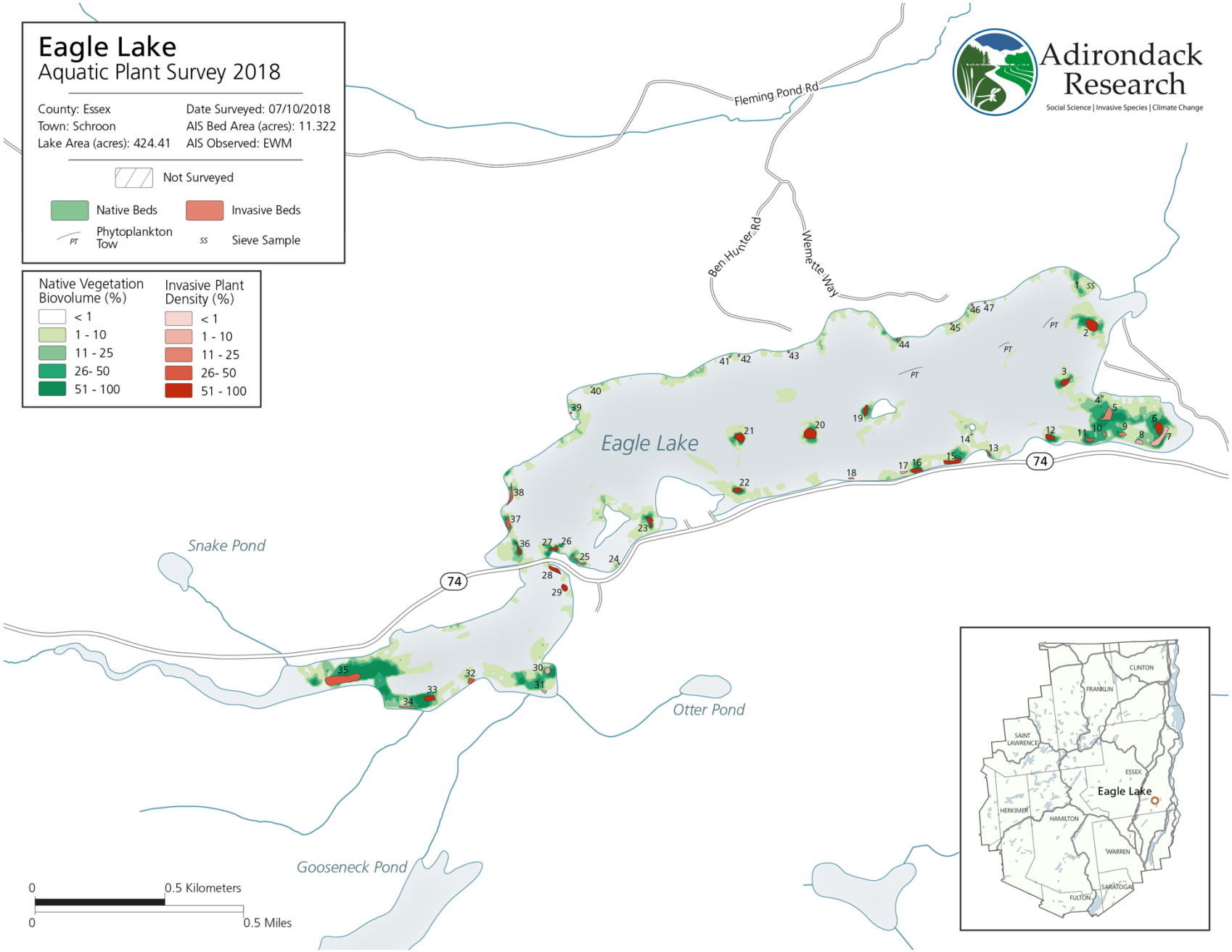
Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected. The team returned to Eagle Lake on 9/4/2018 to do three additional plankton tows after hearing possible reports of *Bythotrephes longimanus* (spiny waterflea). All three additional plankton tows returned no invasive plankton.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil				Eurasian Watermilfoil				Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover	Bed	Size (Ac.)	Size (Sq. ft)	% Cover	Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	0.03	1,231	11 to 25	20	0.75	32,880	51 to	34	0.15	6,590	11 to 25
2	0.71	31,139	51 to	21	0.46	20,128	51 to	35	1.80	78,422	26 to 50
3	0.31	13,385	51 to	22	0.25	10,846	51 to	36	0.18	7,853	51 to 100
4	0.03	1,095	11 to 25	23	0.28	12,055	51 to	37	0.29	12,466	26 to 50
5	0.61	26,418	11 to 25	24	0.02	657	26 to 50	38	0.25	10,950	26 to 50
6	0.49	21,340	51 to	25	0.15	6,324	11 to 25	39	0.02	835	26 to 50
7	0.80	34,840	1 to 10	26	0.02	723	11 to 25	40	0.01	599	11 to 25
8	0.19	8,395	1 to 10	27	0.20	8,625	51 to	41	0.01	335	11 to 25
9	0.15	6,678	11 to 25	28	0.30	13,220	51 to	42	0.00175	77	26 to 50
10	0.07	3,201	11 to 25	29	0.23	10,138	51 to	43	0.00339	148	26 to 50
11	0.19	8,122	26 to 50	30	0.21	8,998	1 to 10	44	0.06	2,751	26 to 50
12	0.27	11,774	51 to	31	0.07	2,890	1 to 10	45	0.00116	51	26 to 50
13	0.07	3,056	26 to 50	32	0.17	7,592	26 to 50	46	0.01	239	26 to 50
14	0.02	706	1 to 10	33	0.36	15,686	51 to	47	0.02	900	11 to 25
15	0.46	20,006	51 to								
16	0.29	12,441	51 to								
17	0.09	3,776	1 to 10								
18	0.05	2,329	11 to 25								
19	0.24	10,364	51 to								

Asian Clam	Spiny Waterflea
Present (Y/N)	Present (Y/N)
No	No


Eagle Lake
Aquatic Plant Survey 2018
County: Essex
Town: Schroon
Lake Area (acres): 424.41
Date Surveyed: 07/10/2018
AIS Bed Area (acres): 11.322
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Adirondack Research
Social Science | Invasive Species | Climate Change
Fleming Pond Rd
Ben Hunter Rd
Wemette Way
Eagle Lake
Snake Pond
Otter Pond
Gooseneck Pond
74
0
0.5 Kilometers
0
0.5 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Eagle Lake
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON

Lake Narrative

East Stoner Lake

Survey Date: June 20, 2018

Lake Description

East Stoner Lake is 82.14 acres. It is located in the town of Arietta, Fulton County and lies in the Mohawk watershed. The team launched at a private residence on the southwest corner of the lake.

Aquatic Invasive Plant Presence

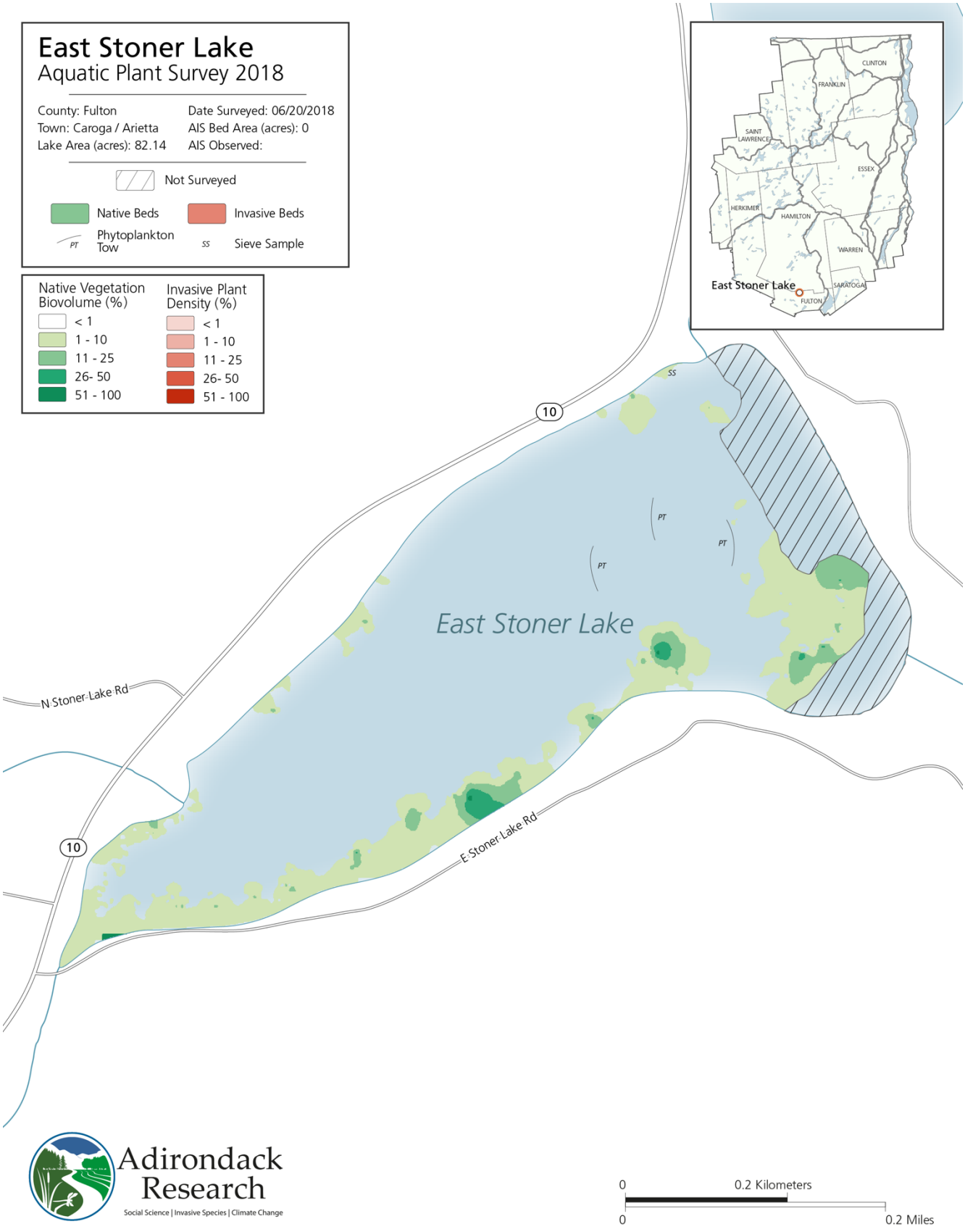
No invasive plants were detected.

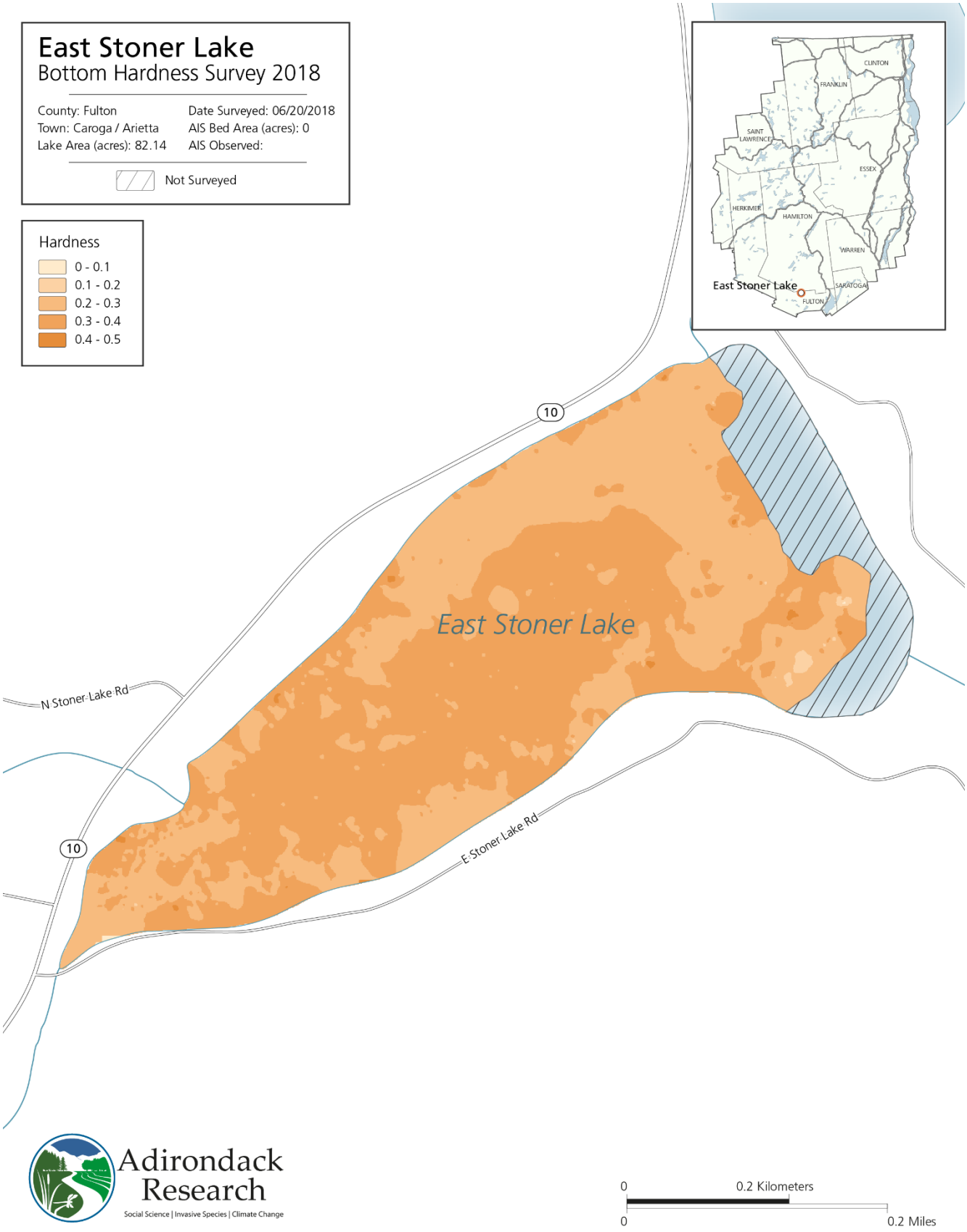
Native Plant Biota

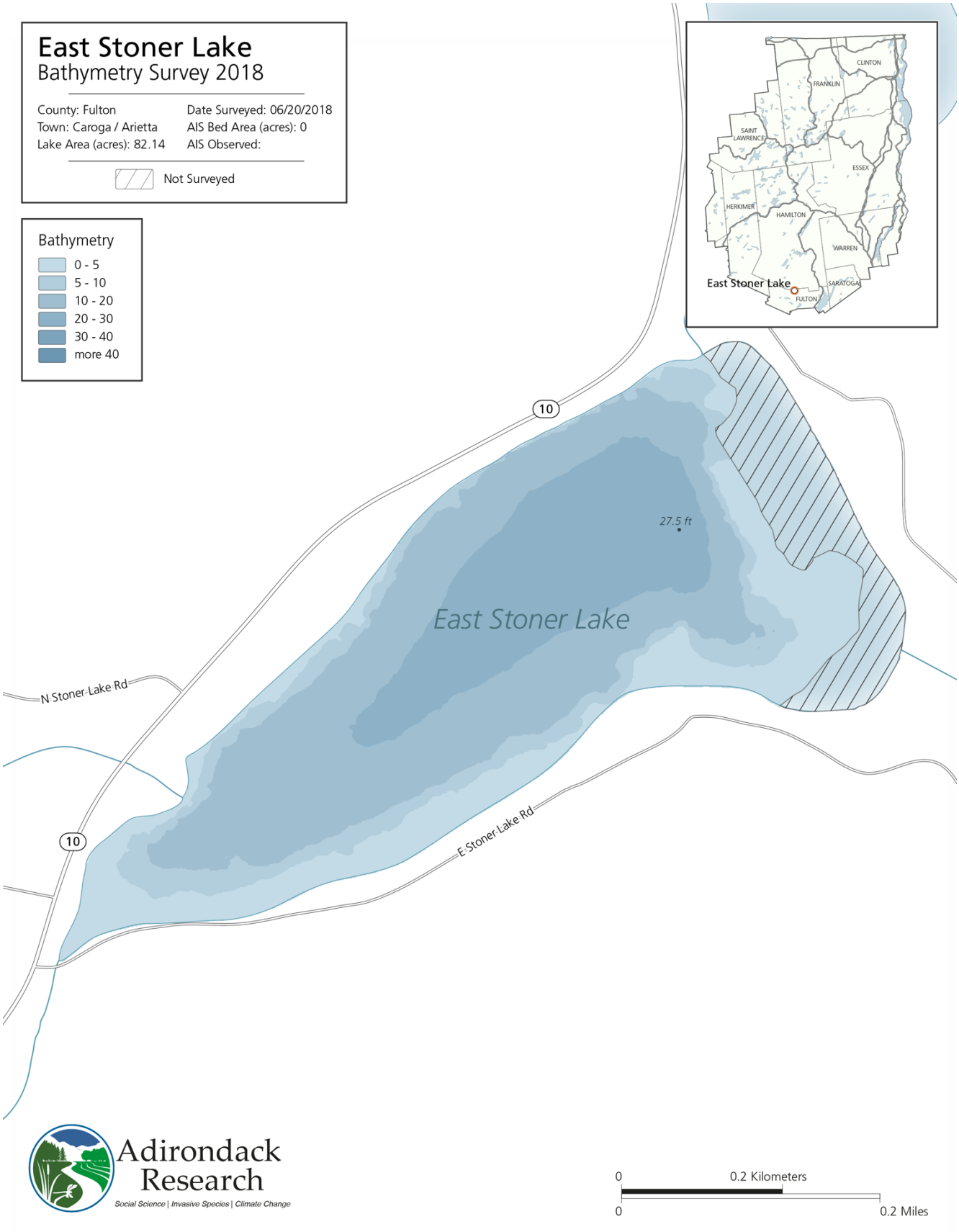
Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. East Stoner Lake is essentially shaped like a bowl and is deeper along the northern shoreline. The southern shoreline is shallow and the bottom substrate consists of hard sand and gravel. *Brasenia schreberi* (watershield) and *Nymphaea odorata* (white water lily) were abundant in the northeast corner of the lake, where the water was shallow. In the southwest corner of the lake, *Utricularia purpurea* (large purple bladderwort) dominated the lake bottom.

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


East Stoner Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Caroga / Arietta
Lake Area (acres): 82.14
Date Surveyed: 06/20/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
East Stoner Lake
East Stoner Lake
N Stoner Lake Rd
E Stoner Lake Rd
10
10
SS
PT
PT
PT
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.2 Kilometers
0
0.2 Miles


East Stoner Lake
Bottom Hardness Survey 2018
County: Fulton
Town: Caroga / Arietta
Lake Area (acres): 82.14
Date Surveyed: 06/20/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Hardness
0 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
East Stoner Lake
East Stoner Lake
10
10
N Stoner Lake Rd
E Stoner Lake Rd
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.2 Kilometers
0
0.2 Miles


East Stoner Lake
Bathymetry Survey 2018
County: Fulton
Town: Caroga / Arietta
Lake Area (acres): 82.14
Date Surveyed: 06/20/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Bathymetry
0 - 5
5 - 10
10 - 20
20 - 30
30 - 40
more 40
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
East Stoner Lake
10
27.5 ft
East Stoner Lake
N Stoner Lake Rd
E Stoner Lake Rd
10
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.2 Kilometers
0
0.2 Miles

Edgecomb Pond

Survey Date: August 23, 2018

Lake Description

Edgecomb Pond is 35.47 acres. It is located in the town of Bolton, Warren County and lies in the Lake Champlain Watershed. The team launched at the public hand launch adjacent to the Town of Bolton Water Supply.

Aquatic Invasive Plant Presence

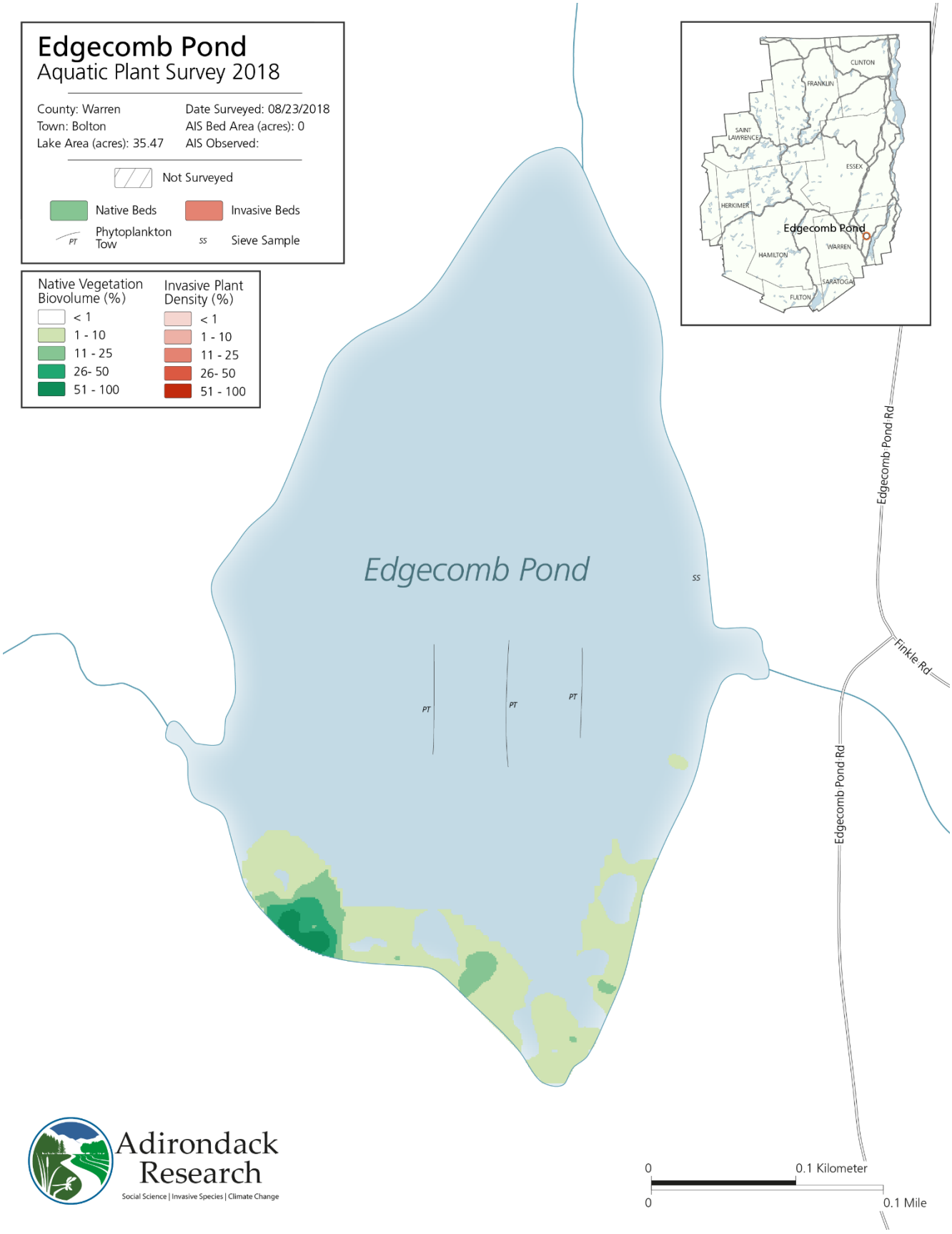
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Few plants were detected in Edgecomb Pond due to a steep near-shoe drop-off and small littoral zone. *Eriocaulon* spp. (pipewort) was the most common plant detected.

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Edgecomb Pond
Aquatic Plant Survey 2018
County: Warren
Town: Bolton
Lake Area (acres): 35.47
Date Surveyed: 08/23/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
Edgecomb Pond
HAMILTON
WARREN
SARATOGA
FULTON
Edgecomb Pond
SS
PT
PT
PT
Edgecomb Pond Rd
Finkle Rd
Edgecomb Pond Rd
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.1 Kilometer
0
0.1 Mile

Friends Lake

Survey Date: August 8, 2018

Lake Description

Friends Lake is 449.00 acres. It is located in the town of Chester, Warren County and lies in the Upper Hudson Watershed. The team was able to access this private lake with the assistance from the Friends Lake Association.

Aquatic Invasive Plant Presence

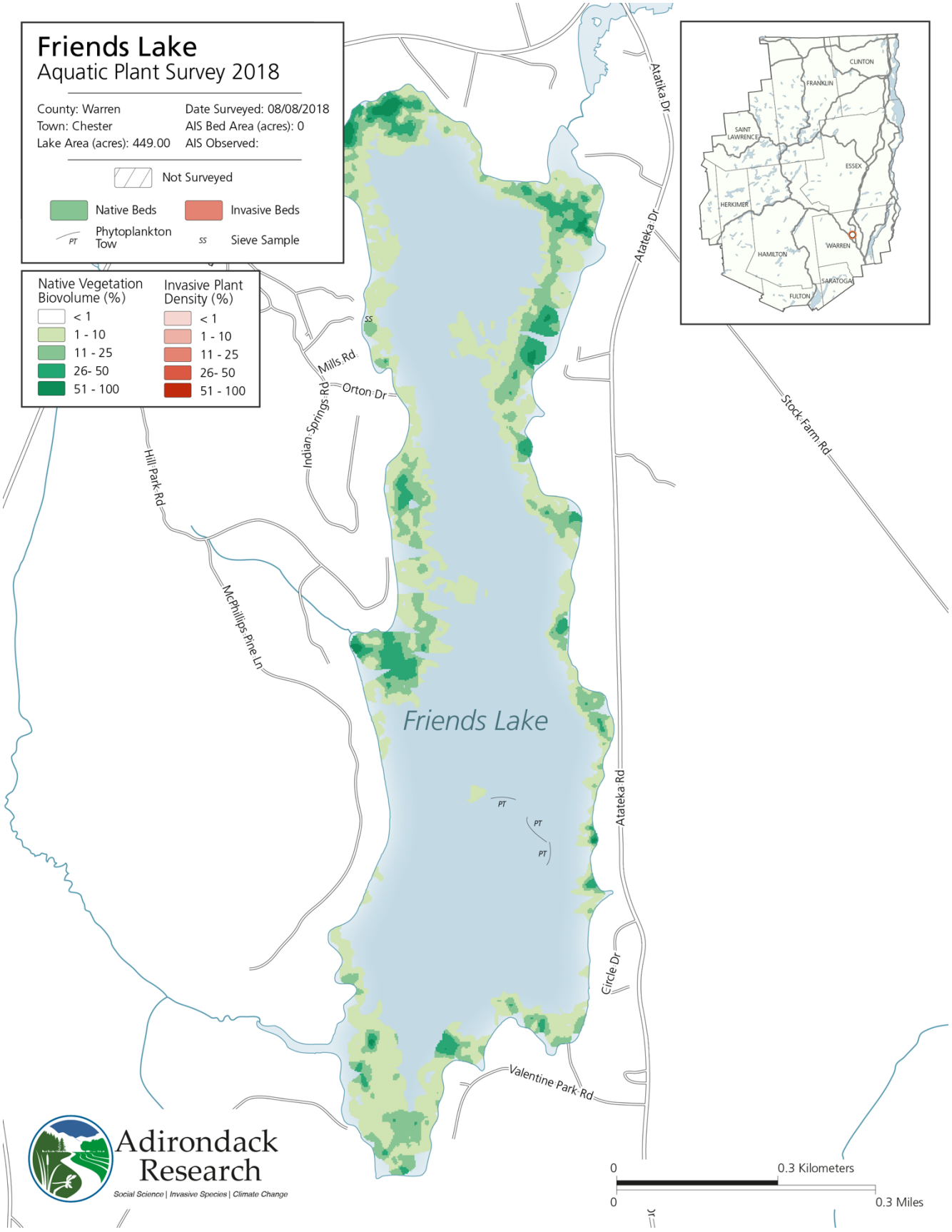
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within the lake include *Brasenia schreberi* (watershield), *Potamogeton amplifolius* (large leaf pondweed), *Nitella* spp., *Elodea canadensis* (common waterweed), *Chara* spp., *Eriocaulon* spp. (pipewort), *Myriophyllum tenellum* (slender watermilfoil), *Nymphoides cordata* (little floating heart), and *Potamogeton natans* (floating leaf pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Friends Lake
Aquatic Plant Survey 2018
County: Warren
Town: Chester
Lake Area (acres): 449.00
Date Surveyed: 08/08/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
WARREN
HAMILTON
SARATOGA
FULTON
Atatika Dr
Atateka Dr
Mills Rd
Orton Dr
Indian Springs Rd
Hill Park Rd
McPhillips Pine Ln
Stock Farm Rd
Atateka Rd
Circle Dr
Valentine Park Rd
Friends Lake
SS
PT
0
0.3 Kilometers
0
0.3 Miles
Adirondack Research
Social Science | Invasive Species | Climate Change

Lake Narrative

Hadlock Pond

Survey Date: August 1 & 6, 2018

Lake Description

Hadlock Pond is 194.18 acres. It is located in Fort Ann, Washington County and lies in the Lake Champlain watershed. The team launched at the Lake Hadlock Association launch at the southern end of the pond.

Aquatic Invasive Plant Presence

There is active invasive *Myriophyllum spicatum* (Eurasian watermilfoil) management on Hadlock Pond. At the time of survey, the management team was mechanically harvesting *Myriophyllum spicatum*. Twenty-seven beds of *Myriophyllum spicatum* were detected. Beds were moderately dense to very dense. *Potamogeton crispus* (curly-leaf pondweed) is another known invasive species in Hadlock Pond, though none was detected during this survey. *Potamogeton crispus* has a unique biology that may factor into detection. It is usually one of the first plants to emerge each spring, and by mid-June or July the plants typically have died off for the season. *Trapa natans* (water chestnut) is another aquatic species that has been found in Hadlock Pond in the past, though none was detected during this survey. *Najas minor* (brittle naiad) was also detected in Hadlock Pond. This species was most prominent in the shallow waters near the two big islands.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native species detected in Hadlock Pond were: *Brasenia schreberi* (watershield), *Elodea canadensis* (common waterweed), *Potamogeton robbinsii* (fern pondweed), *Nitella* spp., *Chara* spp., *Potamogeton illinoensis* (Illinois pondweed), *Fontinalis* spp. (aquatic moss), *Potamogeton gramineus* (variable pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil

Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	0.23	10,101	26 to 50
2	0.25	11,101	11 to 25
3	2.13	92,642	26 to 50
4	0.24	10,485	51 to
5	0.07	2,853	51 to
6	0.00084	37	11 to 25
7	0.04	1,750	11 to 25
8	0.40	17,362	51 to

Brittle Naiad

Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
22	2.53	110,209	1 to 10

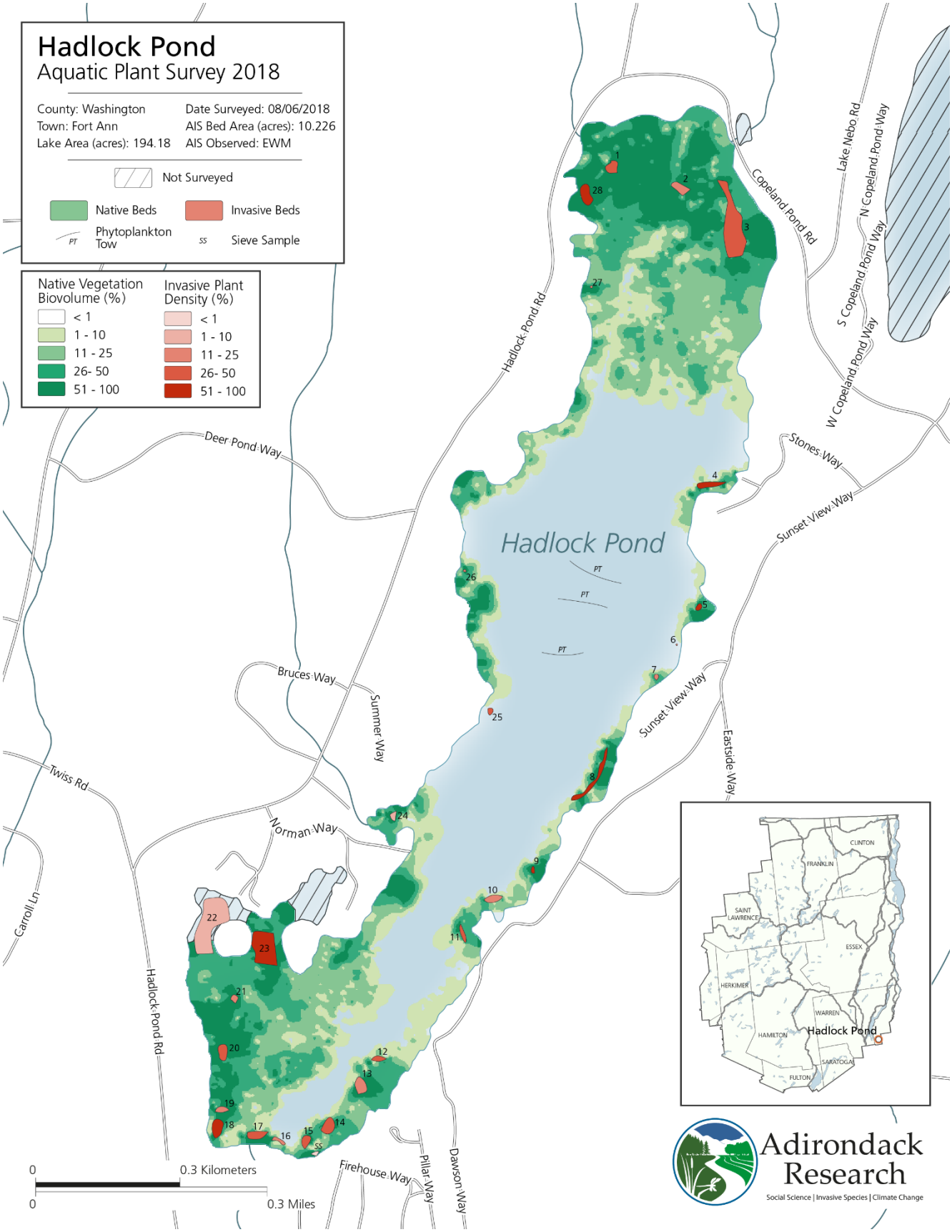
Eurasian Watermilfoil

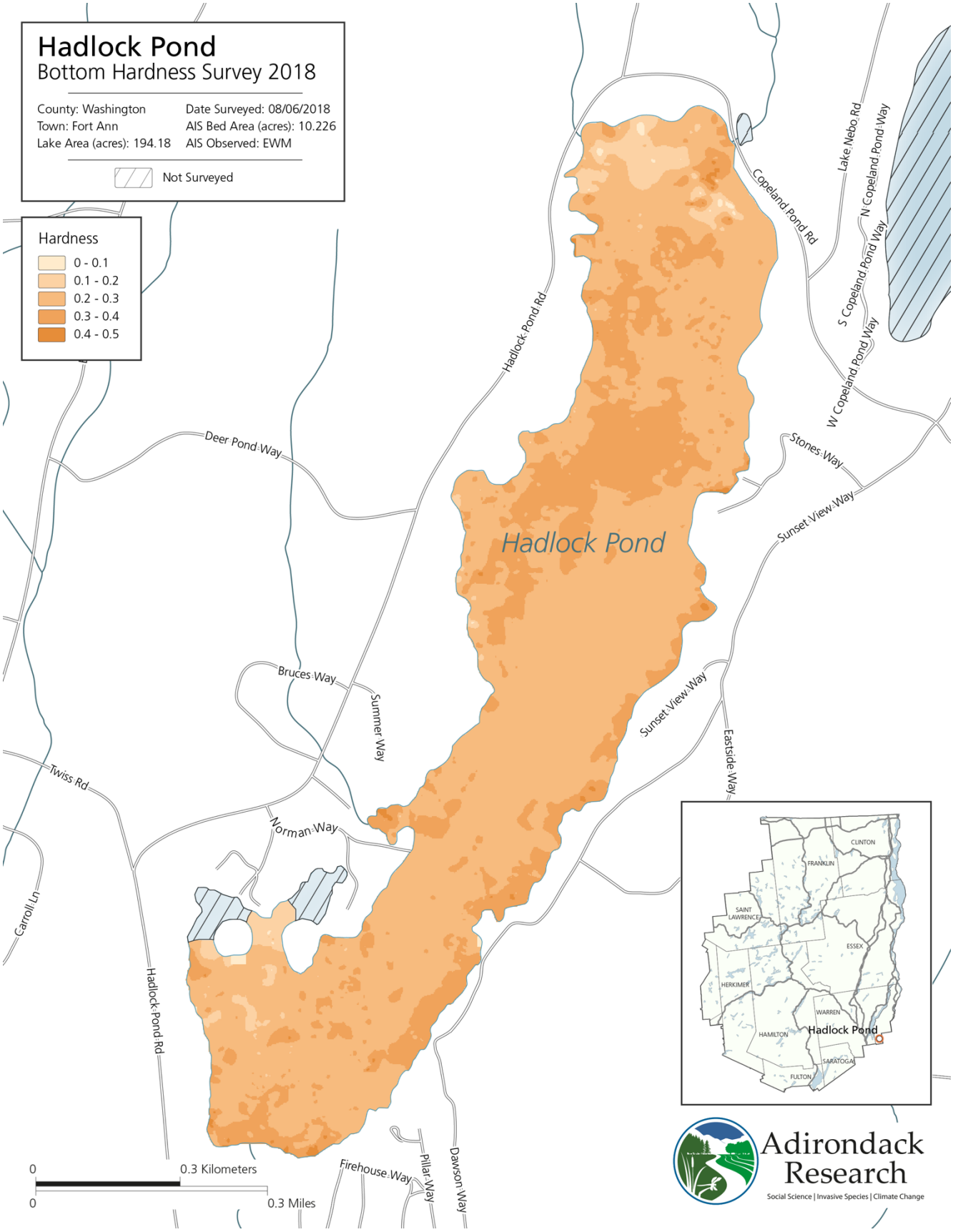
Bed	Size (Ac.)	Size (Sq. ft)	% Cover
9	0.05	2,235	51 to
10	0.20	8,793	11 to 25
11	0.12	5,159	26 to 50
12	0.12	5,346	26 to 50
13	0.30	13,144	11 to 25
14	0.32	13,879	26 to 50
15	0.16	7,183	26 to 50
16	0.09	3,833	11 to 25
17	0.27	11,911	26 to 50
18	0.33	14,532	51 to
19	0.12	5,330	11 to 25
20	0.25	10,968	26 to 50

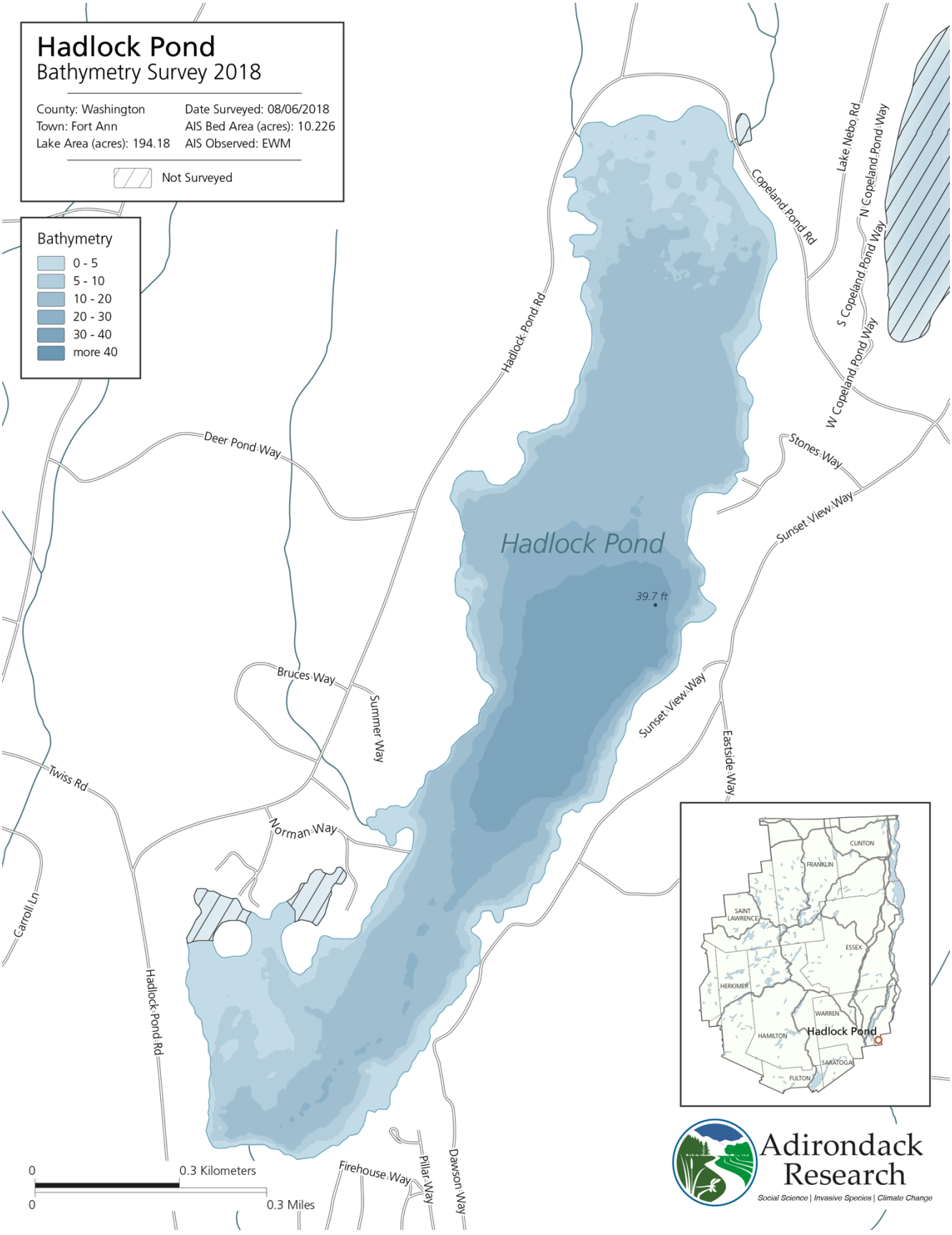
Eurasian Watermilfoil

Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
21	0.08	3,546	11 to 25
22	1.39	60,730	51 to 100
23	0.08	3,466	1 to 10
24	0.06	2,490	26 to 50
25	0.01	527	11 to 25
26	0.00278	121	1 to 10
27	0.36	15,704	51 to 100
28	0.08	3,546	11 to 25

Asian Clam	Spiny Waterflea
Present (Y/N)	Present (Y/N)
No	No


Hadlock Pond
Aquatic Plant Survey 2018
County: Washington
Town: Fort Ann
Lake Area (acres): 194.18
Date Surveyed: 08/06/2018
AIS Bed Area (acres): 10.226
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Hadlock Pond
Lake Nebo Rd
Copeland Pond Rd
N Copeland Pond Way
S Copeland Pond Way
W Copeland Pond Way
Hadlock Pond Rd
Deer Pond Way
Stones Way
Sunset View Way
Bruces Way
Summer Way
Twiss Rd
Norman Way
Carroll Ln
Eastside Way
Firehouse Way
Pillar Way
Dawson Way
0
0.3 Kilometers
0
0.3 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
WARREN
HAMILTON
SARATOGA
FULTON
Hadlock Pond
Adirondack Research
Social Science | Invasive Species | Climate Change


Hadlock Pond
Bottom Hardness Survey 2018
County: Washington
Town: Fort Ann
Lake Area (acres): 194.18
Date Surveyed: 08/06/2018
AIS Bed Area (acres): 10.226
AIS Observed: EWM
Not Surveyed
Hardness
0 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
Hadlock Pond
Hadlock Pond Rd
Copeland Pond Rd
Lake Nebo Rd
N Copeland Pond Way
S Copeland Pond Way
W Copeland Pond Way
Deer Pond Way
Stones Way
Sunset View Way
Bruces Way
Summer Way
Twiss Rd
Norman Way
Carroll Ln
Eastside Way
Firehouse Way
Pillar Way
Dawson Way
0
0.3 Kilometers
0
0.3 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
WARREN
HAMILTON
SARATOGA
FULTON
Hadlock Pond
Adirondack Research
Social Science | Invasive Species | Climate Change


Hadlock Pond
Bathymetry Survey 2018
County: Washington
Town: Fort Ann
Lake Area (acres): 194.18
Date Surveyed: 08/06/2018
AIS Bed Area (acres): 10.226
AIS Observed: EWM
Not Surveyed
Bathymetry
0 - 5
5 - 10
10 - 20
20 - 30
30 - 40
more 40
Hadlock Pond
39.7 ft
Hadlock Pond Rd
Copeland Pond Rd
Lake Nebo Rd
N Copeland Pond Way
S Copeland Pond Way
W Copeland Pond Way
Deer Pond Way
Stones Way
Sunset View Way
Bruces Way
Summer Way
Twiss Rd
Norman Way
Carroll Ln
Eastside Way
Firehouse Way
Pillar Way
Dawson Way
0
0.3 Kilometers
0
0.3 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
WARREN
HAMILTON
Hadlock Pond
SARATOGA
FULTON
Adirondack Research
Social Science | Invasive Species | Climate Change

Harris Lake

Survey Date: July 18, 2018

Lake Description

Harris Lake is 302.69 acres. It is located in Newcomb, Essex County and lies in the Upper Hudson watershed. The team launched using the hard launch located off of Town Beach Road.

Aquatic Invasive Plant Presence

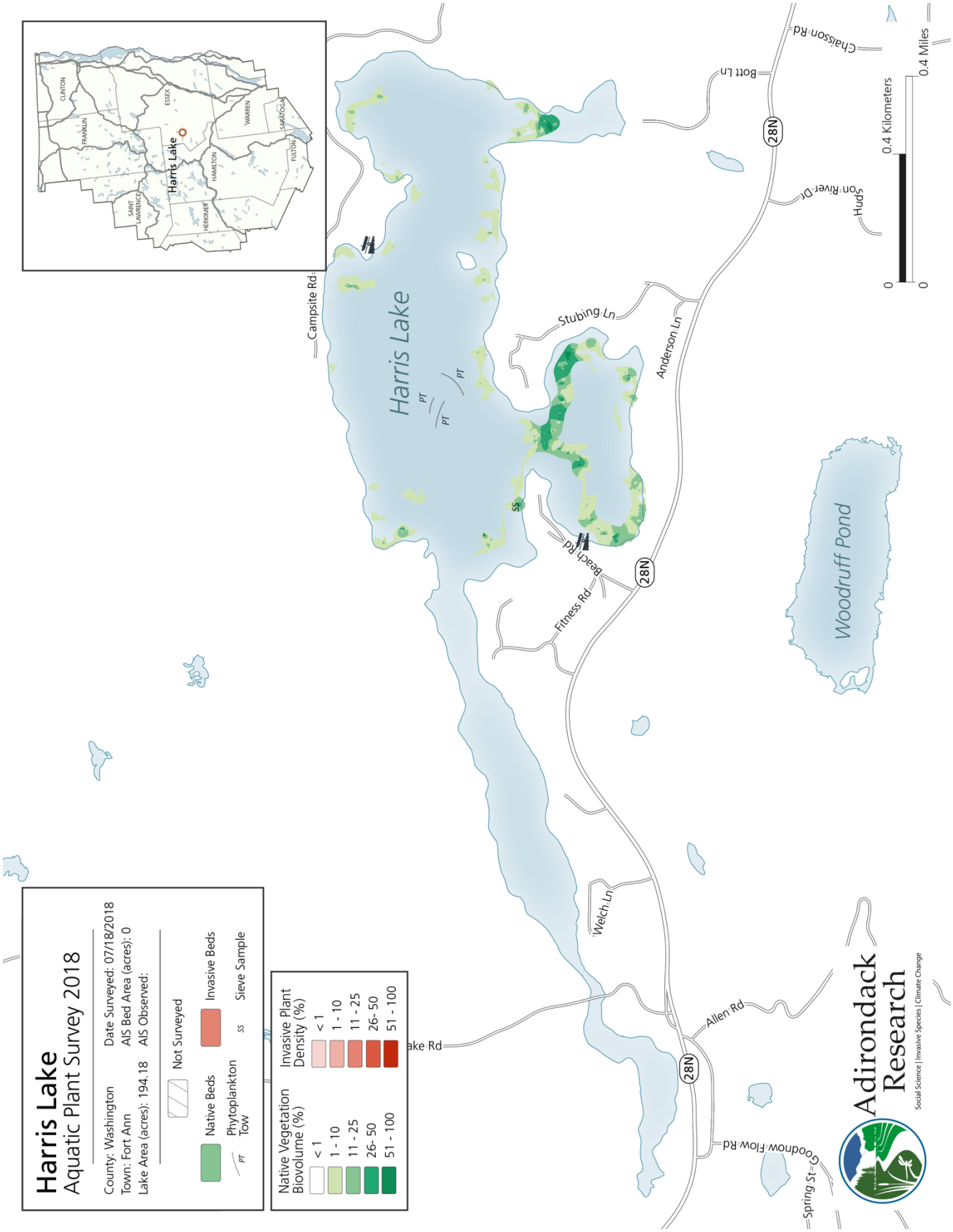
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. A rich variety of native plant species were found, including: *Eriocaulon* spp. (pipewort), *Nymphaea odorata* (white water lily), *Brasenia schreberi* (watershield), *Myriophyllum sibiricum* (northern watermilfoil), *Nitella* spp., *Potamogeton robbinsii* (fern pondweed), *Utricularia purpurea* (large purple bladderwort), *Potamogeton amplifolius* (large leaf pondweed), and *Elodia nuttallii* (slender waterweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Harris Lake
Aquatic Plant Survey 2018
County: Washington
Town: Fort Ann
Lake Area (acres): 194.18
Date Surveyed: 07/18/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
PT
Sieve Sample
SS
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Harris Lake
Woodruff Pond
Campsite Rd
Stubing Ln
Anderson Ln
Beach Rd
Fitness Rd
Welch Ln
Allen Rd
Goodnow Flow Rd
Spring St
Spruce Rd
Bott Ln
Chaisson Rd
Sun River Dr
28N
0
0.4 Kilometers
0
0.4 Miles
Adirondack Research
Social Science | Invasive Species | Climate Change
CLINTON
FRANKLIN
ESSEX
WARREN
SARATOGA
FULTON
HAMILTON
HERKIMER
SAINT LAWRENCE

Lake Narrative

Lake Algonquin

Survey Date: August 30, 2018

Lake Description

Lake Algonquin is 248.63 acres. It is located in the town of Wells, Hamilton County and lies in the Sacandaga Watershed. The team launched at the public launch on Algonquin Drive.

Aquatic Invasive Plant Presence

A total of 9 invasive *Myriophyllum spicatum* (Eurasian watermilfoil) plant beds were mapped. *Myriophyllum spicatum* was detected in Lake Algonquin in 2002. Beds ranged from a few plants to dense monocultures.

Native Plant Biota

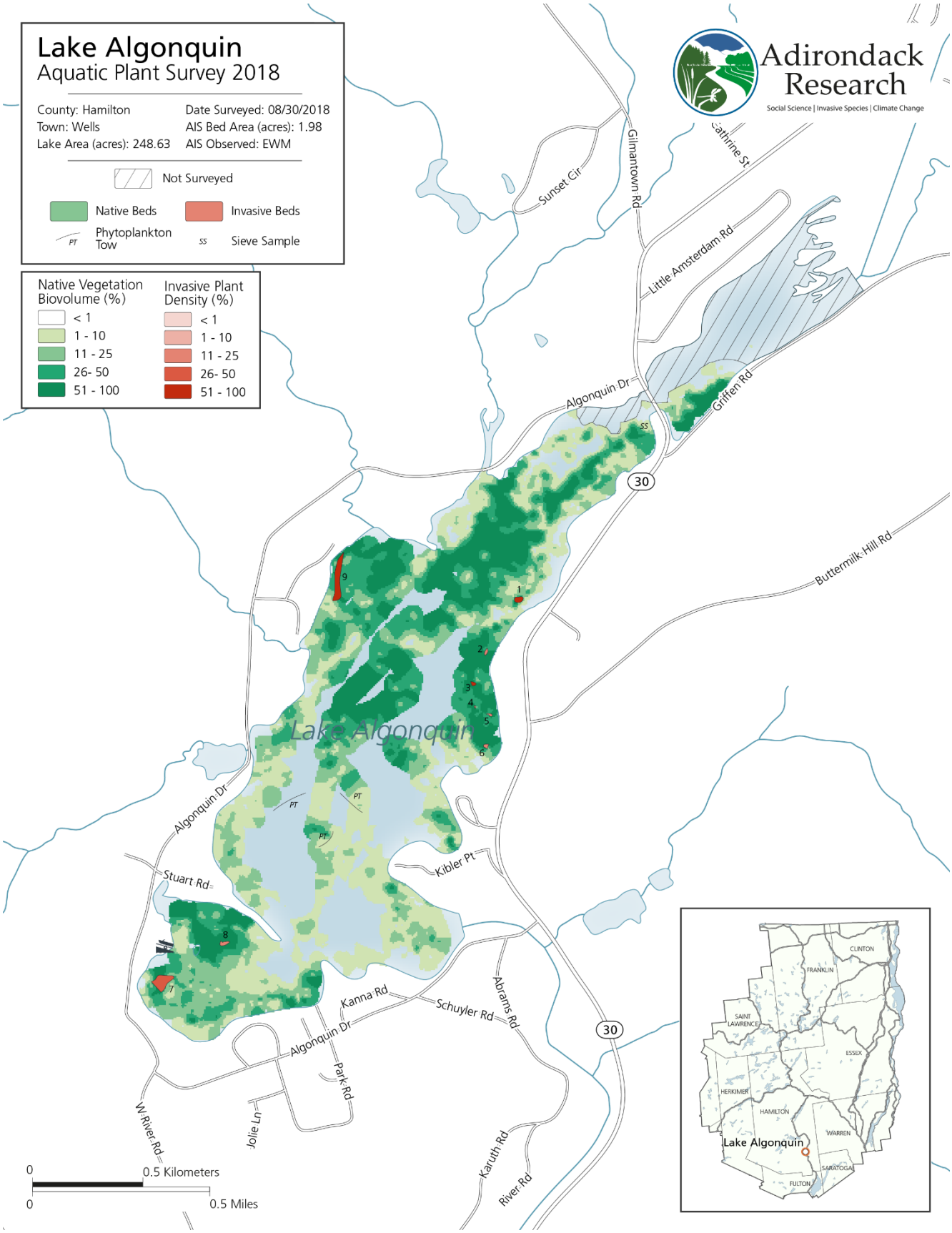
Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Lake Algonquin's shallow waters are full of native plant species, which can be found in abundance alongside the *Myriophyllum spicatum* beds. Native species found include: *Brasenia schreberi* (watershield), *Potamogeton natans* (floating leaf pondweed), *Utricularia vulgaris* (common bladderwort), *Vallisneria americana* (eelgrass), *Potamogeton robbinsii* (fern pondweed), *Nymphaea odorata* (white water lily), *Elodea nuttallii* (common waterweed), *Najas* spp. (naiad), *Nitella* spp., and *Potamogeton praelongus* (white-stem pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil				**Asian Clam**	**Spiny Waterflea**
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover	Present (Y/N)	Present (Y/N)
1	0.13	5,551	51 to 100		
2	0.05	2,194	11 to 25	No	No
3	0.05	2,381	51 to 100		
4	0.01	407	11 to 25		
5	0.03	1,363	11 to 25		
6	0.05	2,222	11 to 25		
7	0.72	31,453	26 to 50		
8	0.10	4,428	11 to 25		
9	0.85	37,074	51 to 100		


Lake Algonquin
Aquatic Plant Survey 2018
County: Hamilton
Town: Wells
Lake Area (acres): 248.63
Date Surveyed: 08/30/2018
AIS Bed Area (acres): 1.98
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Adirondack Research
Social Science | Invasive Species | Climate Change
Lake Algonquin
Gilmantown Rd
Sunset Cir
Little Amsterdam Rd
Griffen Rd
Algonquin Dr
Buttermilk Hill Rd
Stuart Rd
Kibler Pt
Kanna Rd
Schuyler Rd
Abrams Rd
Park Rd
Jolie Ln
W River Rd
Karuth Rd
River Rd
30
0
0.5 Kilometers
0
0.5 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Lake Algonquin

Lake Durant

Survey Date: July 24-26, 2018

Lake Description

Lake Durant is 307.76 acres. It is located in Indian Lake, Hamilton County and lies in the Upper Hudson watershed. The team launched at the Department of Environmental Conservation's Lake Durant Campground and the canoe put-in off Route 28. A motorboat was used for most of the lake and a canoe for the shallow sections.

Aquatic Invasive Plant Presence

Lake Durant's shallow waters, coupled with a low water level, revealed dense beds of *Myriophyllum heterophyllum* (variable-leaf milfoil) across large portions of the lake.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. The most common native plant found on Lake Durant was *Pontederia* spp. (pickerel weed). Other native species detected included: *Potamogeton gramineus* (variable pondweed), *Utricularia purpurea* (large purple bladderwort), *Vallisneria americana* (eelgrass), and *Brasenia schreberi* (watershield).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

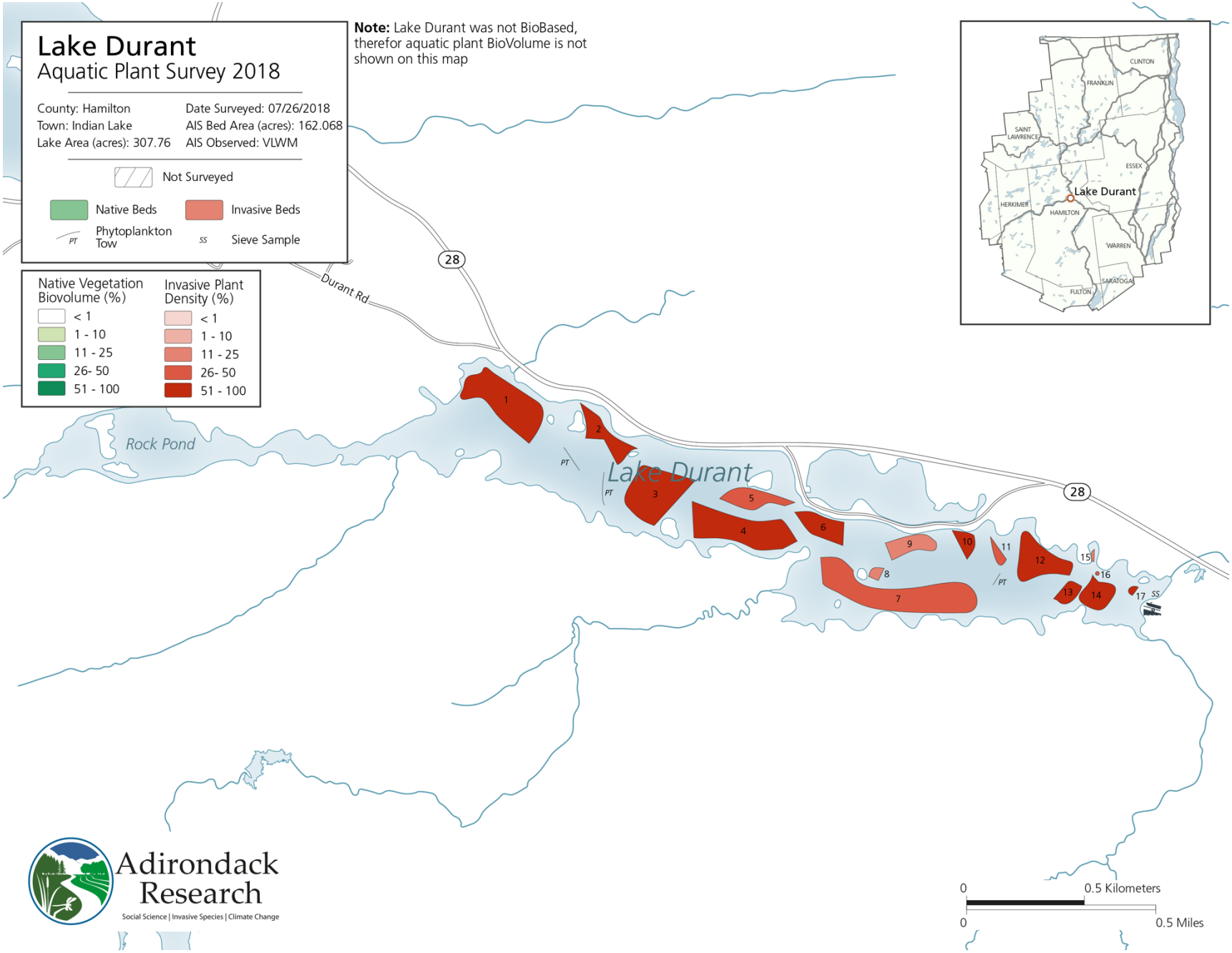
Note: The map of Lake Durant does not show BioBase data in this report due to the technology limitations described on page 13.

Invasive Species Percent Cover (See map on adjacent page)

Variable-Leaf Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	23.85	1,038,690	51 to 100
2	8.11	364,523	51 to 100
3	20.81	906,670	51 to 100
4	22.88	996,675	51 to 100
5	7.68	362,363	26 to 50
6	7.48	357,799	51 to 100
7	34.38	1,514,150	26 to 50
8	1.06	64,314	11 to 25
9	6.44	280,364	11 to 25

Variable-Leaf Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
10	3.05	132,909	51 to 100
11	1.52	66,414	26 to 50
12	11.28	491,529	51 to 100
13	3.18	147,914	51 to 100
14	6.88	299,788	51 to 100
15	0.26	12,456	11 to 25
16	0.03	1,379	26 to 50
17	0.50	21,735	51 to 100

Asian Clam	Spiny Waterflea
Present (Y/N)	Present (Y/N)
No	No


Lake Durant
Aquatic Plant Survey 2018
County: Hamilton
Town: Indian Lake
Lake Area (acres): 307.76
Date Surveyed: 07/26/2018
AIS Bed Area (acres): 162.068
AIS Observed: VLWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Note: Lake Durant was not BioBased, therefor aquatic plant BioVolume is not shown on this map
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Durant Rd
28
Rock Pond
Lake Durant
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Lake Durant
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.5 Kilometers
0
0.5 Miles

Lake Forest

Survey Date: August 7, 2018

Lake Description

Lake Forest is 30.66 acres. It is located in Lake Luzerne, Warren County and lies in the Upper Hudson watershed. The team launched the canoe at the Lake Association beach with permission.

Aquatic Invasive Plant Presence

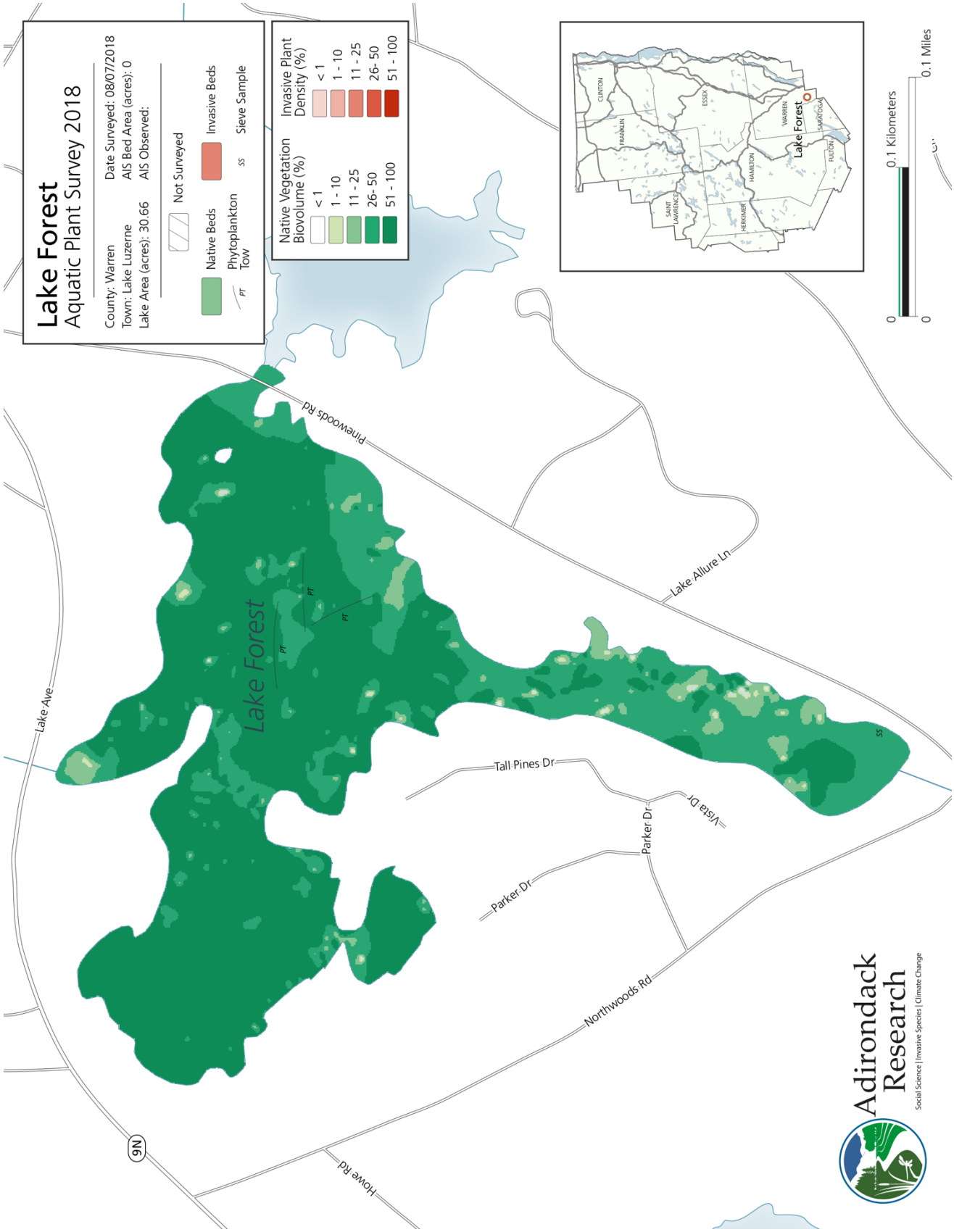
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within the lake included *Brasenia schreberi* (watershield), *Potamogeton amplifolius* (large leaf pondweed), *Nitella* spp., *Utricularia vulgaris* (common bladderwort), *Utricularia intermedia* (flat leaf bladderwort), *Elodia nuttallii* (slender waterweed), and *Potamogeton gramineus* (variable pondweed). Lake Forest is shallow, with plants covering the entire lake bottom.

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Lake Forest
Aquatic Plant Survey 2018
County: Warren
Town: Lake Luzerne
Lake Area (acres): 30.66
Date Surveyed: 08/07/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
PT
Sieve Sample
SS
Native Vegetation Biovolume (%)
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
ESSEX
WARREN
SARATOGA
FULTON
HAMILTON
HERKIMER
SAINT LAWRENCE
Lake Forest
0
0.1 Kilometers
0.1 Miles
Lake Forest
Pinewoods Rd
Lake Allure Ln
Lake Ave
Tall Pines Dr
Vista Dr
Parker Dr
Parker Dr
Northwoods Rd
Howe Rd
9N
Adirondack Research
Social Science | Invasive Species | Climate Change

Lake Luzerne

Survey Date: July 30, 2018

Lake Description

Lake Luzerne is 103.71 acres. It is located in the town of Lake Luzerne, Warren County and lies in the Upper Hudson watershed. The team launched at the ramp on Lake Avenue with special permission from the town supervisor.

Aquatic Invasive Plant Presence

There is active invasive *Myriophyllum spicatum* (Eurasian watermilfoil) management on Lake Luzerne. At the time of survey, the management team was removing *Myriophyllum spicatum* from the lake, near the southern shore. Nineteen beds of *Myriophyllum spicatum* were detected. Beds ranged in size from 159.9 square feet to 6,559 square feet and were moderately dense. *Potamogeton crispus* (curly-leaf pondweed) is another known invasive species in Lake Luzerne, though none was detected during this survey. *Potamogeton crispus* has a unique biology that may factor into detection. It is usually one of the first plants to emerge each spring, and by mid-June or July the plants typically have died off for the season.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native species detected in Lake Luzerne were: *Potamogeton amplifolius* (large leaf pondweed), *Brasenia schreberi* (watershield), *Utricularia intermedia* (flat-leaf bladderwort), *Elodea canadensis* (common waterweed), *Potamogeton robbinsii* (fern pondweed), *Najas* spp. (naiad), *Nitella* spp., *Myriophyllum sibiricum* (northern watermilfoil), and *Potamogeton gramineus* (variable pondweed).

Aquatic Invasive Animal Presence

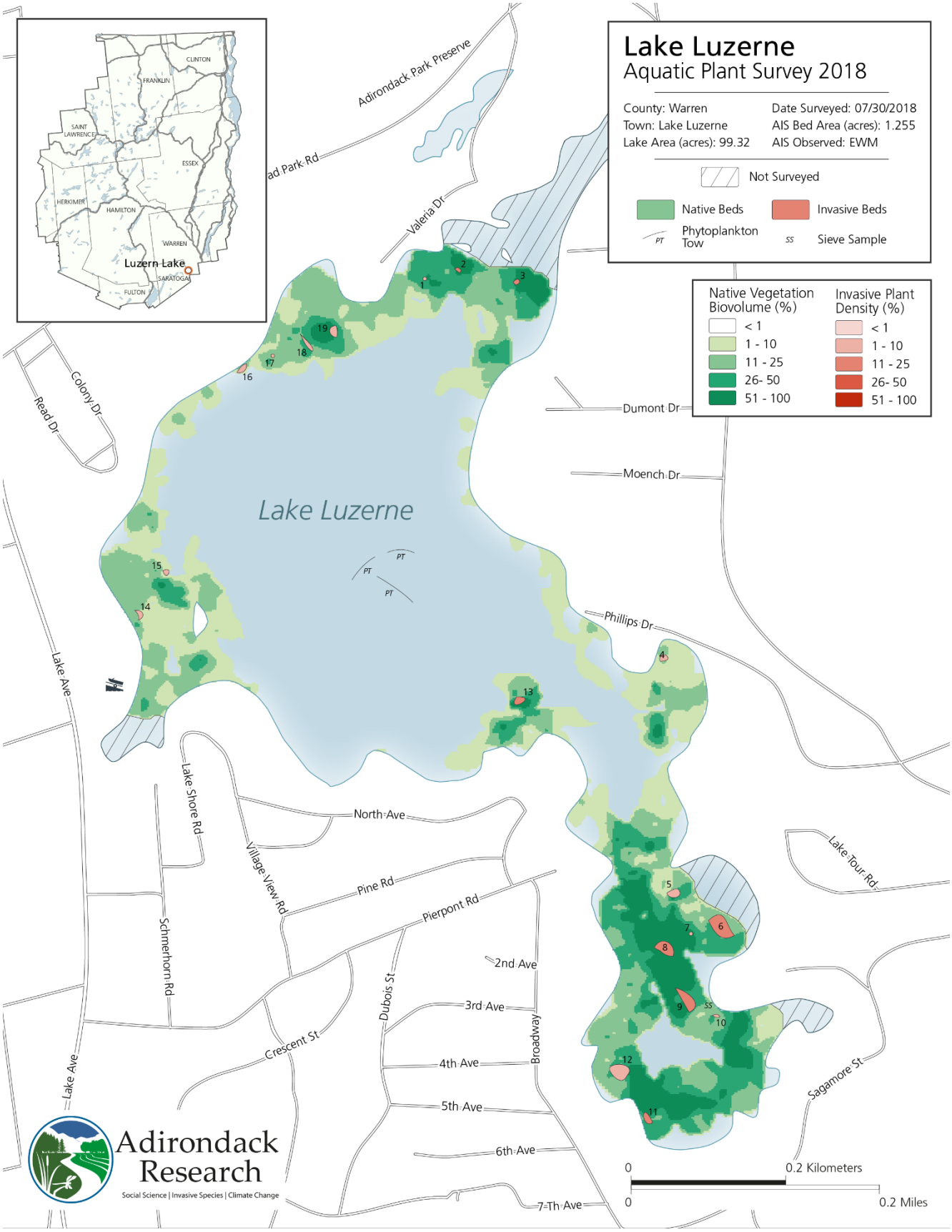
Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	0.001699	74	1 to 10
2	0.01	662	11 to 25
3	0.02	975	11 to 25
4	0.04	1,536	1 to 10
5	0.07	2,903	1 to 10
6	0.28	12,396	11 to 25
7	0.01	302	1 to 10
8	0.15	6,564	11 to 25
9	0.17	7,239	1 to 10
10	0.01	579	1 to 10
11	0.06	2,669	11 to 25

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
12	0.19	8,308	1 to 10
13	0.05	2,202	11 to 25
14	0.03	1,494	1 to 10
15	0.03	1,152	1 to 10
16	0.04	1,661	1 to 10
17	0.001142	50	1 to 10
18	0.03	1,506	1 to 10
19	0.04	1,661	1 to 10

Asian Clam	Spiny Waterflea
Present (Y/N)	Present (Y/N)
No	No


Lake Luzerne
Aquatic Plant Survey 2018
County: Warren
Town: Lake Luzerne
Lake Area (acres): 99.32
Date Surveyed: 07/30/2018
AIS Bed Area (acres): 1.255
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Luzern Lake
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Lake Luzerne
Adirondack Park Preserve
ad Park Rd
Valeria Dr
Colony Dr
Read Dr
Dumont Dr
Moench Dr
Phillips Dr
Lake Ave
Lake Shore Rd
North Ave
Village View Rd
Pine Rd
Pierpont Rd
Schmerhorn Rd
Crescent St
Dubois St
2nd Ave
3rd Ave
4th Ave
5th Ave
6th Ave
7-Th Ave
Broadway
Lake Tour Rd
Sagamore St
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.2 Kilometers
0
0.2 Miles

Lake Pleasant

Survey Date: August 16, 2018

Lake Description

Lake Pleasant is 1449.54 acres. It is located in the town of Lake Pleasant, Hamilton County and lies in the Sacandaga Watershed. The team launched at Lake Pleasant Marine on Route 8 just outside the village of Speculator.

Aquatic Invasive Plant Presence

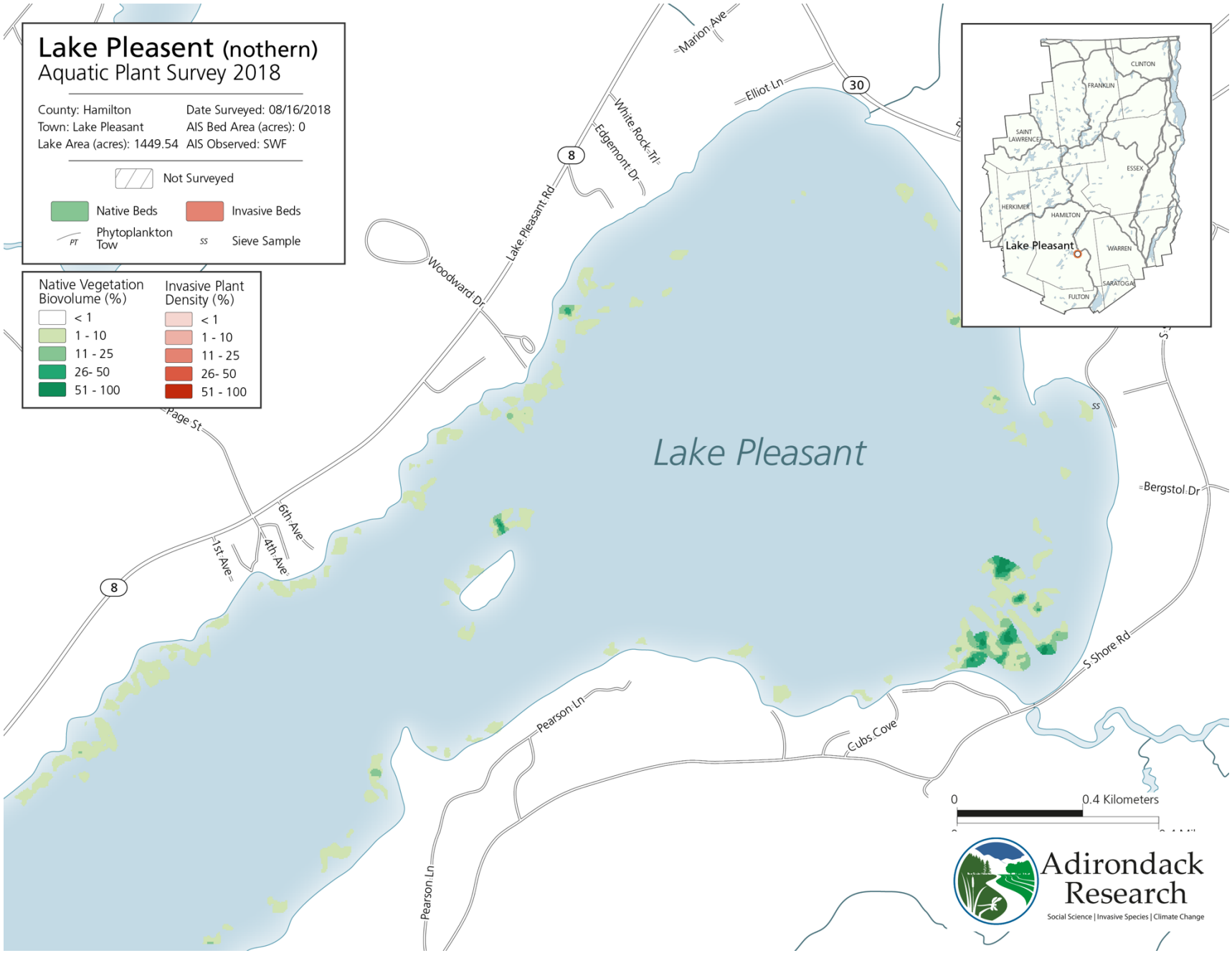
No invasive plants were detected.

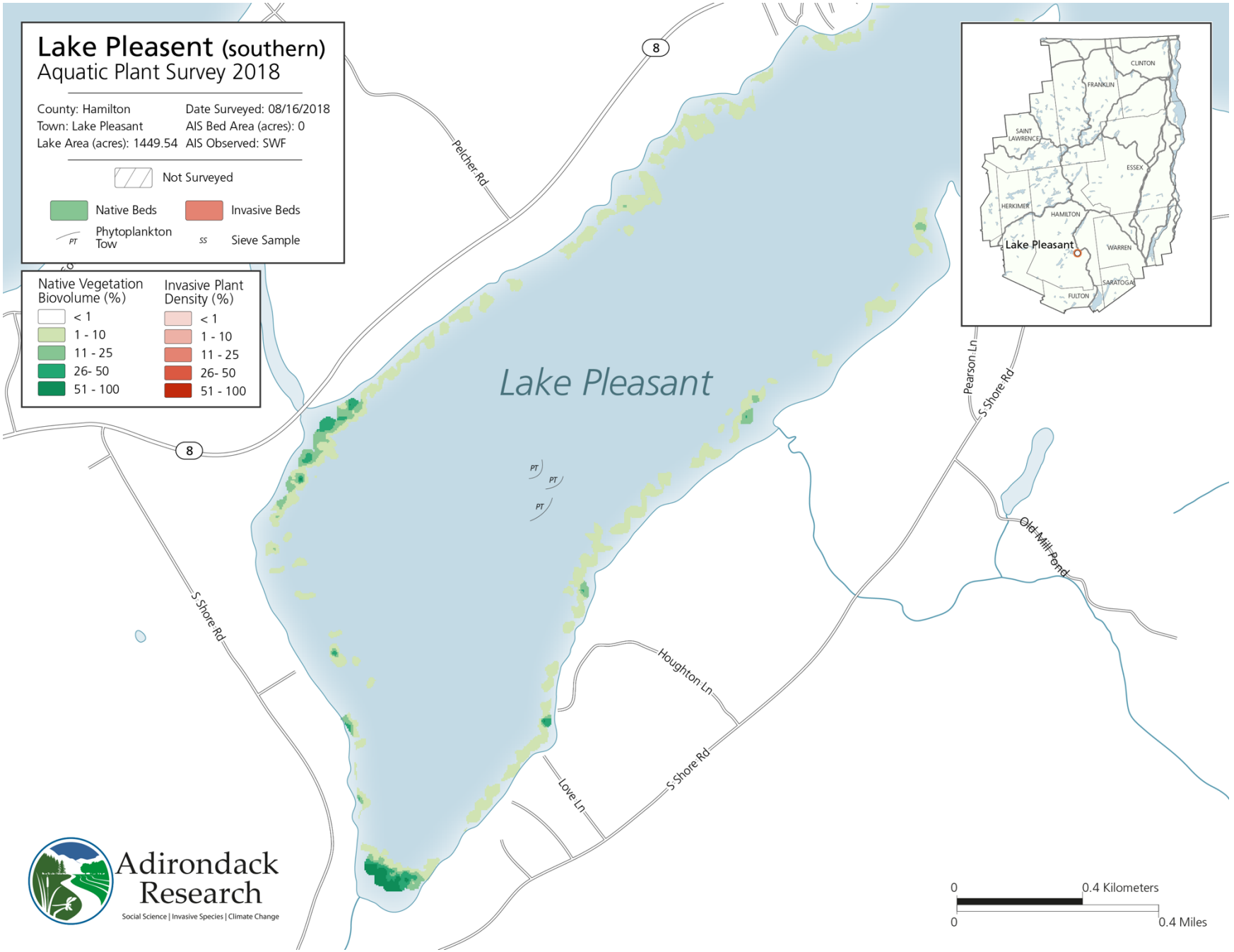
Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within the lake included *Brasenia schreberi* (watershield), *Potamogeton amplifolius* (large leaf pondweed), *Nitella* spp., *Elodea canadensis* (common waterweed), *Chara* spp., *Eriocaulon* spp., *Nymphoides cordata* (little floating heart), *Potamogeton natans* (floating leaf pondweed), *Utricularia vulgaris* (common bladderwort), *Vallisneria americana* (eelgrass), and *Potamogeton robbinsii* (fern pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were conducted with each returning *Bythotrephes longimanus* (spiny waterflea). *Bythotrephes longimanus* is an invasive zooplankton and has been documented in the lake since 2014.


Lake Pleasent (nothern)
Aquatic Plant Survey 2018
County: Hamilton
Town: Lake Pleasant
Lake Area (acres): 1449.54
Date Surveyed: 08/16/2018
AIS Bed Area (acres): 0
AIS Observed: SWF
Not Surveyed
Native Beds
Invasive Beds
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Lake Pleasant
Marion Ave
Elliot Ln
30
8
White Rock Trl
Edgemont Dr
Lake Pleasant Rd
Woodward Dr
Page St
1st Ave
4th Ave
6th Ave
SS
Bergstol Dr
S Shore Rd
Pearson Ln
Cubs Cove
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Lake Pleasant
0
0.4 Kilometers
Adirondack Research
Social Science | Invasive Species | Climate Change


Lake Pleasent (southern)
Aquatic Plant Survey 2018
County: Hamilton
Town: Lake Pleasant
Lake Area (acres): 1449.54
Date Surveyed: 08/16/2018
AIS Bed Area (acres): 0
AIS Observed: SWF
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Lake Pleasant
Pelcher Rd
S Shore Rd
Houghton Ln
Love Ln
Pearson Ln
Old Mill Pond
8
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.4 Kilometers
0
0.4 Miles

Lake Vanare

Survey Date: August 7, 2018

Lake Description

Lake Vanare is 35.84 acres. It is located in Lake Luzerne, Warren County and lies in the Upper Hudson watershed. The team launched a canoe from the Pine Point Cottages & Motel property.

Aquatic Invasive Plant Presence

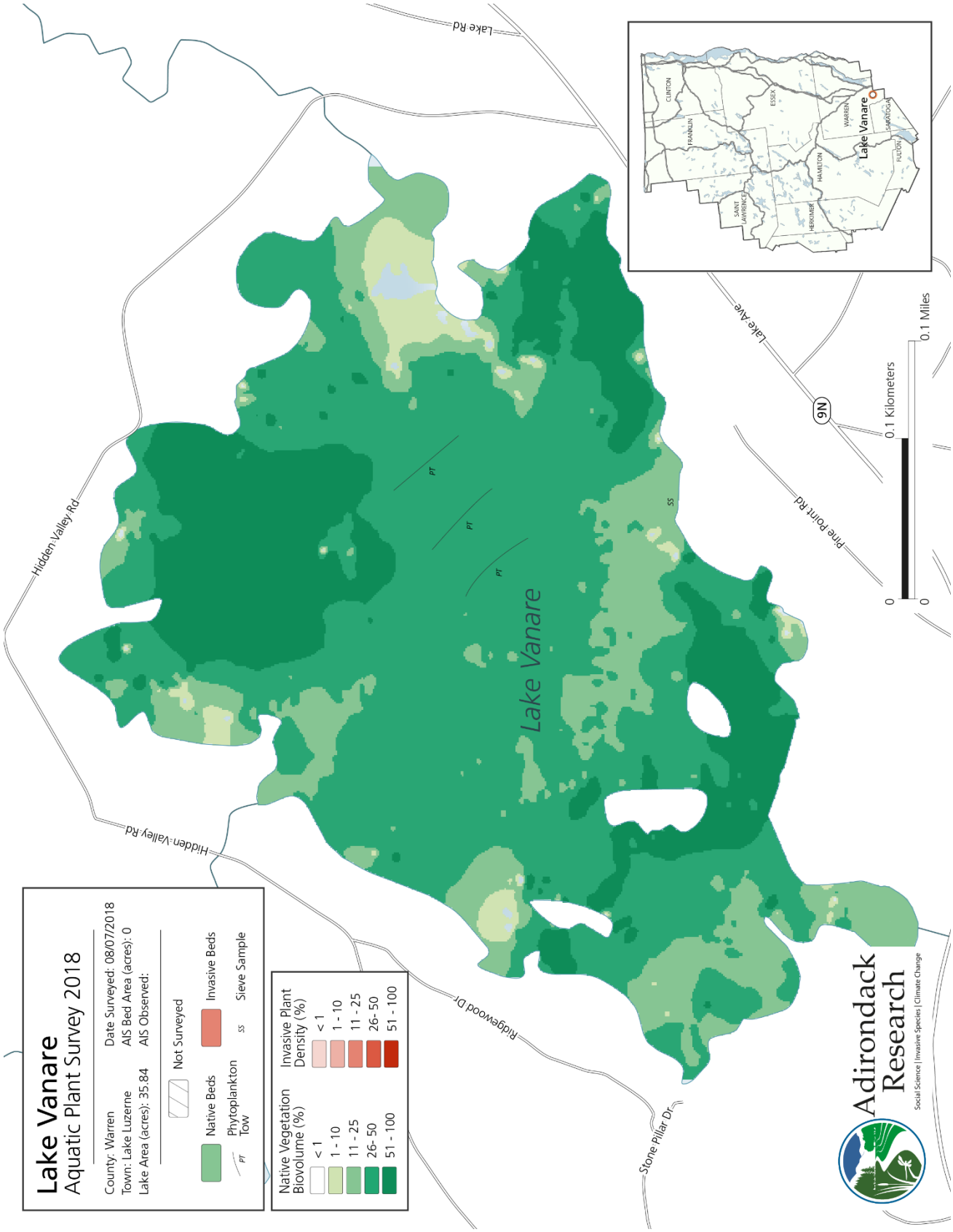
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within the lake include *Brasenia schreberi* (watershield), *Elodia nuttallii* (slender waterweed), *Lemnoideae* spp. (duckweed), *Potamogeton amplifolius* (large leaf pondweed), *Potamogeton gramineus* (variable pondweed), *Potamogeton robbinsii* (fern pondweed), *Utricularia vulgaris* (common bladderwort), and *Potamogeton illinoensis* (Illinois pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Lake Vanare
Aquatic Plant Survey 2018
County: Warren
Town: Lake Luzerne
Lake Area (acres): 35.84
Date Surveyed: 08/07/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
PT
SS
Sieve Sample
Native Vegetation Biovolume (%)
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Lake Vanare
Hidden Valley Rd
Lake Rd
Lake Ave
Pine Point Rd
Ridgewood Dr
Stone Pillar Dr
9N
0.1 Kilometers
0.1 Miles
0
0
CLINTON
ESSEX
FRANKLIN
WARREN
SARATOGA
HAMILTON
FULTON
SAINT LAWRENCE
HERKIMER
Adirondack Research
Social Science | Invasive Species | Climate Change

Lake Narrative

Loon Lake

Survey Dates: July 31, and August 22, 2018

Lake Description

Loon Lake is 547.16 acres. It is located in Chester, Warren County and lies in the Upper Hudson watershed. The team launched at the town launch on the southern-most shore of the lake.

Aquatic Invasive Plant Presence

There is active invasive *Myriophyllum spicatum* (Eurasian watermilfoil) management on Loon Lake. At the time of survey, the management team was removing *Myriophyllum spicatum* from the lake. Nine beds of *Myriophyllum spicatum* were detected. Beds were moderately dense. *Trapa natans* (water chestnut) is another AIS that has been historically found in Loon Lake. In 2015, a small infestation was detected by a contracted management team and APIPP has been assisting the lake association with management ever since. No *Trapa natans* was detected in 2018. *Potamogeton crispus* (curly-leaf pondweed) is another known invasive species in Loon Lake, though none was detected during this survey. *Potamogeton crispus* has a unique biology that may factor into detection. It is usually one of the first plants to emerge each spring, and by mid-June or July the plants typically have died off for the season.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native species detected in Loon Lake included: *Potamogeton amplifolius* (large leaf pondweed), *Brasenia schreberi* (watershield), *Elodea canadensis* (common waterweed), *Potamogeton robbinsii* (fern pondweed), *Nitella* spp., *Myriophyllum sibiricum* (northern watermilfoil), *Chara* spp., *Vallisneria americana* (eelgrass), and *Nuphar variegata* (bullhead pond lily).

Aquatic Invasive Animal Presence

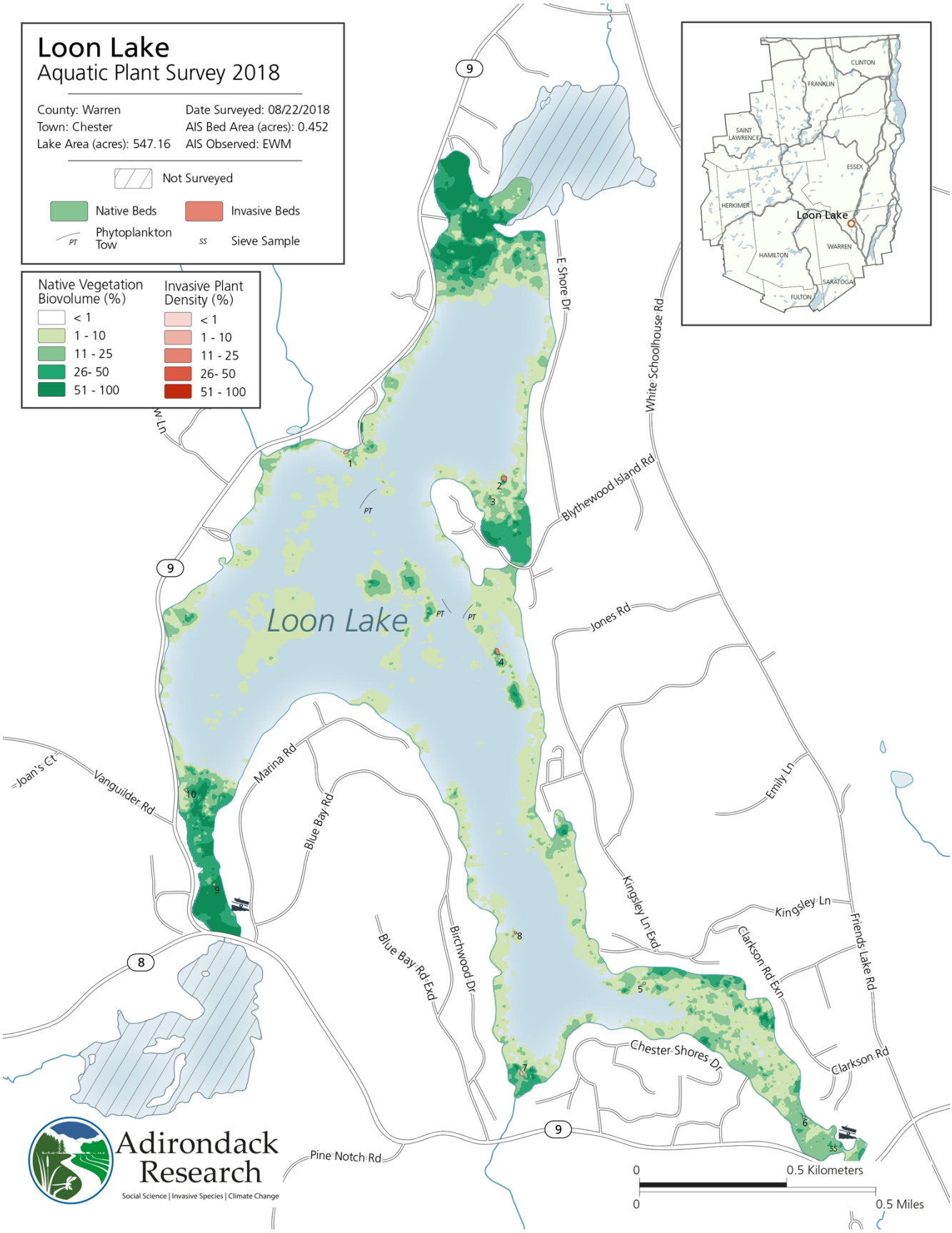
Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

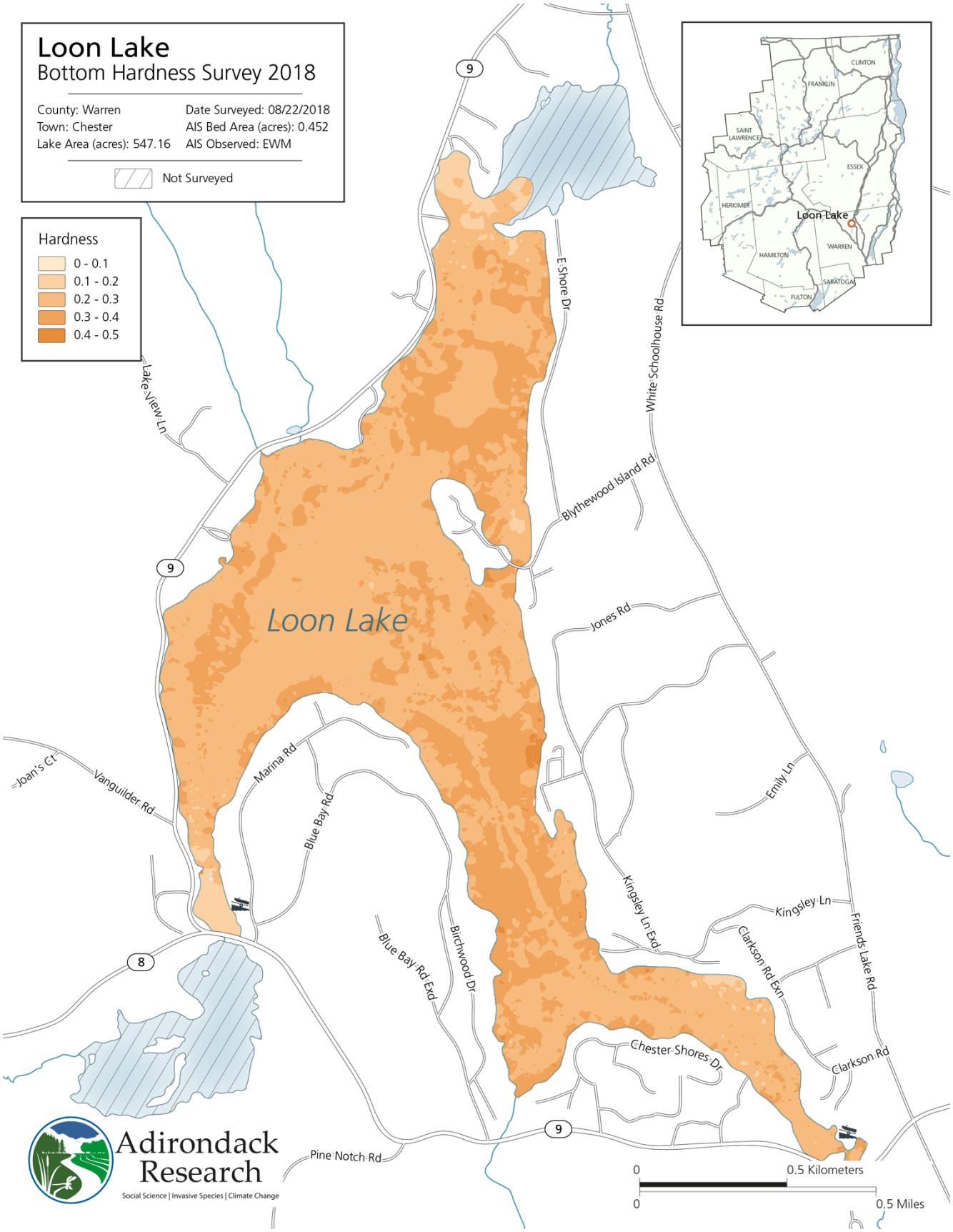
Invasive Species Percent Cover (See map on adjacent page)

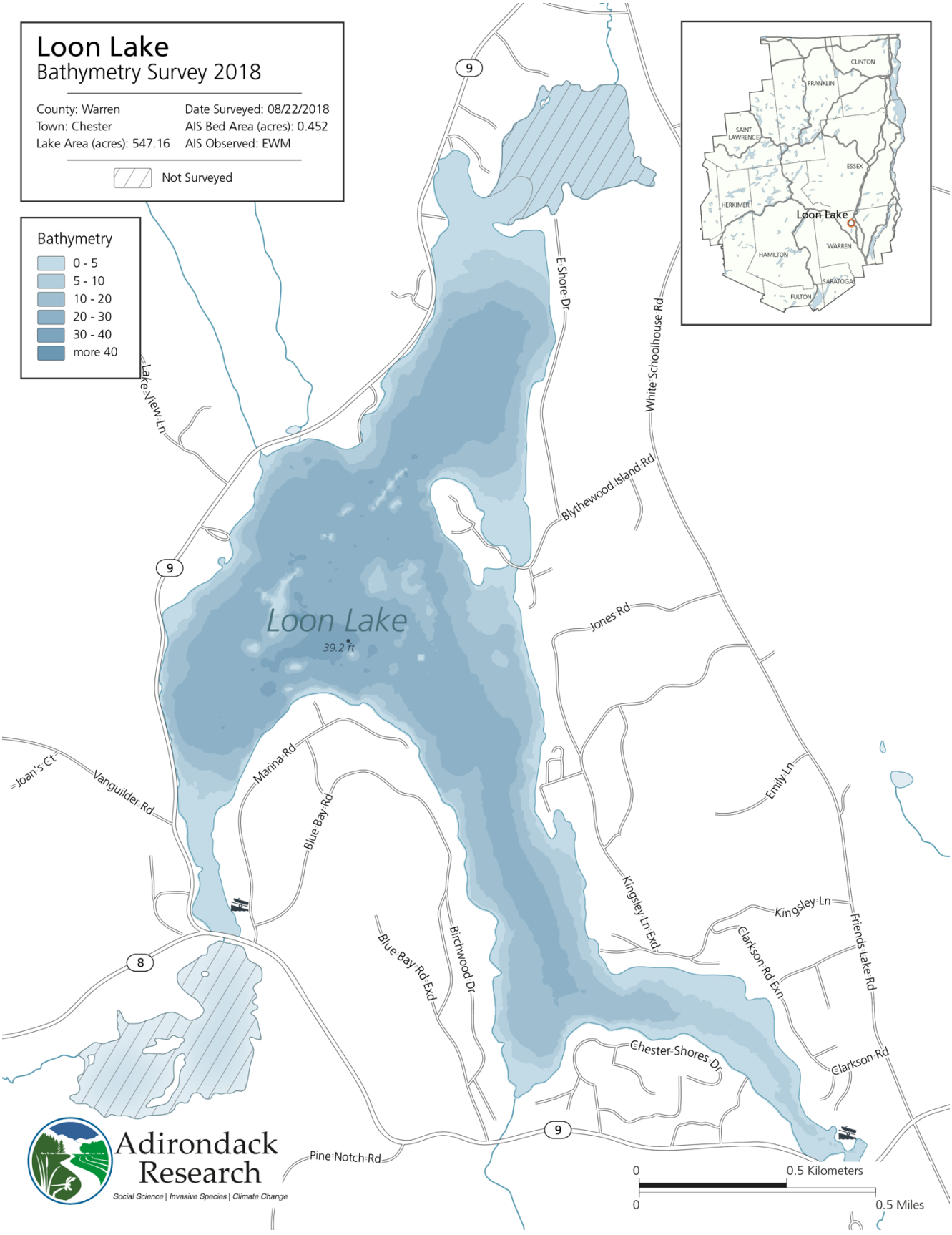
Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	0.08	3,391	1 to 10
2	0.15	6,454	11 to 25
3	0.000007	0.308097	1 to 10
4	0.14	6,008	11 to 25
5	0.000004	0.154658	1 to 10
6	0.01	326	1 to 10
7	0.10	4,445	1 to 10
8	0.02	895	11 to 25

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
9	0.01	366	1 to 10

Asian Clam	Spiny Waterflea
Present (Y/N)	Present (Y/N)
No	No


Loon Lake
Aquatic Plant Survey 2018
County: Warren
Town: Chester
Lake Area (acres): 547.16
Date Surveyed: 08/22/2018
AIS Bed Area (acres): 0.452
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
Loon Lake
HAMILTON
WARREN
SARATOGA
FULTON
Loon Lake
E Shore Dr
White Schoolhouse Rd
Blythewood Island Rd
Jones Rd
Marina Rd
Joan's Ct
Vanguilder Rd
Blue Bay Rd
Blue Bay Rd Exd
Birchwood Dr
Kingsley Ln Exd
Kingsley Ln
Emily Ln
Clarkson Rd Exn
Friends Lake Rd
Chester Shores Dr
Clarkson Rd
Pine Notch Rd
9
8
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.5 Kilometers
0
0.5 Miles


Loon Lake
Bottom Hardness Survey 2018
County: Warren
Town: Chester
Lake Area (acres): 547.16
Date Surveyed: 08/22/2018
AIS Bed Area (acres): 0.452
AIS Observed: EWM
Not Surveyed
Hardness
0 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
Loon Lake
WARREN
HAMILTON
SARATOGA
FULTON
Loon Lake
E Shore Dr
White Schoolhouse Rd
Lake View Ln
Blythewood Island Rd
Jones Rd
Joan's Ct
Vanguilder Rd
Marina Rd
Blue Bay Rd
Blue Bay Rd Exd
Birchwood Dr
Kingsley Ln Exd
Kingsley Ln
Emily Ln
Clarkson Rd Exn
Friends Lake Rd
Chester Shores Dr
Clarkson Rd
Pine Notch Rd
9
8
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.5 Kilometers
0
0.5 Miles


Loon Lake
Bathymetry Survey 2018
County: Warren
Town: Chester
Lake Area (acres): 547.16
Date Surveyed: 08/22/2018
AIS Bed Area (acres): 0.452
AIS Observed: EWM
Not Surveyed
Bathymetry
0 - 5
5 - 10
10 - 20
20 - 30
30 - 40
more 40
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
Loon Lake
HAMILTON
WARREN
SARATOGA
FULTON
Loon Lake
39.2 ft
9
8
E Shore Dr
White Schoolhouse Rd
Lake View Ln
Blythewood Island Rd
Jones Rd
Joan's Ct
Vanguilder Rd
Marina Rd
Blue Bay Rd
Blue Bay Rd Ext
Birchwood Dr
Kingsley Ln Ext
Kingsley Ln
Emily Ln
Clarkson Rd Ext
Friends Lake Rd
Clarkson Rd
Chester Shores Dr
Pine Notch Rd
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.5 Kilometers
0
0.5 Miles

Mason Lake

Survey Date: August 27, 2018

Lake Description

Mason Lake is 92.89 acres. It is located in the town of Lake Pleasant, Hamilton County and lies in the Upper Hudson Watershed. The team launched at the hand launch off Jessup River Road.

Aquatic Invasive Plant Presence

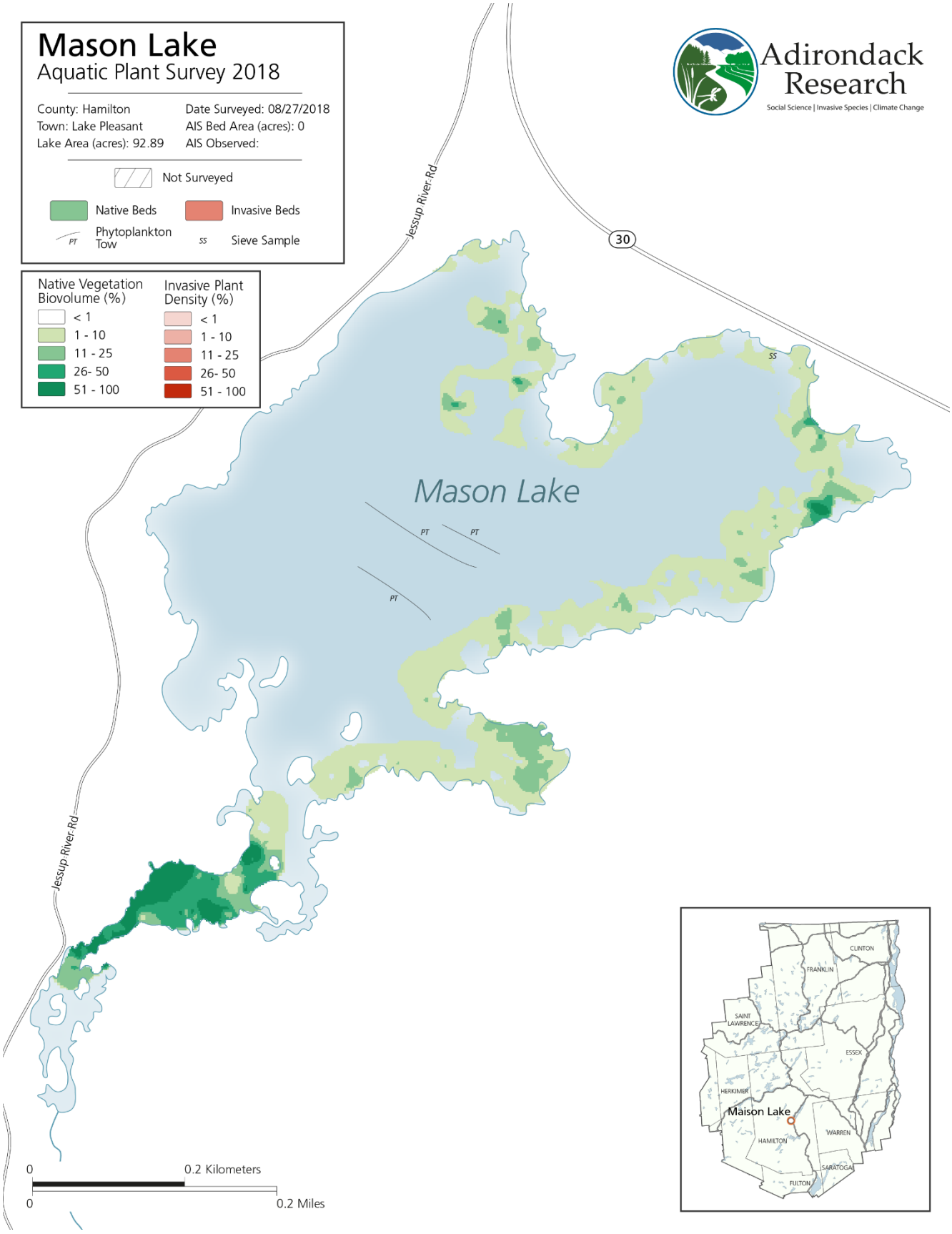
No aquatic invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Commonly found native plants in Mason Lake included: *Brasenia schreberi* (watershield), *Eriocaulon* sp. (pipewort), *Nymphaea odorata* (white water lily), *Utricularia purpurea* (large purple bladderwort), *Nitella* spp., *Sagittaria graminea* (grass-leaved arrowhead), and *Utricularia vulgaris* (common bladderwort).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Mason Lake
Aquatic Plant Survey 2018
County: Hamilton
Town: Lake Pleasant
Lake Area (acres): 92.89
Date Surveyed: 08/27/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Adirondack Research
Social Science | Invasive Species | Climate Change
Jessup River Rd
30
Mason Lake
PT
PT
PT
SS
Jessup River Rd
0
0.2 Kilometers
0
0.2 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
Maison Lake
HAMILTON
WARREN
SARATOGA
FULTON

Lake Narrative

North Pond

Survey Date: August 21, 2018

Lake Description

North Pond is 19.79 acres. It is located in the town of Hague, Warren County and lies in the Lake Champlain Watershed. The team launched at the roadside hand launch off Route 8.

Aquatic Invasive Plant Presence

A total of seven invasive *Myriophyllum spicatum* (Eurasian watermilfoil) plant beds were mapped. *Myriophyllum spicatum* was detected in North Pond in 2006. Beds ranged from a single plant to dense monocultures.

Native Plant Biota

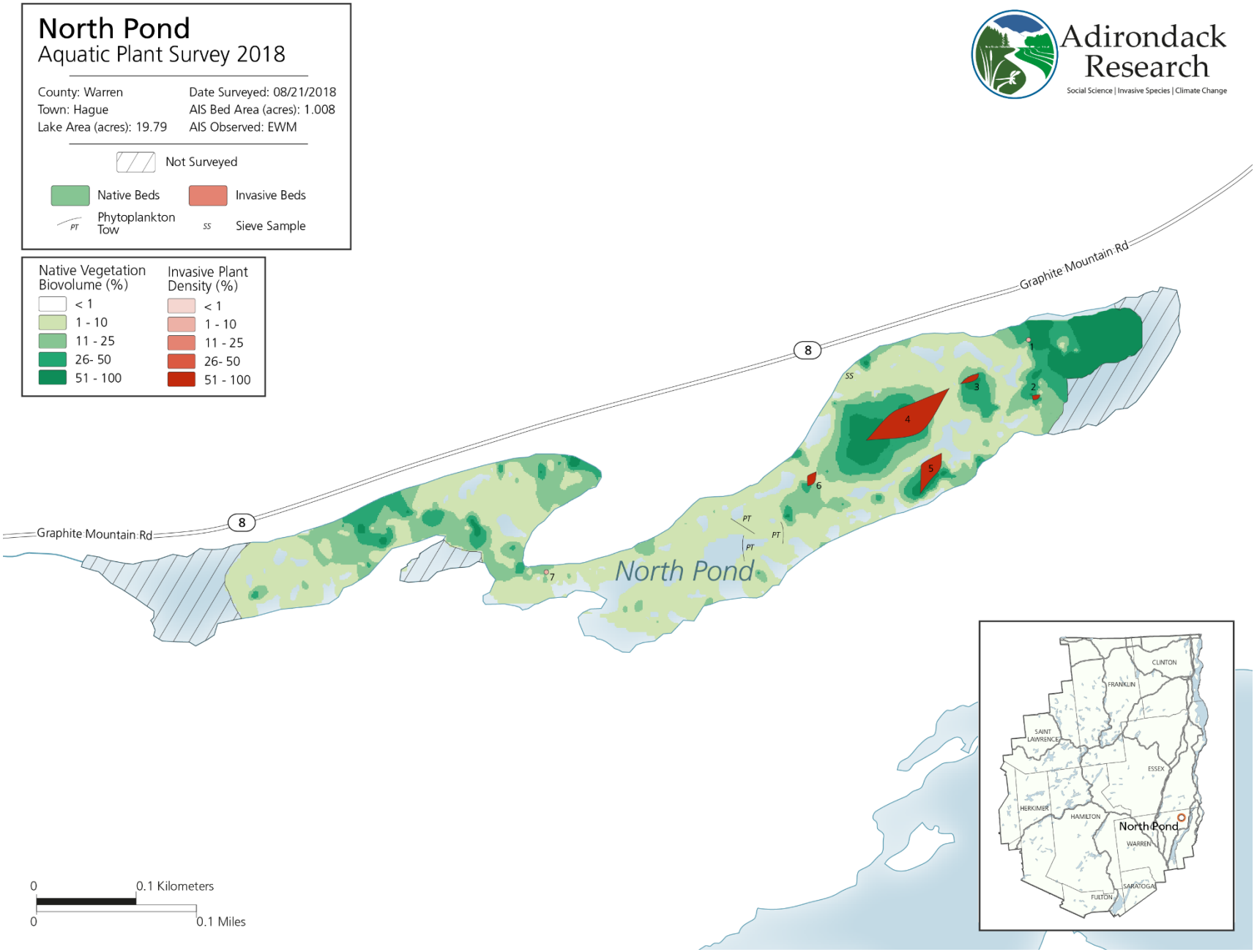
Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native species included: *Brasenia schreberi* (watershield), *Nuphar variegata* (white water lily), and *Potamogeton amplifolius* (large leaf pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil				**Asian Clam**	**Spiny Waterflea**
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover	Present (Y/N)	Present (Y/N)
1	0.0020	90	1 to 10		
2	0.01	521	51 to 100	No	No
3	0.04	1,654	51 to 100		
4	0.72	31,259	51 to 100		
5	0.20	8,662	51 to 100		
6	0.04	1,694	51 to 100		
7	0.0002	8	1 to 10		



Adirondack Research
Social Science | Invasive Species | Climate Change

Oliver Pond

Survey Date: June 27, 2018

Lake Description

Oliver Pond is 44.53 acres. It is located in the town of Schroon, Essex County and lies in the Upper Hudson watershed. The team launched at the hand launch off of County Road 24 (Hoffman Road).

Aquatic Invasive Plant Presence

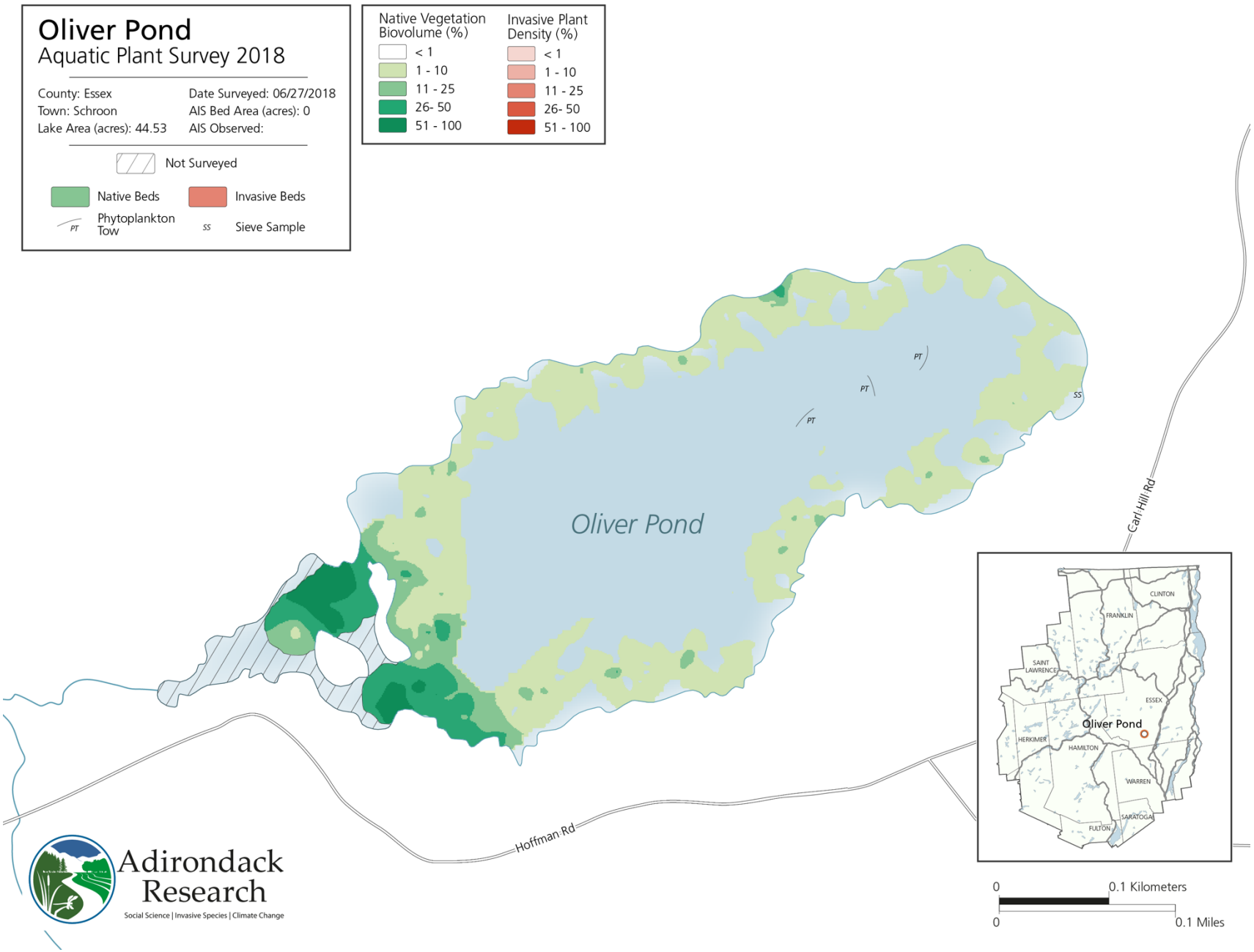
No aquatic invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. *Brasenia schreberi* (watershield) dotted the perimeter in shallow water. Other native species documented included *Nymphaea odorata* (white water lily), *Nuphar variegata* (bullhead pond lily), and *Utricularia purpurea* (large purple bladderwort), which formed thick mats that covered a large area of the western side of the lake.

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Oliver Pond
Aquatic Plant Survey 2018
County: Essex
Town: Schroon
Lake Area (acres): 44.53
Date Surveyed: 06/27/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Oliver Pond
Carl Hill Rd
Hoffman Rd
PT
SS
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Oliver Pond
0
0.1 Kilometers
0
0.1 Miles
Adirondack Research
Social Science | Invasive Species | Climate Change

Lake Narrative

Paradox Lake

Survey Date: July 9 & 11, 2018

Lake Description

Paradox Lake is 931.60 acres. It is located in the town of Schroon, Essex County and lies in the Upper Hudson watershed. The team launched at the Department of Environmental Conservation's Paradox Pond Campground, located off Route 74.

Aquatic Invasive Plant Presence

There is active invasive milfoil (*Myriophyllum spicatum*) management on Paradox Lake. At the time of survey, the management team had already removed much of the *Myriophyllum spicatum* (Eurasian watermilfoil) from the lake. One bed was detected where management had not yet occurred. *Potamogeton crispus* (curly leaf pondweed) is another known invasive species in Paradox Lake, though none was detected during this survey. *Potamogeton crispus* has a unique biology that may factor into detection. It is usually one of the first plants to emerge each spring, and by mid-June or July the plants typically have died off for the season. *Myriophyllum heterophyllum* (variable-leaf milfoil) has also been reported in Paradox Lake, though its presence has not been confirmed and the team did not detect it in 2018.

Native Plant Biota

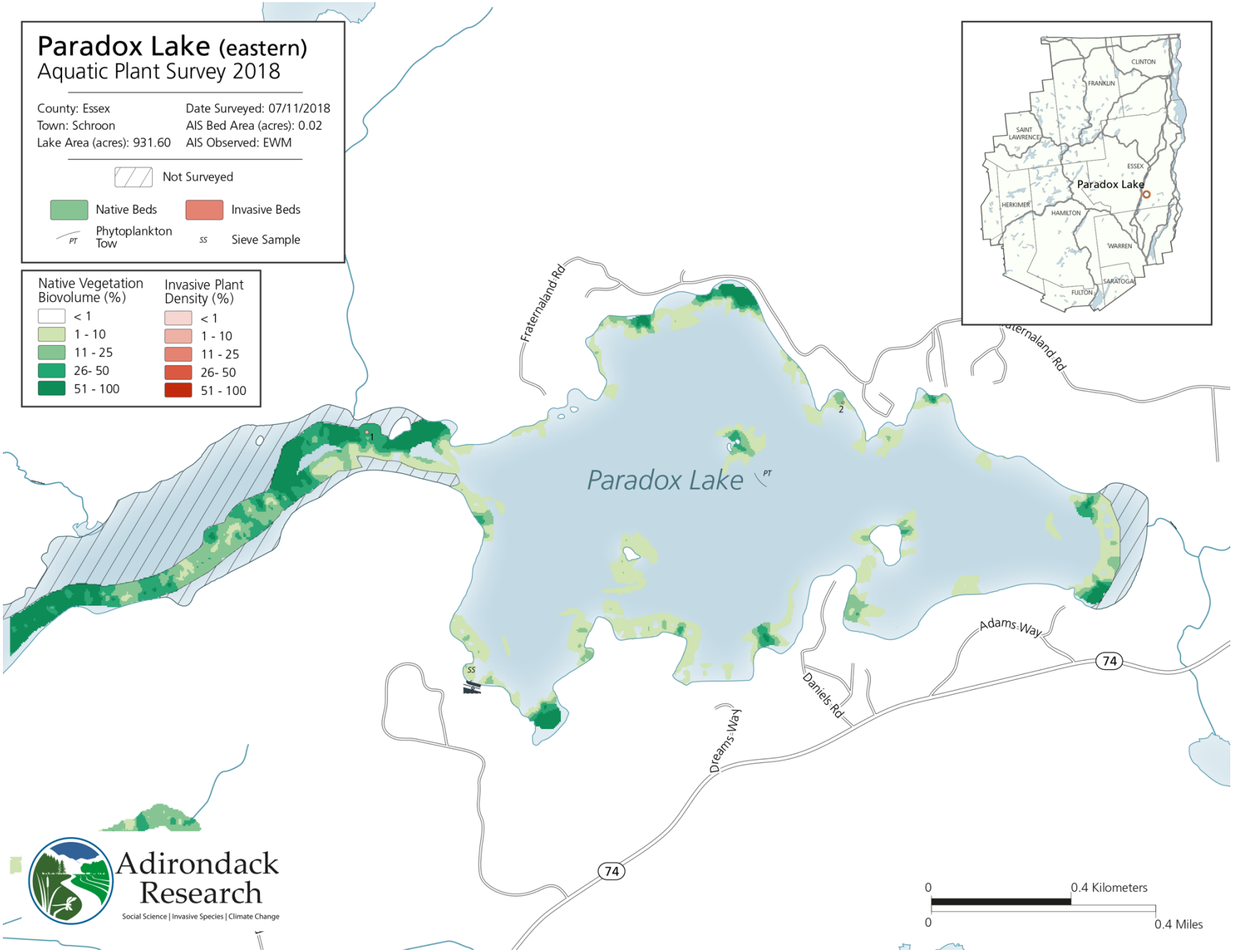
Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. The East and West lake is separated by a shallow channel called The Narrows. Deep water can be found along much of the shoreline, leaving little room for plants, but vegetation was found in most bays or coves. Near the boat launch, beds of *Potamogeton robbinsii* (fern pondweed), *Potamogeton praelongus* (white stemmed pondweed), and *Utricularia vulgaris* (common bladderwort) were found. *Potamogeton praelongus* was also detected along the southwestern shore of Crawford Island, along the northern shore of the east lake, and along the northern, western, and southern shore of the west lake. Other species found in the lake included: *Potamogeton amplifolius* (large leaf pondweed), *Potamogeton perfoliatus* (clasping leaf pondweed), *Nymphaea odorata* (white water lily), *Brasenia schreberi* (watershield), *Nuphar variegata* (bullhead pond lily), and *Chara* spp.

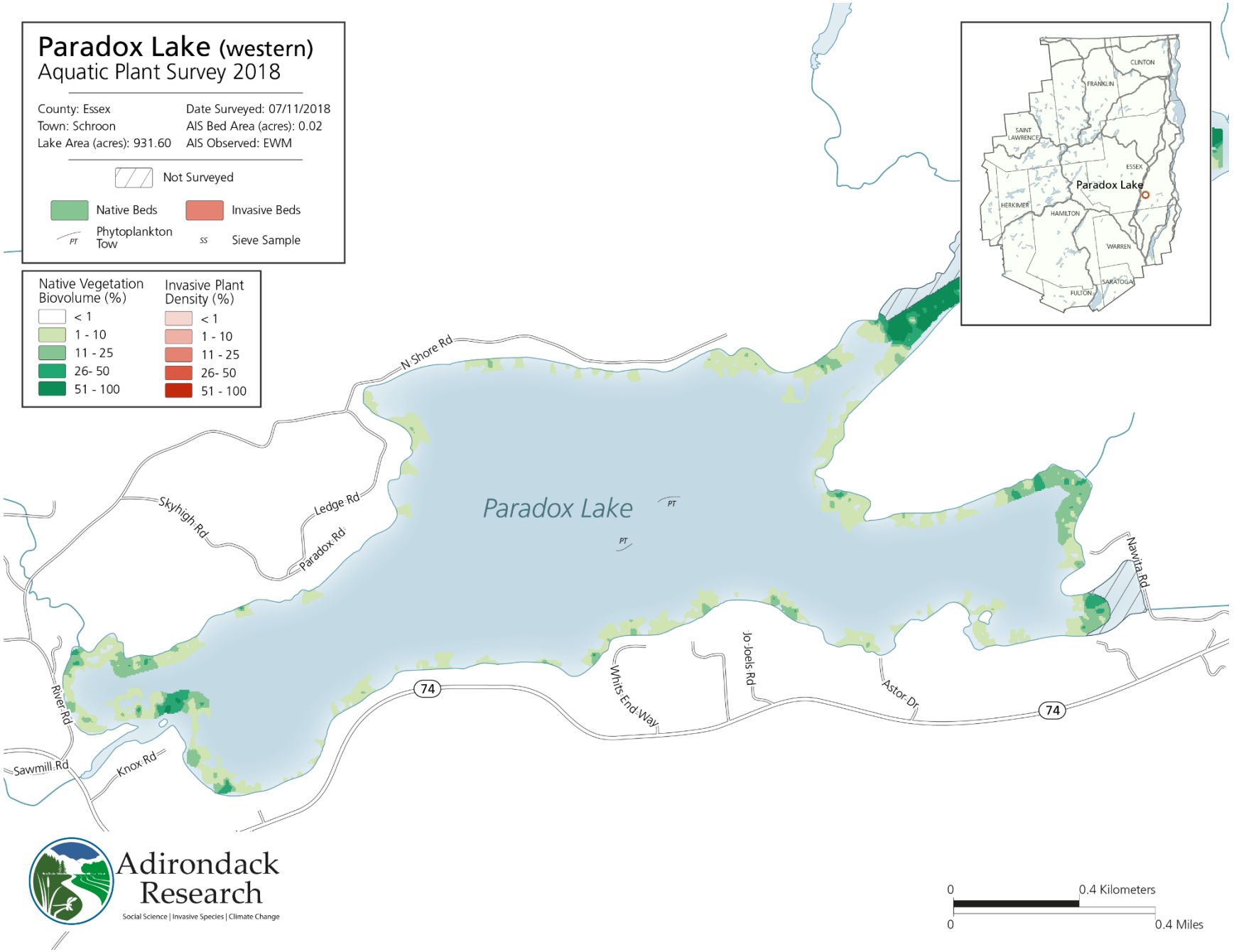
Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil				**Asian Clam**	**Spiny Waterflea**
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover	Present (Y/N)	Present (Y/N)
1	0.05	15	1 to 10	No	No
2	0.02	760	11 to 25		


Paradox Lake (eastern)
Aquatic Plant Survey 2018
County: Essex
Town: Schroon
Lake Area (acres): 931.60
Date Surveyed: 07/11/2018
AIS Bed Area (acres): 0.02
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Paradox Lake
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Fraternaland Rd
Paradox Lake
PT
1
2
SS
Adams Way
74
Daniels Rd
Dreams Way
74
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.4 Kilometers
0
0.4 Miles


Paradox Lake (western)
Aquatic Plant Survey 2018
County: Essex
Town: Schroon
Lake Area (acres): 931.60
Date Surveyed: 07/11/2018
AIS Bed Area (acres): 0.02
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Paradox Lake
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
N Shore Rd
Skyhigh Rd
Ledge Rd
Paradox Rd
Paradox Lake
PT
Nawita Rd
Jo Joels Rd
Whits End Way
Astor Dr
74
River Rd
Sawmill Rd
Knox Rd
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.4 Kilometers
0
0.4 Miles

Pine Lake

Survey Date: September 5, 2018

Lake Description

Pine Lake is 166.36 acres. It is located in the town of Caroga, Fulton County and lies in the Mohawk Watershed. The team launched at the public hand launch at the end of Pine Lake Road.

Aquatic Invasive Plant Presence

No invasive plants were detected.

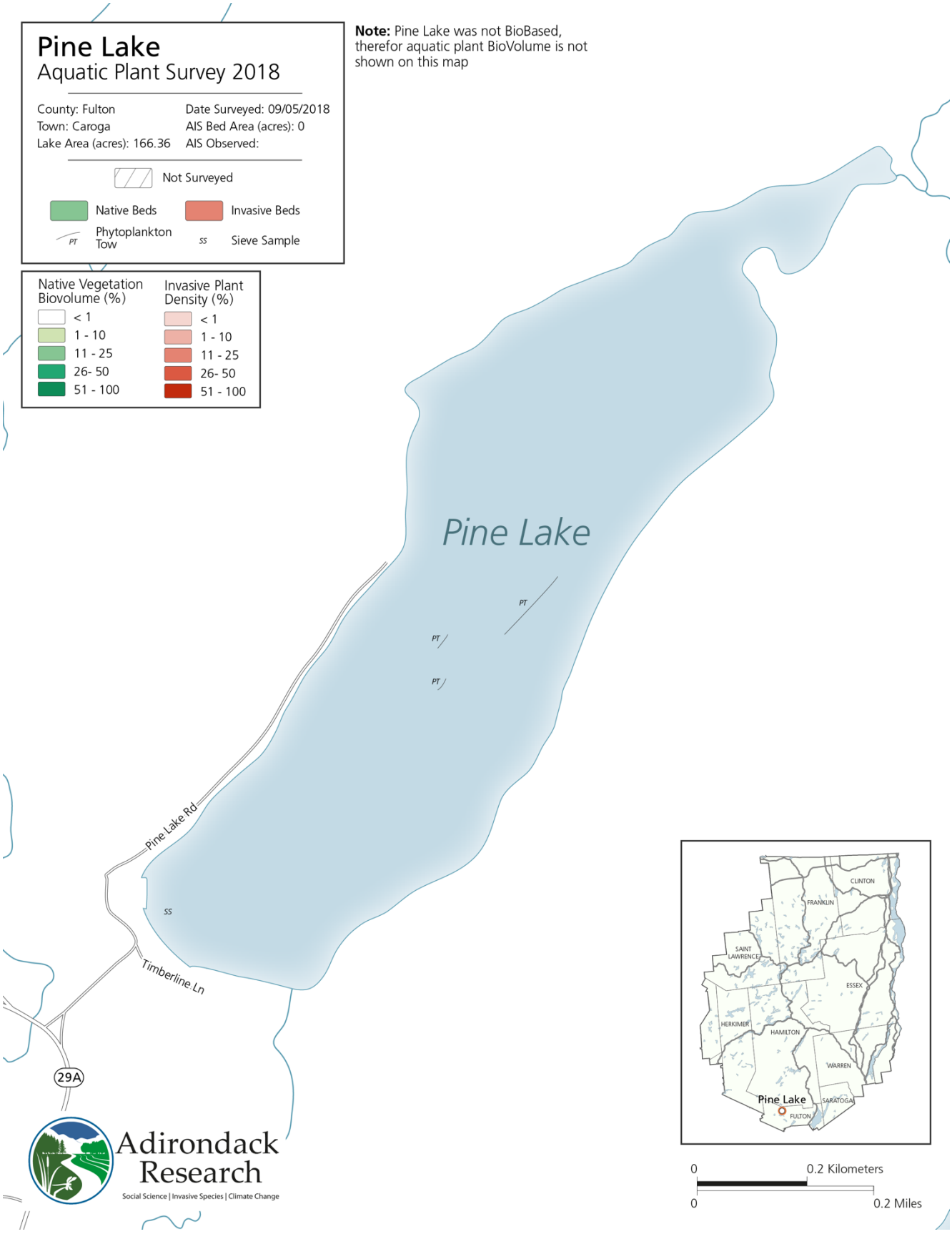
Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Among the native plant species identified were: *Brasenia schreberi* (watershield), *Eriocaulon* spp. (pipewort), *Nuphar variegata* (bullhead pond lily), *Nymphaea odorata* (white water lily), *Nymphoides cordata* (little floating heart), *Potamogeton natans* (floating leaf pondweed), *Utricularia vulgaris* (common bladderwort), *Utricularia purpurea* (large purple bladderwort), and *Eleocharis parvula* (little headed spikesedge).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Note: The map of Pine Lake does not show BioBase data in this report due to the technology limitations described on page 13.


Pine Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Caroga
Lake Area (acres): 166.36
Date Surveyed: 09/05/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
PT
Phytoplankton Tow
SS
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Note: Pine Lake was not BioBased, therefor aquatic plant BioVolume is not shown on this map
Pine Lake
PT
PT
PT
SS
Pine Lake Rd
Timberline Ln
29A
Adirondack Research
Social Science | Invasive Species | Climate Change
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
Pine Lake
SARATOGA
FULTON
0
0.2 Kilometers
0
0.2 Miles

Piseco Lake

Survey Date: August 28, 2018

Lake Description

Piseco Lake is 2805.16 acres. It is located in the town of Piseco, Hamilton County and lies in the Sacandaga Watershed. The team launched at the Department of Environmental Conservation's Little Sand Point Campground.

Aquatic Invasive Plant Presence

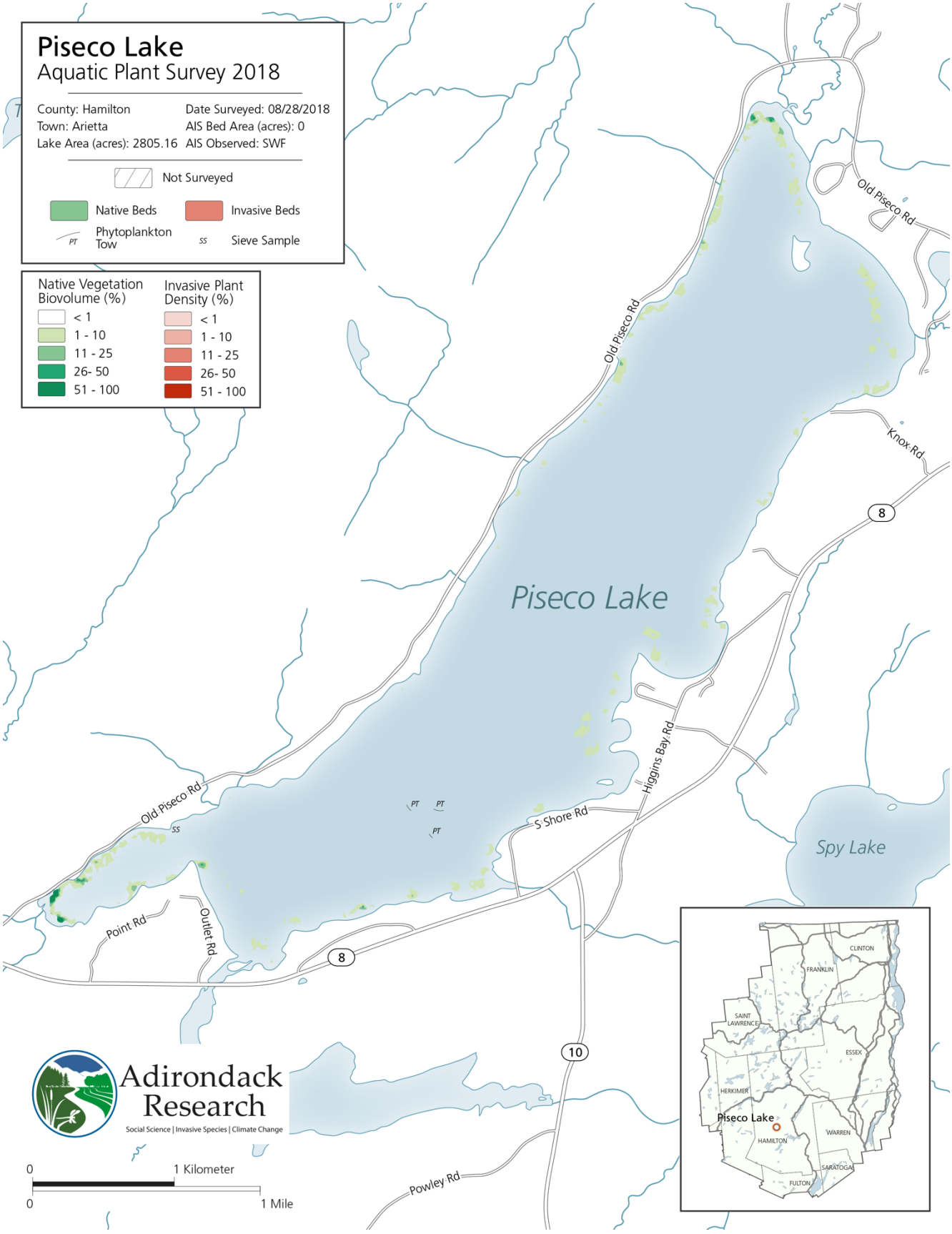
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within the lake included: *Brasenia schreberi* (watershield), *Eriocaulon* spp. (pipewort), *Potamogeton natans* (floating leaf pondweed), *Utricularia vulgaris* (common bladderwort), *Vallisneria americana* (eelgrass), *Potamogeton robbinsii* (fern pondweed), *Ceratophyllum demersum* (coontail), and *Nymphaea odorata* (white water lily).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were conducted with and each returning *Bythotrephes longimanus* (Spiny waterflea). *Bythotrephes longimanus* is an invasive zooplankton and has been documented in the lake since 2014.


Piseco Lake
Aquatic Plant Survey 2018
County: Hamilton
Town: Arietta
Lake Area (acres): 2805.16
Date Surveyed: 08/28/2018
AIS Bed Area (acres): 0
AIS Observed: SWF
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Piseco Lake
Spy Lake
Old Piseco Rd
Knox Rd
Higgins Bay Rd
S Shore Rd
Point Rd
Outlet Rd
Powley Rd
8
10
PT
SS
Adirondack Research
Social Science | Invasive Species | Climate Change
0
1 Kilometer
0
1 Mile
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
Piseco Lake
HAMILTON
WARREN
SARATOGA
FULTON

Pleasant Lake

Survey Date: July 3, 2018

Lake Description

Pleasant Lake is 242.70 acres. It is located in the town of Stratford, Fulton County and lies in the Mohawk watershed. The team launched at a private residence on the eastern shore.

Aquatic Invasive Plant Presence

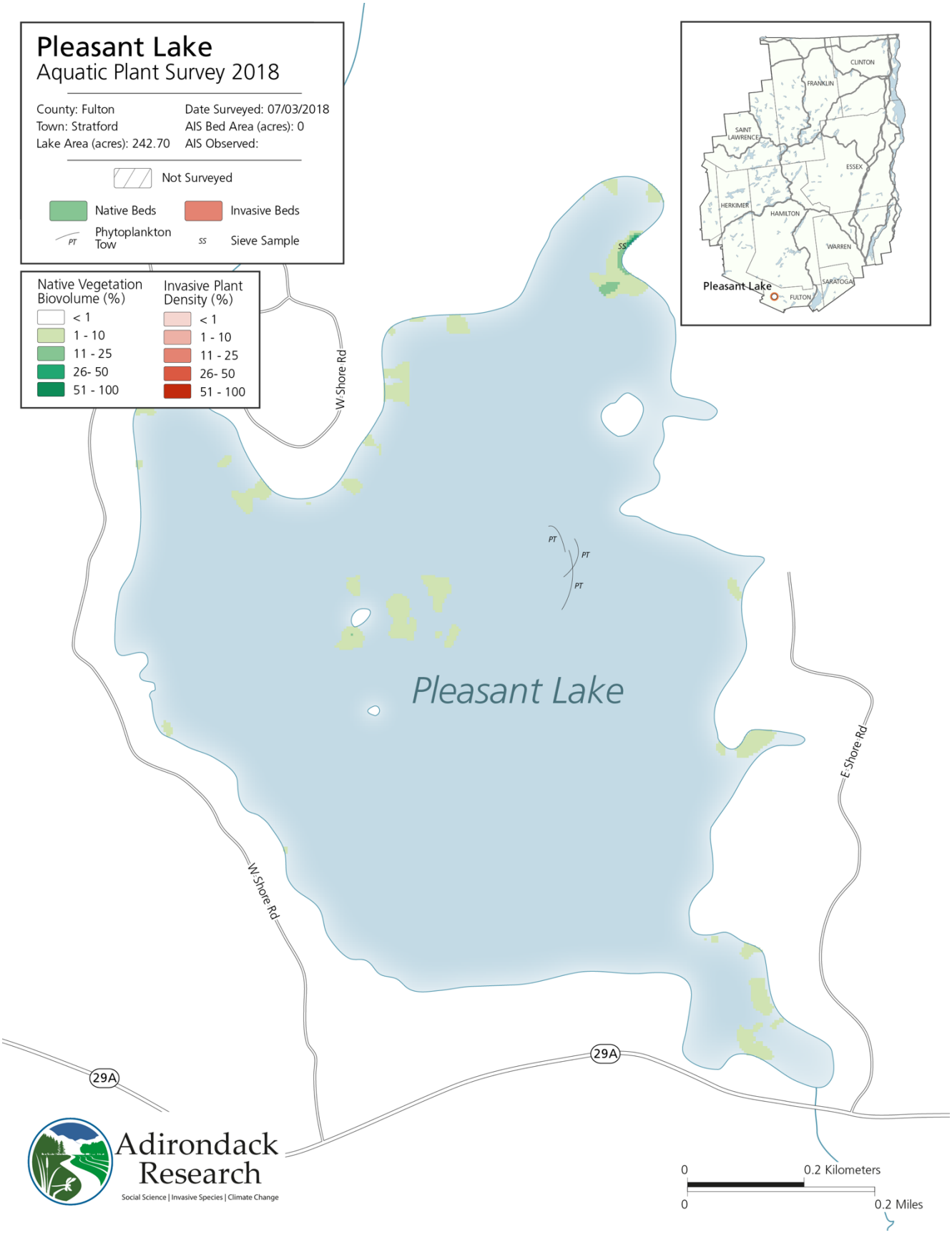
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. A rocky lake bottom and deep shoreline restricts most plant growth to the shallow inlet and outlet. Floating plants, such as *Brasenia schreberi* (watershield), *Nymphaea odorata* (white water lily), and *Nuphar variegata* (bullhead pond lily), were documented with higher densities of a native pondweed (*Potamogeton*) species, such as *Potamogeton gramineus* (variable pondweed) found in the western bay. *Vallisneria americana* (eelgrass) was also found.

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Pleasant Lake
Aquatic Plant Survey 2018
County: Fulton
Town: Stratford
Lake Area (acres): 242.70
Date Surveyed: 07/03/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Pleasant Lake
W Shore Rd
E Shore Rd
29A
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.2 Kilometers
0
0.2 Miles

Lake Narrative

Putnam Pond

Survey Date: July 6 & 9, 2018

Lake Description

Putnam Pond is 280.43 acres. It is located in the town of Ticonderoga, Essex County and lies in the Lake Champlain watershed. The team launched at the Department of Environmental Conservation's Putnam Pond campground.

Aquatic Invasive Plant Presence

A total of 17 invasive *Myriophyllum spicatum* (Eurasian watermilfoil) plant beds were mapped, with the heaviest concentrations at the southern and northern ends of the pond.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. A bay on the northeastern side of the lake as well as the area between an island and the western shore consisted of dense patches of *Nymphaea odorata* (white water lily), *Brasenia schreberi* (watershield), and *Nuphar variegata* (bullhead pond lily). *Vallisneria americana* (eelgrass) and *Elodea nuttallii* (slender waterweed) were common submerged aquatic plants detected. *Chara* spp. and *Nitella* spp. were found in the southern portion of the lake.

Aquatic Invasive Animal Presence

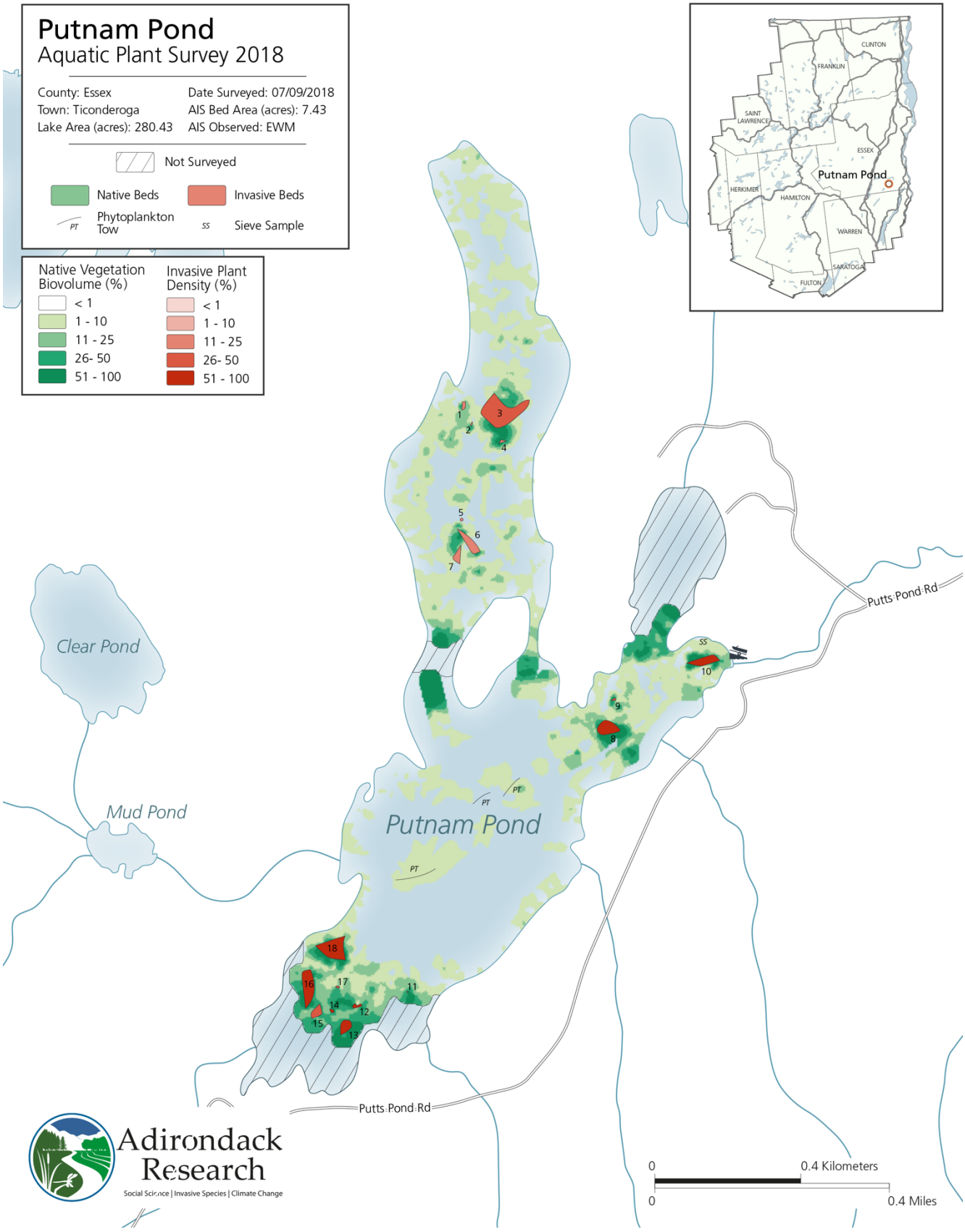
Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.

Invasive Species Percent Cover (See map on adjacent page)

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
1	0.08	3,670.07	11 to 25
2	0.02	651	11 to 25
3	2.89	126,017	26 to 50
4	0.04	1,627	11 to 25
5	0.0035	153	11 to 25
6	0.76	33,194	11 to 25
7	0.26	11,382	11 to 25
8	0.59	25,750	51 to 100
9	0.03	1,231	26 to 50
10	0.64	27,723	51 to 100

Eurasian Watermilfoil			
Bed	Size (Ac.)	Size (Sq. Ft.)	% Cover
11	0.01	220	26 to 50
12	0.08	3,499	51 to 100
13	0.41	17,665	51 to 100
14	0.05	2,130	51 to 100
15	0.31	13,519	26 to 50
16	1.25	54,296	51 to 100
17	0.03	1,100	26 to 50

Asian Clam	**Spiny Waterflea**
Present (Y/N)	Present (Y/N)
No	No


Putnam Pond
Aquatic Plant Survey 2018
County: Essex
Town: Ticonderoga
Lake Area (acres): 280.43
Date Surveyed: 07/09/2018
AIS Bed Area (acres): 7.43
AIS Observed: EWM
Not Surveyed
Native Beds
Invasive Beds
PT Phytoplankton Tow
SS Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
Putnam Pond
HERKIMER
HAMILTON
WARREN
SARATOGA
FULTON
Clear Pond
Mud Pond
Putnam Pond
Putts Pond Rd
Putts Pond Rd
Adirondack Research
Social Science | Invasive Species | Climate Change
0
0.4 Kilometers
0
0.4 Miles

Lake Narrative

Sacandaga Lake

Survey Date: August 13 & 15, 2018

Lake Description

Sacandaga Lake is 1593.23 acres. It is located in the town of Lake Pleasant, Hamilton County and lies in the Sacandaga Watershed. The team launched at the Department of Environmental Conservation's Moffitt Beach campground.

Aquatic Invasive Plant Presence

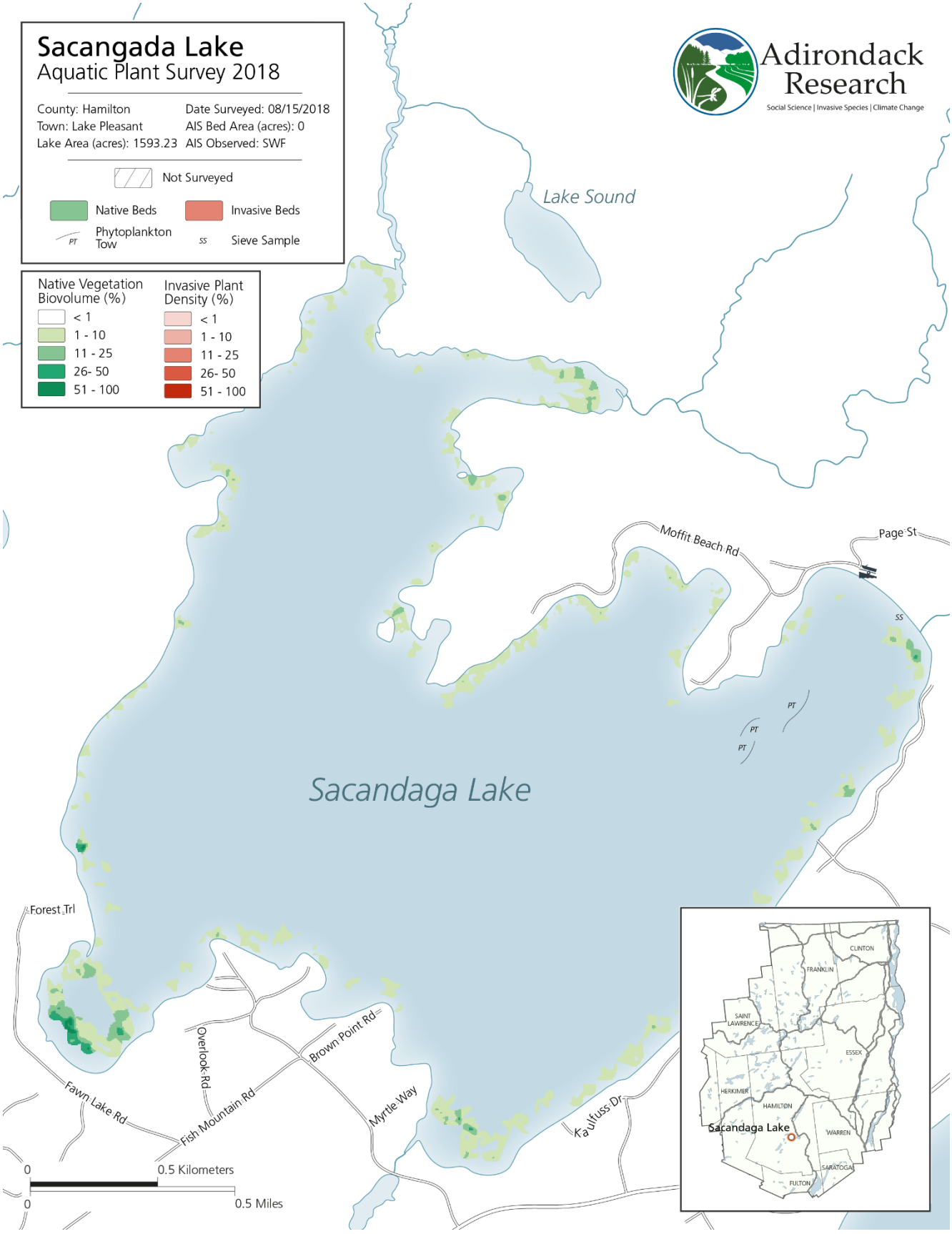
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within the lake included *Brasenia schreberi* (watershield), *Potamogeton amplifolius* (large leaf pondweed), *Eriocaulon* spp. (pipewort), *Nymphoides cordata* (little floating heart), *Potamogeton natans* (floating leaf pondweed), *Utricularia vulgaris* (common bladderwort), *Vallisneria americana* (eelgrass), and *Potamogeton robbinsii* (fern pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were conducted with each returning *Bythotrephes longimanus* (Spiny waterflea). *Bythotrephes longimanus* is an invasive zooplankton and has been documented in the lake since 2010.


Sacangada Lake
Aquatic Plant Survey 2018
County: Hamilton
Town: Lake Pleasant
Lake Area (acres): 1593.23
Date Surveyed: 08/15/2018
AIS Bed Area (acres): 0
AIS Observed: SWF
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Adirondack Research
Social Science | Invasive Species | Climate Change
Lake Sound
Moffit Beach Rd
Page St
SS
PT
PT
PT
Sacandaga Lake
Forest Trl
Fawn Lake Rd
Overlook Rd
Fish Mountain Rd
Brown Point Rd
Myrtle Way
Kaluftuss Dr
0
0.5 Kilometers
0
0.5 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
HERKIMER
HAMILTON
Sacandaga Lake
WARREN
SARATOGA
FULTON

Lake Narrative

Viele Pond

Survey Date: August 7, 2018

Lake Description

Viele Pond is 24.34 acres. It is located in Warrensburg, Warren County and lies in the Lake Champlain watershed. The team launched at one of three hand launches along Viele Pond Road.

Aquatic Invasive Plant Presence

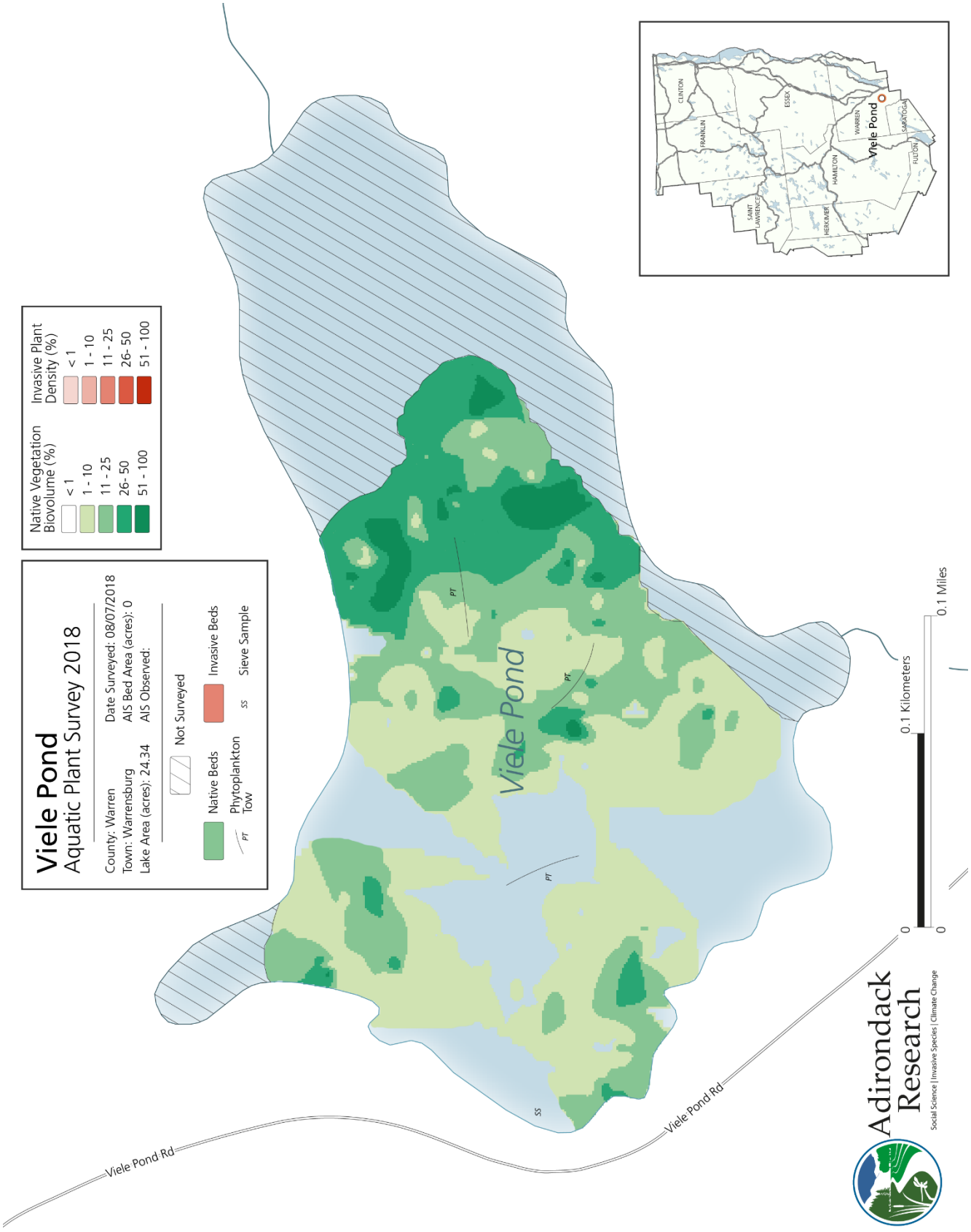
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Native plants found within this pond included *Nuphar variegata* (bullhead pond lily), *Nymphaea odorata* (white water lily), *Utricularia vulgaris* (common bladderwort), *Potamogeton gramineus* (variable pondweed), and *Potamogeton amplifolius* (large leaf pondweed).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.


Viele Pond
Aquatic Plant Survey 2018
County: Warren
Town: Warrensburg
Lake Area (acres): 24.34
Date Surveyed: 08/07/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
PT
Phytoplankton Tow
SS
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Viele Pond
Viele Pond Rd
Viele Pond Rd
0
0.1 Kilometers
0
0.1 Miles
CLINTON
FRANKLIN
ESSEX
WARREN
SARATOGA
FULTON
HAMILTON
SAINT LAWRENCE
HERKIMER
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Wakely Pond

Survey Date: July 26, 2018

Lake Description

Wakely Pond is 39.11 acres. It is located in Indian Lake, Hamilton County and lies in the Mohawk watershed. The team launched a canoe off Cedar River Road, approximately 11 miles from Routes 28 & 30.

Aquatic Invasive Plant Presence

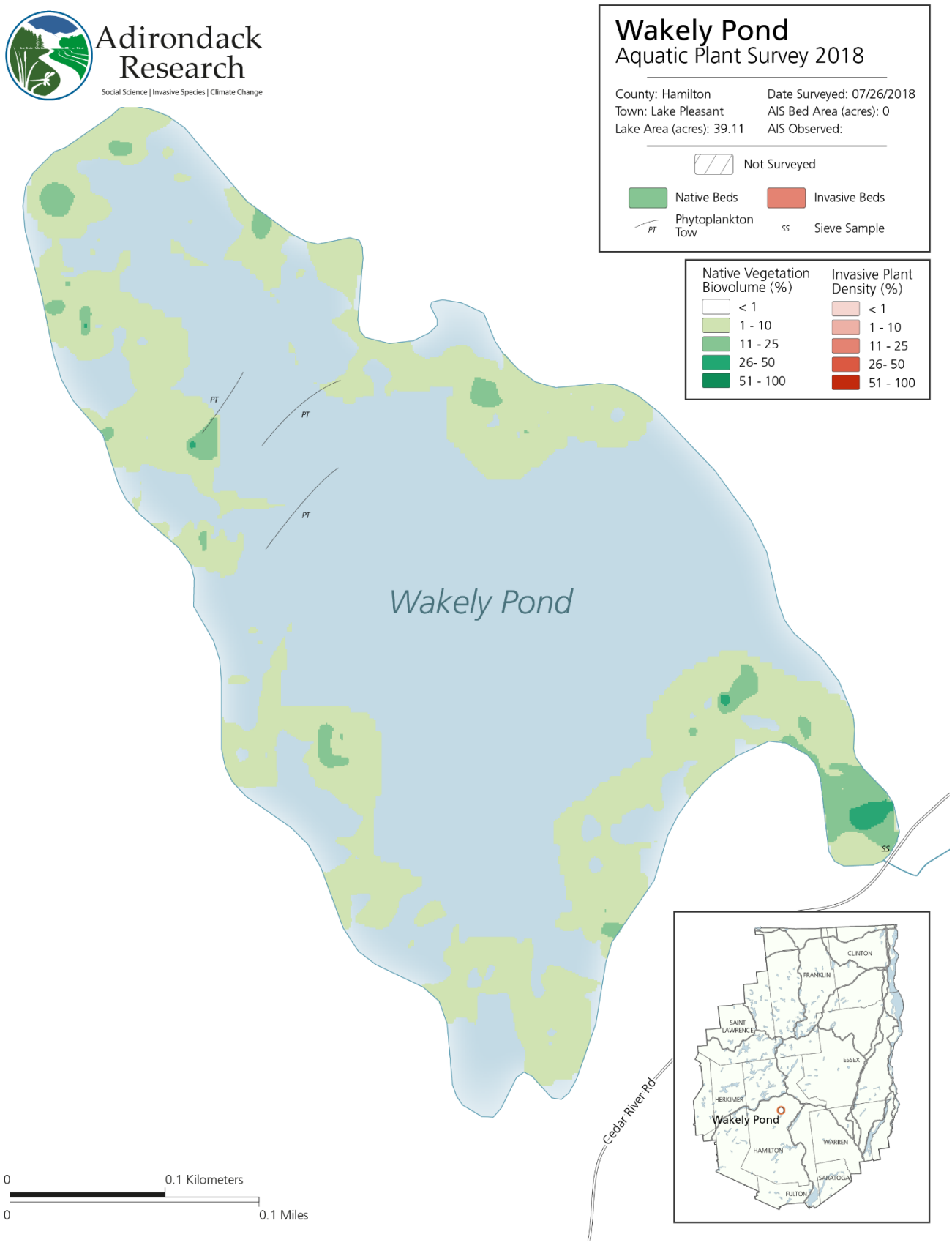
No invasive plants were detected.

Native Plant Biota

Comprehensive surveys of all native plants found within the pond were not prioritized in 2018, as this data had been previously collected in 2015 when the lake was first surveyed. Wakely Pond's water is turbid, yielding more floating plants than submerged ones. Among the native species found were: *Nymphoides cordata* (little floating heart)*, Nuphar variegata* (bullhead pond lily), *Nymphaea odorata* (white water lily), *Potamogeton amplifolius* (large leaf pondweed), and *Myriophyllum sibiricum* (northern watermilfoil).

Aquatic Invasive Animal Presence

Sediment sieves were taken to determine the presence of *Corbicula fluminea* (Asian clams). None were found. Three plankton tows were also conducted with no invasive plankton detected.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Wakely Pond
Aquatic Plant Survey 2018
County: Hamilton
Town: Lake Pleasant
Lake Area (acres): 39.11
Date Surveyed: 07/26/2018
AIS Bed Area (acres): 0
AIS Observed:
Not Surveyed
Native Beds
Invasive Beds
Phytoplankton Tow
Sieve Sample
Native Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Invasive Plant Density (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
PT
SS
Wakely Pond
Cedar River Rd
0
0.1 Kilometers
0
0.1 Miles
CLINTON
FRANKLIN
SAINT LAWRENCE
ESSEX
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Wakely Pond
HAMILTON
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FULTON

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