Region 9 Aquatic Invasive Species Monitoring Program

Aquatic Vegetation Survey

Silver Lake, Wyoming County, NY

Final Report, 2023-2024

Prepared by:

Lindsay Yoder, Region 9 AIS Coordinator
Adam Turner, AIS Strike Team Technician
Whitney Pierrot, AIS Strike Team Technician
NYS Department of Environmental Conservation
Bureau of Invasive Species and Ecosystem Health, Invasive Species Coordination Section
in cooperation with NYS Water Resources Institute at Cornell University

AIS Monitoring Program: Problem Definition and Background

Aquatic invasive species (AIS) are non-native plants, animals or pathogens that have the potential to cause harm to the environment, economy, or human health once introduced. Some of these impacts can include competition with native species for habitat and food resources, predation on native species, and impairment of water quality. Over the past two centuries, the Great Lakes have seen the establishment of 188 non-native species introduced through ballast water of commercial vessels, canals, organisms in trade, and recreational boats and equipment. While there are numerous aquatic invasive species management activities being conducted by multiple agencies and special interest groups in Lake Erie and Lake Ontario, the capacity for similar efforts in inland waterways within the Great Lakes watershed in Region 9 of New York has been limited. Without knowing the full distribution and degree of establishment of invasive species, managers are less likely to be able to efficiently manage infestations and prevent their further spread. The Region 9 AIS Program aims to bridge the gap in this knowledge and assist in early detection-rapid response (EDRR) of aquatic invasive plants, invertebrates, and vertebrates through a variety of sampling techniques.

The Region 9 AIS Program was initiated in 2022 with the goal of monitoring high-priority water bodies for target invasive plant species, including hydrilla, water hyacinth, water lettuce, European frog-bit, and water chestnut, to be added into the state's preferred data repository (iMapInvasives). The program aims to be a complete monitoring and management program that consists of a variety of survey components, all to provide a more descriptive picture of the presence of AIS in the region. These components include point-intercept submersed aquatic vegetation surveys of a random-systematic design for presence/absence and density of native and invasive plants using the rake toss method (Madsen 1999; Madsen and Wersal 2017), zooplankton sampling, and macroinvertebrate sieve surveys, where applicable.

Project Description

Site Snapshot	
Site Name and Location: Silver Lake, Wyoming Co., NY, 42.695507, -78.034018	
Monitoring Date(s): 6/12/2023, 7/11/2023, 7/20/2023 6/20/24, 9/17/24	**Monitoring Type(s):** Vegetation, Zooplankton, Macroinvertebrate
Acres Monitored: 379	**Observations Reported:** 1721
AIS: Curly-leaf pondweed, Unidentified invasive watermilfoil, European Frog-bit, Zebra Mussel	

The Region 9 AIS Strike Team conducted a point-intercept survey at Silver Lake across multiple days in 2023 and 2024. We completed only the northeast quadrant of the lake in 2024, as it couldn't be completed in 2023. Silver Lake is 836 acres. Based on bathymetric data, much of the center of the lake was excluded and 379 total acres were surveyed, with an average depth of 6.9 feet at all points sampled. The deepest part of the lake surveyed was 33.6 feet (points over 25 feet excluded from average, as rake tosses were not performed at these locations). The dominant substrate types of the lake are muck/cobble/gravel/sand. The dominant bottom coverage is macrophytes/benthic algae/woody debris.

A total of 304 points were surveyed across the two years using the rake-toss method, a standard across New York state. Two rake tosses are performed at each point on either side of the vessel, with total

vegetation density and individual species density collected. Density is recorded using the following scale: Zero (0), Trace (1), Sparse (2), Moderate (3), and Dense (4). The data collected is then averaged to estimate species density and frequency in both lakes, all of which can be found in the Appendix at the end of this report. Typically, rake tosses are performed at all locations that fall between 0 and 25 ft, but due to several points showing no growth toward the center of the lake, staff focused on the more direct littoral zone (0-100m from shore) to cover as much of the lake as possible.

Invasive Species at Silver Lake

Three* invasive plants were found in Silver Lake over the two years, curly-leaf pondweed (*Potamogeton crispus*), European Frog-bit (*Hydrocharis morsus-ranae*), and an invasive watermilfoils (*Myriophyllum spicatum* and *Myriophyllum spicatum x Myriophyllum sibiricum)* which made up ~24% of the total species occurrences at the points surveyed in the lake. *It is believed that both watermilfoils are present in Silver Lake, but it is difficult to determine quickly in the field so the species have been grouped into a single species complex for the purpose of this report. Charts and maps of frequency, whole rake abundance (density) and species composition at each survey point can be seen in Appendices I and II.

Curly-leaf pondweed (*Potamogeton crispus*) is dominant throughout New York and all of the United States. Vegetative reproduction through turions or hardened overwintering buds that begin to grow in autumn and persist throughout the winter in a slow-growing or dormant state, is the most important form of reproduction for curly-leaf pondweed. This makes it one of the first plants to appear each season, appearing as early as February/March. Curly-leaf pondweed often outcompetes native plants and may impede recreation. It typically dies off by July but has been persisting through the fall in many New York lakes in recent years.

Eurasian watermilfoil (*Myriophyllum spicatum*) and Hybrid watermilfoil (*Myriophyllum spicatum x Myriophyllum sibiricum*). Eurasian watermilfoil is widespread throughout the U.S. and has also been found to hybridize. Hybrid milfoil is a hybrid between Eurasian watermilfoil and Northern watermilfoil (*Myriophyllum sibiricum*). Although Northern watermilfoil is native to New York, hybrid milfoil is considered invasive and shares many of the characteristics of Eurasian watermilfoil. Both watermilfoils can withstand low water temperatures, giving it the ability to overwinter beneath ice and begin to grow earlier each season than most other native aquatic plants. Hybrid watermilfoil also has the propensity to form dense canopies, impeding recreation and contributing to declines in native aquatic plant diversity and abundance. Fragmentation is believed to be the main source of spread. A piece of plant no larger than 2 inches, so long as there is a stem and a node with leaves, can establish an entire new infestation.

European frog-bit (*Hydrocharis morsus-ranae*) is a free-floating aquatic plant with heart-shaped leaves that form rosettes. The species does have roots, but they are not typically anchored to the substrate, unless in shallow waters. However, both roots and rosettes can tangle with other vegetation and create dense clumps, which can prevent light from reaching native submerged plants underneath. European frog-bit reproduces primarily through turions, or buds that overwinter and begin to grow when spring arrives. One European frog-bit plant can produce 100 to 150 turions in a single season.

Zebra mussel (*Dreissena polymorpha*), a mollusk named for its dark, zig-zagged stripes on its shell, are triangular, shaped like the letter D, with a sharply pointed edge at the hinge. They can be found attached to objects and many surfaces, giving them the ability to clog pipes and block water flow, damage boats and other property, and injure water-goers with their sharp edge. Zebra mussels can also attach to other native mussels, which ultimately die because they cannot feed. They are also filter feeders that can rapidly filter entire bodies of water. During the summer, they filter a volume of water equal to all the water in the Hudson River estuary every 2-4 days! This efficient feeding method lessens the amount of food available to native invertebrates and other animals, disrupting food webs and threatening other species in the waterbody. Overall, once they are attached to an ideal surface, zebra mussels multiply rapidly and form dense colonies. One individual can release up to one million eggs each year.

Management

Best management practices are methods, techniques and plans that have been tested to achieve an objective, while keeping finance resources in mind. It is also critical to evaluate to feasibility and efficacy of potential management options as they relate to the overall goal of plant management within the lake. The primary management goals for invasive plant management considered by the DEC are prevention, eradication, and suppression/containment.

Prevention refers to management options that limit the spread and potential introduction of aquatic invasive species through education and outreach, physical barriers, decontamination methods, etc. New York's most successful prevention initiative is the Watercraft Inspection Steward Program, which educates hundreds of thousands of recreational water users and intercepts new invasive species attached to vessels, such as hydrilla, each year. To learn more about this program, visit https://www.dec.ny.gov/animals/107807.html#:~:text=DEC%2C%20Parks%2C%20and%20the%20NY%20Natural%20Heritage%20Program,are%20connected%20within%20and%20beyond%20New%20York%20State.

Eradication refers to control of a species to the point at which it is no longer found in the waterbody. This option is typically applied to emerging or less common species but may also be appropriate for early infestations of regionally widespread species. The evaluation of the feasibility eradication as a goal is highly necessary, as not all infestations are capable of being eradicated, especially considering the

potential treatment options used. Some methods will be ineffective at eradication no matter the size of infestation, purely from the method's mode of action. Mechanical methods like harvesters, for example, rarely (if ever) result in full eradication, as there is a high potential for induced fragmentation and vegetative reproduction. Typically, hand-pulling and/or chemical control are the most appropriate activities for a goal of eradication. But remember, species can always be reintroduced, which is why prevention activities post-eradication for several years is important.

Suppression, or containment, refers to the management of a species to limit continued spread both within and outside of the waterbody, and potentially offset negative impacts to the ecosystem with priority treatment areas. This is a common goal for widespread species, especially at sites with high risk of reintroduction or sites with older, larger infestations. Physical methods such as hand-pulling, benthic barriers, mechanical harvesters, drawdown, and even targeted chemical control are options for suppression or containment. Another less common option with high potential is native plant restoration in areas that have plants with early-season senescence, such as curly-leaf pondweed. This may allow for native plant beds to take up space in disturbed areas that are at the greatest risk of invasion.

Recommendations for Silver Lake

Due to the widespread nature of invasive watermilfoil and curly-leaf pondweed, treatment of these species is not recommended at this time unless chemical control is found to be a potential option for treatment of Silver Lake necessary for improving recreational access, which is being impaired at certain areas of the lake. Use of mechanical methods, such as a weed harvester, is **not recommended** due to the high potential for fragmentation and further spread of the species, except as a component of integrated pest management plan with the understanding that it will not aid in suppression of either species unless in conjunction with chemical control or another potential control technique.

The presence of hybrid watermilfoil has not been confirmed through genetic testing but is presumed due to leaflet counts performed in the field. Eurasian watermilfoil leaves typically have 14-21 leaflets, while the hybrid species will have 8-12. Hybrid milfoil has only been reported in this region at one lake through genetic testing conducted by this program in 2022. There are implications for chemical control of hybrid milfoils, so testing is recommended if treatment is desired, which can be conducted by the DEC team if requested.

European frogbit is an emerging species in the region, and it appears to be currently managed by NYS Parks staff through manual removal efforts. It is recommended that this control effort continue for potential eradication of the species. If it is not being managed currently, the DEC AIS Strike Team would potentially be able to conduct this removal with assistance from local stakeholders.

Additionally, spread prevention should be a high priority for Silver Lake, as it is a lake that experiences heavy recreational use. It is recommended that a boat steward be placed at the boat launch on high volume days and/or ensuring an AIS disposal station/signage is present to encourage users to Clean, Drain, and Dry and prevent AIS introductions.

Appendix I. Graphs and Tables

1. Plant Composition of Silver Lake

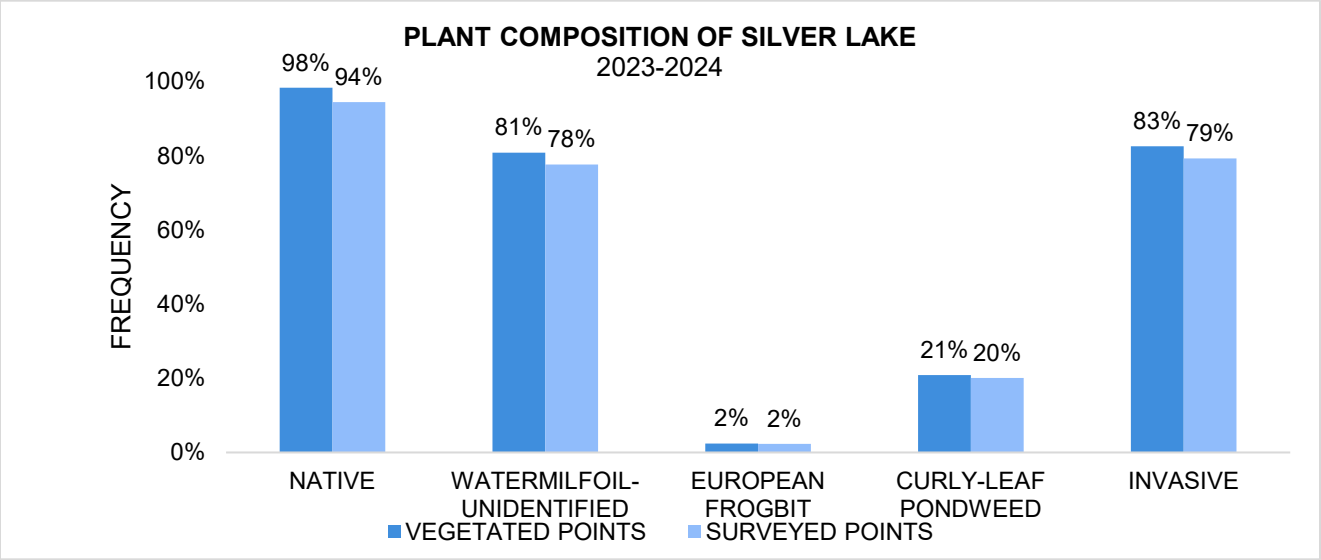


Fig. 1 Comparison of plant composition between **all surveyed** points and **vegetated** points in Silver Lake in 2023 and 2024. This graph represents the overall frequency of individual species at all points surveyed within the lake as well as locations exclusively with vegetation. This can be interpreted as the frequency of surveyed points being representative for the entire lake, while the frequency at vegetated points is often higher because "zero" points have been eliminated.

2. Frequency and Density of Plants in Silver Lake

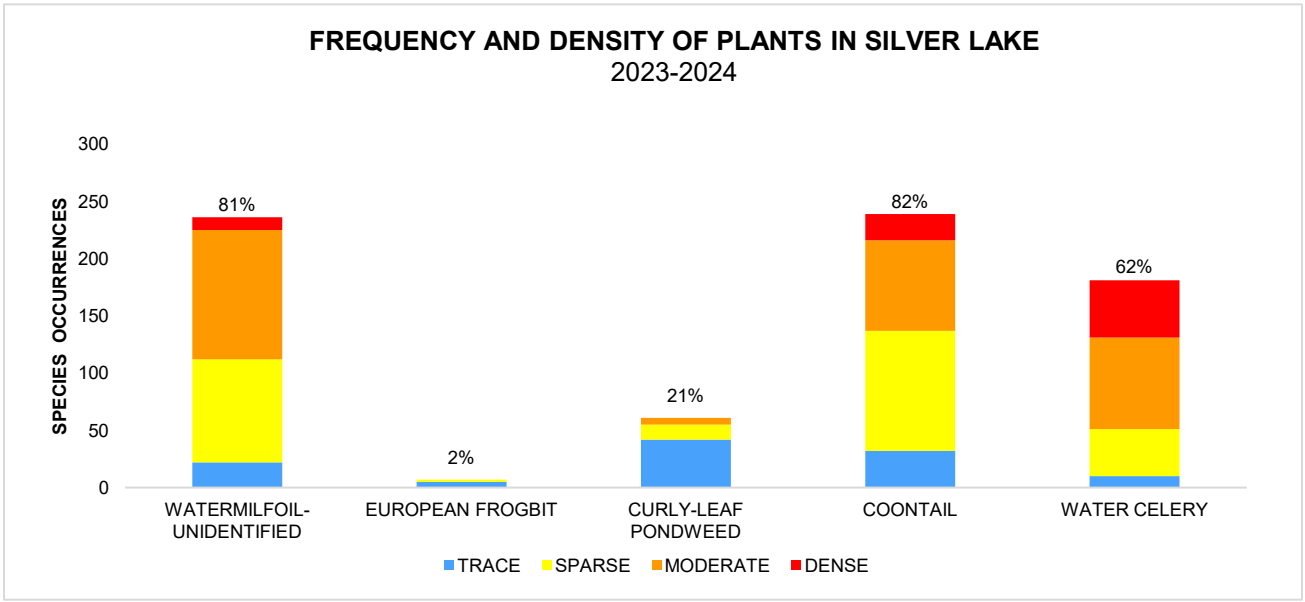


Fig. 2 Frequency and density of key native and invasive plants found in Silver Lake in 2023 and 2024. This graph depicts the density or abundance levels (trace, sparse, moderate, and dense) broken down within the overall frequency of species at all vegetated points.

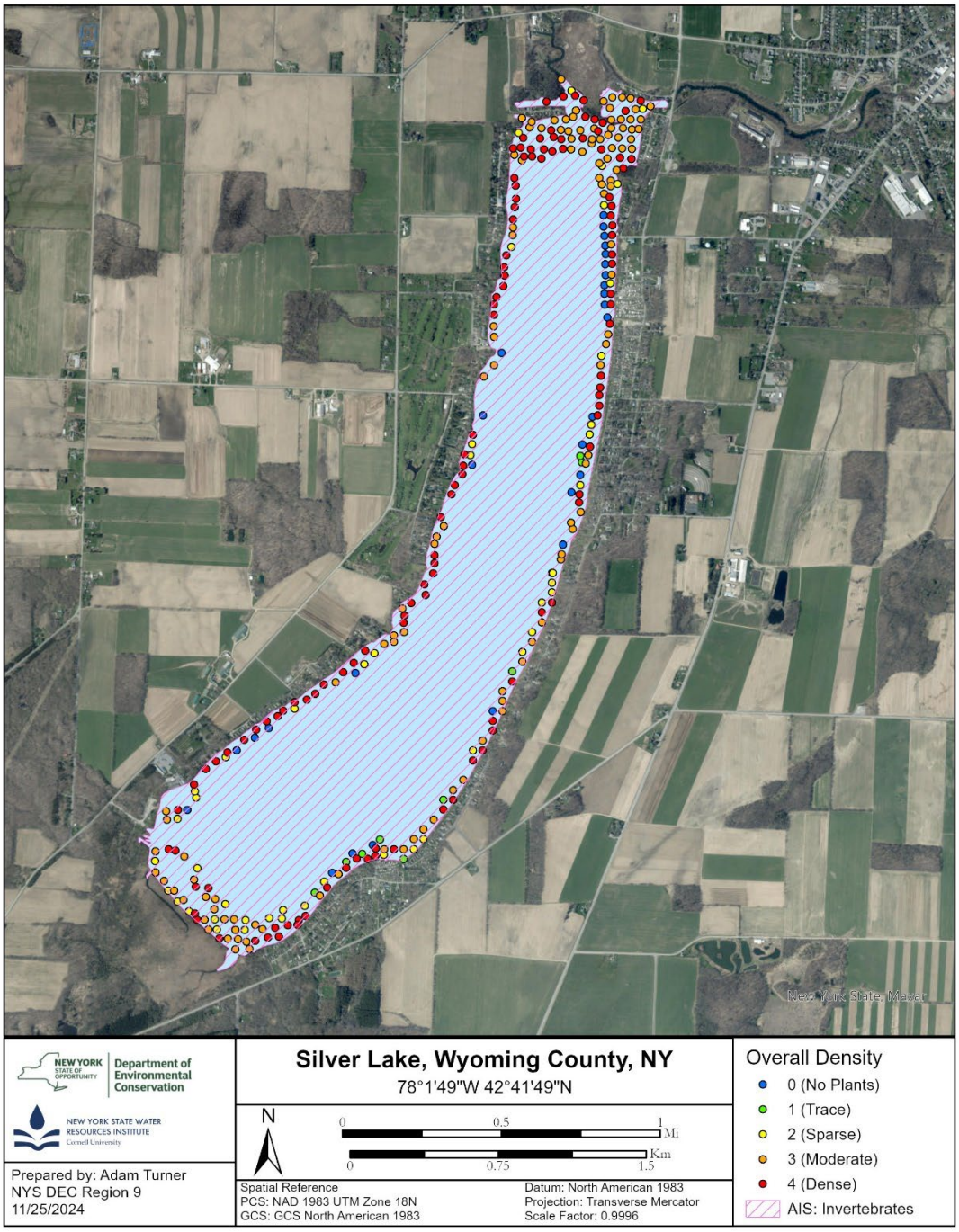
3. Overall Vegetation Summary of Silver Lake

Lake Summary	2023-2024	Total Records:304	Vegetated Records: 292	
Species	**Total Species Occurrences**	**Total Frequency of Macrophytes (All observations)**	**Total Frequency of Macrophytes (Observations with Vegetation)**	**Average Species Density (Observations with Vegetation)**
Watermilfoil - unidentified	236	78%	81%	3 (Moderate)
Curly-leaf pondweed	61	20%	21%	2 (Sparse)
European Frogbit	7	2%	2%	2 (Sparse)
Coontail	239	79%	82%	3 (Moderate)
Elodea spp.	52	17%	18%	2 (Sparse)
Unknown pondweed	22	7%	8%	2 (Sparse)
Common duckweed	17	6%	6%	2 (Sparse)
White water lily	50	16%	17%	2 (Sparse)
Water celery	181	60%	62%	3 (Moderate)
Greater duckweed	12	4%	4%	2 (Sparse)
Nuttall's waterweed	25	8%	9%	2 (Sparse)
Spatterdock	4	1%	1%	3 (Moderate)
Slender naiad	21	7%	7%	2 (Sparse)
Flat stem pondweed	48	16%	16%	2 (Sparse)
False pondweed	7	2%	2%	2 (Sparse)
Richardson's pondweed	6	2%	2%	2 (Sparse)
Water stargrass	31	10%	11%	2 (Sparse)
Leafy pondweed	22	7%	8%	2 (Sparse)
Duckweed spp.	13	4%	4%	4 (Dense)
Watershield	1	0%	0%	2 (Sparse)
Star duckweed	7	2%	2%	1 (Trace)
Small pondweed	6	2%	2%	3 (Moderate)
Waternymph - unidentified	4	1%	1%	1 (Trace)

Appendix II. Maps

1. Whole Rake Abundance

Overall Density
2023-2024



2. Individual Species Density

European Frog-bit
2023-2024

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NEW YORK STATE WATER RESOURCES INSTITUTE
Cornell University

Prepared by: Adam Turner
NYS DEC Region 9
11/25/2024

Silver Lake, Wyoming County, NY
78°1'49"W 42°41'49"N

N

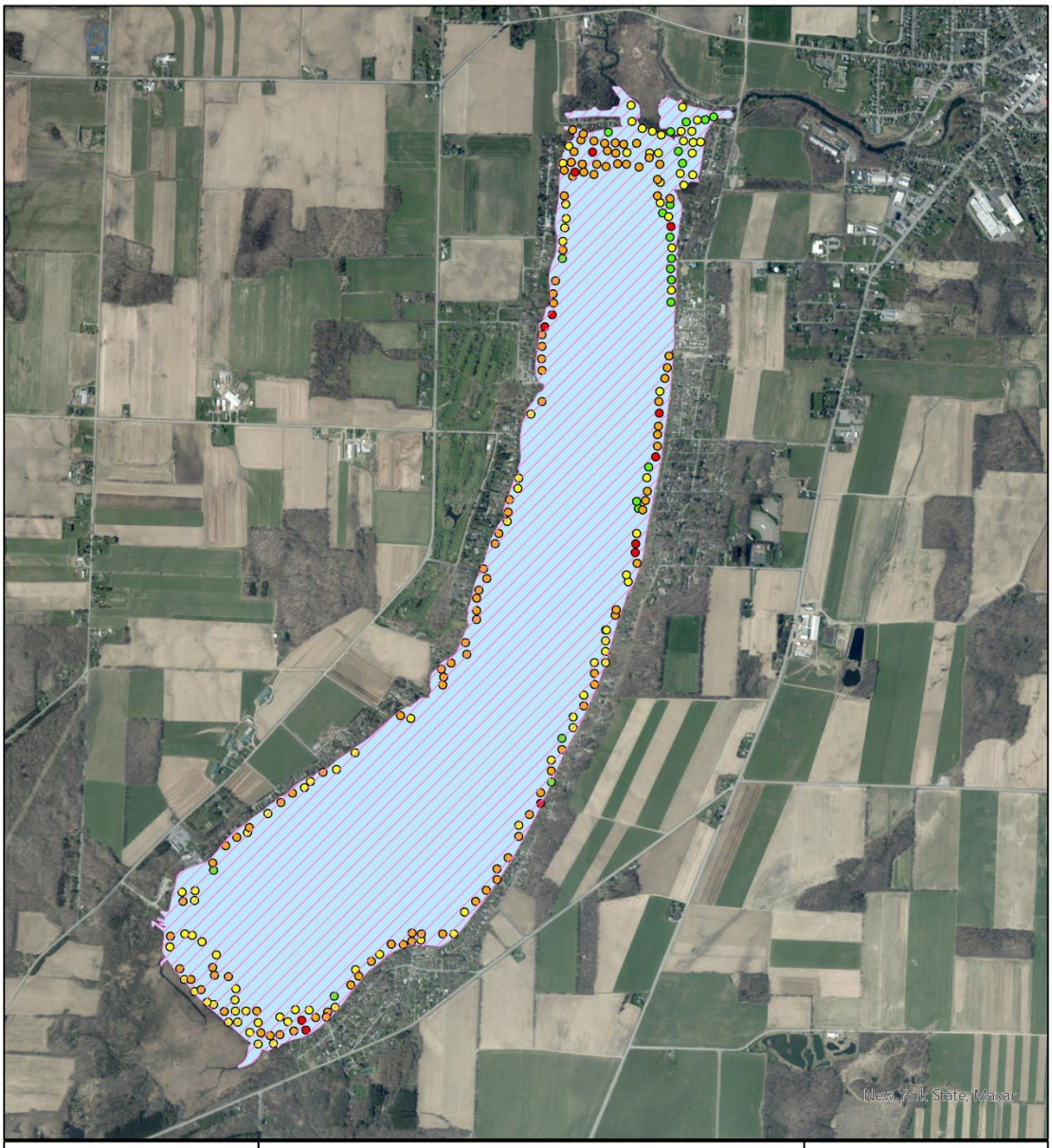
0 0.5 1 Mi
0 0.75 1.5 Km

Spatial Reference
PCS: NAD 1983 UTM Zone 18N
GCS: GCS North American 1983

Datum: North American 1983
Projection: Transverse Mercator
Scale Factor: 0.9996

Species Density
- 0 (No Plants)
- 1 (Trace)
- 2 (Sparse)
- 3 (Moderate)
- 4 (Dense)

Unidentified Invasive Watermilfoil
2023-2024



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Species Density
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- 4 (Dense)

Appendix III: Methodology

Submersed Aquatic Vegetation Survey (Non-motorized)
The AIS Strike Team technicians utilize the point-intercept method and a random systematic sampling design to monitor plant distribution in small waterbodies throughout Region 9. Sample points are selected based on pre-generated locations across a 50 m^2 grid, overlayed on the New York State Priority Waterbodies Listing polygon layer in ArcMap 10.7. Coordinates of sampling points are loaded onto Garmin eTrex 30 GPS units. Depth is recorded and points are surveyed using the rake-toss method, wherein a double-sided garden rake attached to 50ft of rope is thrown from the boat, allowed to sink, and slowly dragged to retrieve a representative sample of vegetation at a given location. Two rake tosses are performed at each point on either side of the vessel, with total vegetation density and individual species density collected. Density is recorded using the following scale: Zero (0), Trace (1), Sparse (2), Moderate (3), and Dense (4). The data collected is then averaged to estimate overall density and lake wide distribution and recorded in SASPro, housed in the Survey123 application, which is quality checked before approval to upload into iMapInvasives.

Invertebrate Sieve Survey
At the end of the survey, a mesh sieve will be used to sample for invertebrates in shallow areas near the shoreline, specifically focusing on the Asian clam, the New Zealand mud snail, and mystery snails. Sediment will be scooped into the sieve and water will be poured over the sample to wash away fine sediments. This will be repeated up to 7 times in a ray pattern as much as depth will allow. Sessile invertebrates (zebra mussels) will be documented by observing stationary objects/vegetation within the waterbody. Only invasive invertebrate samples will be kept. Invasive animals will be disposed of or collected in a sampling jar with lake water. All species will be collected in a container with oxygenated water from the site and euthanized by a 2-step euthanization process suitable for the taxon as outlined by the 2020 AVMA Guidelines for the Euthanization of Animals, as AIS cannot be re-released into the water as per 6 NYCRR Part 576. This process includes immersion in 95% ethanol (10-30 mL/L for fish or 10-50mL/L for invertebrates) for at least 10 minutes, and then frozen. Species will be stored in 70% ethanol for preservation for educational purposes or disposed of. The species found will be noted in SASPro.