LAKE COMO

Aquatic Vegetation Comprehensive Report

July 2024

PREPARED FOR:

The Lake Como Association

PREPARED BY:

SŌLitude Lake Management

Table of Contents

1.0 INTRODUCTION

Lake Como, located in New York, is a medium-sized freshwater lake known for its clear waters and scenic shoreline, spanning approximately 150 acres with a maximum depth of 20 feet.

In 2024, SOLitude Lake Management implemented a comprehensive aquatic vegetation survey, further refining their understanding of the lake's ecological dynamics. A Point-Intercept survey is a systematic method used to assess aquatic vegetation within a waterbody. This survey involves sampling vegetation at predefined points along transects, typically using a grid pattern across the lake. By recording species presence and abundance at each point, the survey provides valuable data on the distribution, composition, and density of aquatic plants. This information is essential for understanding the ecological health of the lake, identifying invasive species, and guiding targeted management strategies to maintain a balanced and thriving aquatic ecosystem. In addition, the data gathered from the Point-Intercept survey informs the selection and application of herbicides such as ProcellaCOR EC in Lake Como. By identifying specific areas and species of aquatic vegetation, the survey helps ensure precise and effective herbicide targeting, maximizing treatment efficacy while minimizing environmental impact. This information serves as a foundation for the planned application of ProcellaCOR EC and SeClear, scheduled to continue The Lake Como Association's proactive stewardship of Lake Como's aquatic resources. The remainder of this text summarizes 2024 comprehensive survey results and offers 2025 recommendations.

Key Survey Findings

- Two invasive species were the most abundant plant species present:
    - Curly-leaf Pondweed (*Potamogeton crispus*)
    - Eurasian Watermilfoil (*Myriophyllum spicatum*)
- 13 species, including two algae, were identified.
- Most vegetation was at trace or sparse density.

2.0 COMPREHENSIVE AQUATIC VEGETATION SURVEY

2.1 Methods

A Point-Intercept survey, using the standard Point-Intercept Method, was conducted on May 31, 2024. This was the first year a comprehensive survey was completed; therefore, sample points that will be used in future surveys were created prior to the survey (Appendix A). Viewing conditions into the water were favorable for observation.

Prior to conducting a Point-Intercept survey, specific survey points are pre-determined using GIS software to ensure systematic coverage of the littoral zone of Lake Como. The littoral zone, which is the shallow, nearshore area where aquatic plants primarily grow, is crucial for biodiversity and lake ecosystem health. Survey points are typically spaced evenly along transects within this zone, using a 50 meter grid pattern to ensure representative sampling across different habitats and depths. This approach allows researchers to systematically record the presence and abundance of aquatic vegetation species at each designated point. By meticulously planning these survey points in advance, the surveyors can comprehensively assess the distribution and density of plant communities. These points will be recurring for future surveys in effort to assess changes over time. A total of 55 data points, based on the 50-meter grid throughout the littoral zone, were surveyed (Appendix A).

Recorded at each data point was the following information: aquatic plants present, dominant species and plant biomass. The plant community was assessed through visual inspection and use of a throw-rake. Plants were identified to genus and species level when possible. A plant abundance ranking was designated for each species at each point using the following scale:

- ***0*** No biomass; plants generally absent
- ***1*** Low biomass; plants growing only as a low layer on the sediment
- ***2*** Moderate biomass; plants protruding well into the water column but generally not reaching the water surface
- ***3*** High biomass; plants filling enough of the water column and/or covering enough of the water surface to be considered a possible recreational nuisance or habitat impairment
- ***4*** Extremely high biomass; water column filled and/or surface completely covered, obvious nuisance conditions and habitat impairment severe

2.2 Point-Intercept Survey Results

Table 1. Aquatic Macrophyte Abundance Distribution.

Aquatic Macrophyte	Total		Trace		Sparse		Moderate		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
TOTAL SITES	55									
OVERALL	54	98%	6	11%	13	24%	25	46%	10	19%
Benthic Filamentous Algae *Various species*	42	76%	14	33%	19	45%	8	19%	1	2%
Curly-Leaf Pondweed *Potamogeton crispus*	37	67%	8	22%	10	27%	15	41%	4	11%
Eurasian Water Milfoil *Myriophyllum spicatum*	28	51%	13	46%	10	36%	3	11%	2	7%
Coontail *Ceratophyllum demersum*	19	35%	8	42%	9	47%	2	11%	0	0%
Common Waterweed *Elodea canadensis*	18	33%	13	72%	3	17%	1	6%	1	6%
Leafy Pondweed *Potamogeton foliosus*	18	33%	7	39%	2	11%	4	22%	5	28%
White Waterlily *Nymphaea odorata*	14	25%	9	64%	2	14%	3	21%	0	0%
Wild Celery *Vallisneria americana*	10	18%	9	90%	1	10%	0	0%	0	0%
Bassweed *Potamogeton amplifolius*	7	13%	6	86%	1	14%	0	0%	0	0%
Arrowhead *Sagittaria latifolia*	3	5%	2	67%	1	33%	0	0%	0	0%
Spatterdock *Nuphar advena*	3	5%	1	33%	1	33%	1	33%	0	0%
Muskgrass (Maco Algae) *Chara spp.*	3	5%	3	100%	0	0%	0	0%	0	0%
White Water Crowfoot *Ranunculus aquatilis*	1	2%	0	0%	1	100%	0	0%	0	0%

*Red indicates an invasive species

2.3 Point-Intercept Survey Discussion

2.3.1 Overall Vegetation (Table 1)

Aquatic macrophytes play a critical role in shaping the structure and function of aquatic ecosystems, influencing water quality, habitat complexity, and biodiversity. The distribution and abundance data presented indicate a varied and dynamic community of aquatic plants within the studied waterbodies.

Firstly, the widespread presence of vegetation at 98% of sites suggests a generally favorable environment for aquatic macrophyte growth across the sampled area. This widespread distribution indicates that the conditions such as water depth, substrate type, nutrient availability, and light penetration are generally suitable for supporting plant life.

Most of the vegetation observed exhibited trace to sparse density, indicating insubstantial coverage in many areas. These densities are crucial as they can provide habitats for fish and other aquatic organisms, enhance water quality through nutrient uptake and sediment stabilization, and contribute to overall ecosystem stability while leaving open space for growth and establishment of other plants.

2.3.2 Invasive Vegetation (Table 1)

Eurasian watermilfoil was the most frequently encountered species, present at 51% of sites. Despite its prevalence, it was mostly found in trace or sparse abundance. The past use of herbicides likely targeted Eurasian watermilfoil to control its growth. The trace to sparse presence post-treatment may indicate successful management efforts in reducing the plant's overall abundance. However, some residual populations or regrowth may still persist, albeit at reduced levels.

In small quantities, milfoil may not dominate or significantly alter habitat structure compared to dense populations but can easily repopulate to moderate or dense populations within the season. Maintaining Eurasian watermilfoil at trace to sparse levels can be challenging. The species has a resilient reproductive strategy, with the ability to propagate from stem fragments. Effective management typically requires ongoing monitoring and possibly supplementary control measures to prevent resurgence. Reduced Eurasian watermilfoil abundance may allow native aquatic plants to recover and compete more effectively for resources such as light, nutrients, and space. This can contribute to restoring or maintaining biodiversity within the aquatic ecosystem.

In addition to Eurasian watermilfoil, Curly-leaf pondweed (*Potamogeton crispus*) stood out for its moderate density levels at 67% of sites. Curly-leaf pondweed, typically invasive, was predominantly moderate in abundance, suggesting it may be thriving under local conditions, potentially outcompeting native species.

Curly-leaf pondweed (*Potamogeton crispus*) is an aquatic plant known for its distinctive curly leaves and ability to thrive in a variety of freshwater habitats. Its biology includes perennial growth with submerged stems that can extend horizontally across the sediment, producing dense stands under favorable conditions. It is a cold water species that is typically the first to appear under cooler water temperatures and disappears into the summer. It may make a reappearance in the late fall when water temperatures drop again. This species reproduces through seeds and vegetative propagation, enabling rapid colonization and establishment in new environments. Ecologically, curly-leaf pondweed plays complex roles: it provides habitat for aquatic organisms, stabilizes sediments, and absorbs nutrients, but its dense growth can outcompete native vegetation and alter ecosystem dynamics. Managing its abundance through aquatic herbicides is crucial for maintaining balanced aquatic ecosystems and preserving biodiversity.

2.3.3 Native Vegetation and Algae (Table 1)

Benthic filamentous algae were observed at 76% of sites, indicating the presence of nutrient-rich conditions that can promote algal growth. Benthic filamentous algae are multicellular organisms that typically form dense mats or strands on submerged substrates in aquatic environments. Their biology involves a filamentous structure composed of interconnected cells capable of rapid growth through fragmentation and spore formation, adapting to various environmental conditions. Ecologically, these algae play critical roles in nutrient cycling and sediment stabilization, but excessive growth can indicate nutrient enrichment and degrade water quality by reducing light penetration and oxygen availability in affected habitats. While some algae are beneficial as food sources and oxygen producers, excessive growth can lead to algal blooms and oxygen depletion, affecting overall water quality.

The presence of Wild Celery (*Vallisneria americana*) and other species like Arrowhead (*Sagittaria* spp.), Spatterdock (*Nuphar advena*), Muskgrass (*Chara* spp.), and White Water Crowfoot (*Ranunculus aquatilis*) at lower frequencies indicates their more specialized habitat requirements or limited distribution within the studied area. These species, although less common, contribute to the overall biodiversity and ecological function of the waterbodies where they occur.

3.0 WATER QUALITY

3.1 Background Information and Methods

As part of comprehensive lake monitoring, conducting a Temperature/Dissolved Oxygen (DO) profile provides crucial insights into the physical and chemical dynamics of the water column. This profile is typically obtained by collecting data at multiple depths throughout the lake. Temperature gradients are measured using a calibrated probe that records water temperature at each depth while Dissolved Oxygen levels are measured in situ using a DO meter.

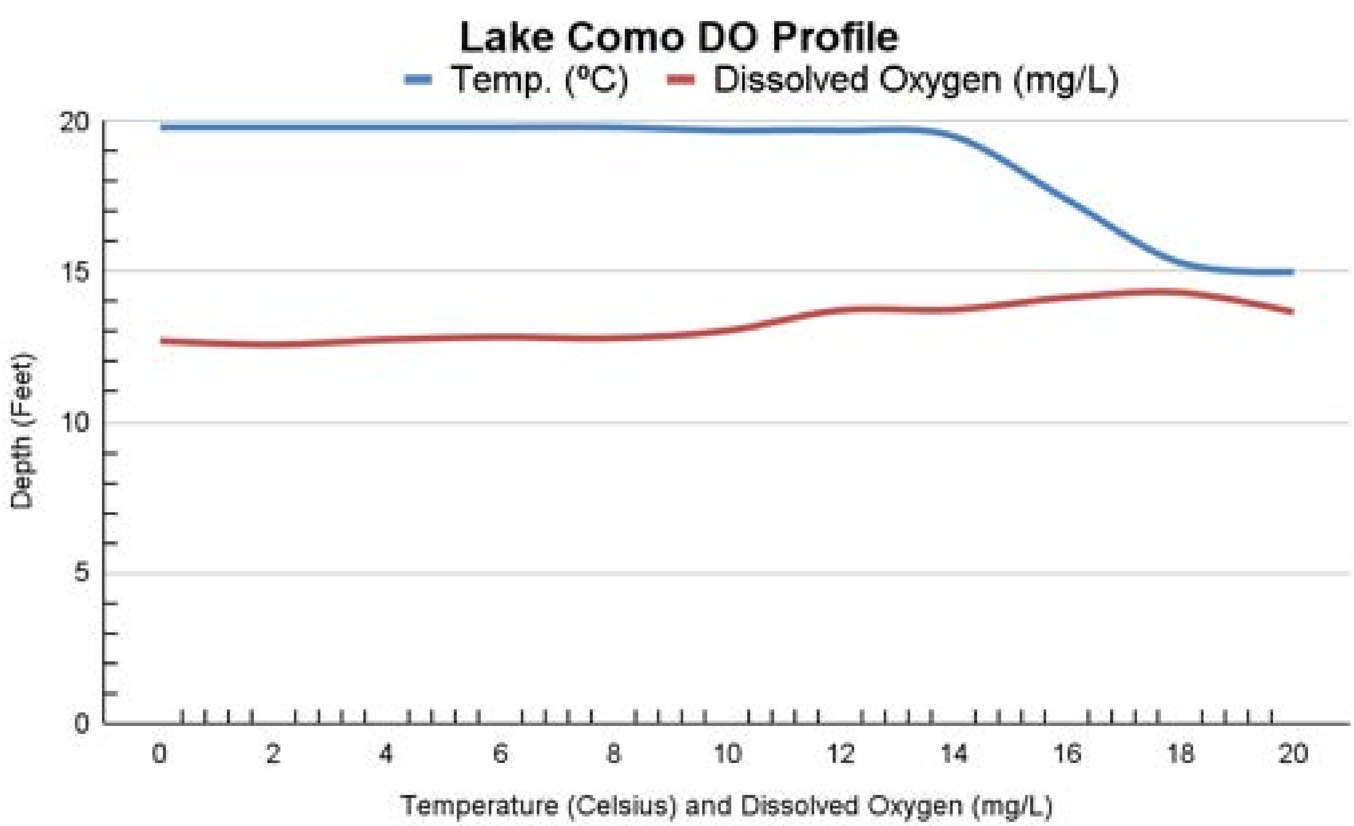
The methodology involves lowering the probe or sampling device at predefined intervals from the lake surface to the bottom, ensuring representative sampling across different depths and locations. Temperature variations reveal stratification patterns within the water column, identifying distinct layers such as the epilimnion (warm surface layer), metalimnion (thermocline), and hypolimnion (cold bottom layer) during stratified periods. Dissolved Oxygen levels are critical indicators of lake health, with variations influenced by photosynthesis, respiration, and decomposition processes. Low DO levels can indicate oxygen depletion due to organic matter decomposition or nutrient enrichment, impacting aquatic organisms and overall ecosystem function.

The significance of Temperature/Dissolved Oxygen profiles lies in their ability to assess lake stratification, thermal habitat availability, and oxygen availability—critical factors for aquatic life, particularly fish and macroinvertebrates. These profiles also inform management strategies for nutrient loading and aquatic vegetation control. For example, understanding thermal stratification dynamics can guide the timing of herbicide applications to target invasive species effectively while minimizing impacts on native flora and fauna.

DO profiles also play crucial roles in shaping the distribution, growth, and health of aquatic vegetation. As previously indicated, temperature directly influences metabolic rates, photosynthesis, and respiration of aquatic plants. Warmer temperatures can enhance photosynthesis, leading to increased growth rates of some aquatic vegetation species, but can also increase respiration rates and nutrient uptake, potentially leading to oxygen depletion. Cooler temperatures, on the other hand, may limit plant growth but help maintain higher DO levels due to increased oxygen solubility. The stratification of water bodies, where warmer, oxygen-rich surface layers are separated from cooler, oxygen-poor deeper layers, can create distinct habitats and influence which plant species thrive in different zones. Understanding temperature profiles helps predict seasonal growth patterns and the spatial distribution of aquatic plants.

3.2 DO Profile Results

Chart 1. Lake Como Temperature/Dissolved Oxygen Profile



3.3 DO Profile Discussion (Chart 1)

The provided DO profiles reveal important aspects of the aquatic environment's vertical structure. The temperature remains relatively constant at 19.8°C from the surface down to a depth of 8 feet, indicating a well-mixed upper layer. Below this, there is a noticeable decrease in temperature, dropping to 15.0°C at 20 feet. This temperature decline suggests a thermocline, a layer where the temperature gradient is steeper, usually due to reduced mixing and the differential heating of the water column.

The DO profile shows high levels throughout the water column, with a slight increase in DO concentration as depth increases, peaking at 14.31 mg/L at 18 feet before slightly decreasing to 13.66 mg/L at 20 feet. The higher DO concentrations at greater depths are indicative of colder water's ability to hold more oxygen. This profile suggests minimal biological oxygen demand (BOD) or decomposition in the deeper layers, as DO levels remain high.

Aquatic plants typically thrive in well-lit, oxygen-rich environments. The relatively stable temperature of 19.8°C in the upper 10 feet of the water column suggests a suitable habitat for many aquatic plants, particularly those adapted to warmer temperatures. The high DO levels (above 12.5 mg/L) throughout the water column indicate an oxygen-rich environment conducive to healthy plant respiration and growth. The slight decline in temperature and rise in DO below 10 feet can support deeper-rooted or submerged plants that prefer cooler, oxygen-rich waters. Overall, these conditions suggest a favorable environment for diverse aquatic plant communities, potentially leading to high primary productivity.

Fish species have varying temperature and oxygen requirements. The well-oxygenated upper layers (0-10 feet) with a stable temperature of around 19.8°C can support warm-water fish species, such as bass and sunfish. These conditions are ideal for feeding, breeding, and overall health. The deeper, cooler waters with even higher DO levels (up to 14.31 mg/L) are favorable for cold-water fish species, such as trout, which require cooler temperatures and higher oxygen concentrations. The presence of a thermocline and high DO levels at depth provides a refuge for these species during warmer periods, ensuring a diverse fish community can coexist in this water body.

Invertebrates and microorganisms also benefit from these conditions. High DO levels support aerobic microbial processes, which are essential for nutrient cycling and organic matter decomposition. Benthic invertebrates, such as insect larvae and crustaceans, thrive in oxygen-rich environments and contribute to the food web by serving as prey for fish and other animals. The presence of a thermocline and high DO levels at depth also suggest limited anoxic conditions, reducing the risk of harmful anaerobic processes that can produce toxic substances like hydrogen sulfide.

Overall, the temperature and DO profiles suggest a healthy, stratified aquatic ecosystem with diverse habitats supporting a range of species. The well-mixed upper layers and oxygen-rich deeper waters can sustain various plant and animal life, promoting biodiversity and ecological stability. Monitoring and maintaining these conditions are crucial for the long-term health and resilience of the aquatic ecosystem.

3.4 Secchi Depth Measurement

A Secchi depth reading of 9 feet indicates relatively clear water, which has several positive implications for the aquatic ecosystem. Clear water allows sunlight to penetrate deeper into the water column, promoting photosynthesis in submerged aquatic vegetation. This enhanced light penetration can support a greater diversity and abundance of aquatic plants, which in turn provide habitat and food for various aquatic organisms, including fish and invertebrates. Clear water also generally indicates lower levels of suspended sediments and phytoplankton, which can reduce the likelihood of algal blooms and improve water quality. Additionally, deeper light penetration can contribute to higher dissolved oxygen levels throughout the water column, as photosynthetic activity by aquatic plants produces oxygen. Overall, a Secchi depth of 9 feet suggests a healthy, well-functioning aquatic ecosystem with good water quality, supporting diverse and thriving plant and animal communities.

4.0 2024-2025 RECOMMENDATIONS

Based on the observed distribution of aquatic macrophytes and algae, as well as the presence of invasive species like Eurasian watermilfoil and Curly-leaf Pondweed, a comprehensive management and survey plan is recommended for the remainder of the year and subsequent seasons.

Management Recommendations:

1. **Control Efforts:** Implement targeted herbicide treatments to manage invasive species such as Eurasian watermilfoil and Curly-leaf Pondweed, focusing on areas where these species are present in moderate to high abundance. Follow best practices for herbicide application to minimize environmental impact while effectively controlling target species. Mechanical and biological control methods are often not suitable for managing Eurasian watermilfoil and Curly-leaf pondweed due to several limitations. Mechanical removal, such as harvesting and cutting, can be labor-intensive and expensive, with the risk of fragmenting these plants and unintentionally promoting their spread, as both species can reproduce vegetatively from small fragments. Biological control methods, such as introducing herbivorous insects or other organisms, may lack specificity and effectiveness, potentially leading to unintended ecological consequences and insufficient control of the target species. Given these challenges, more reliable methods, such as targeted herbicide treatments, are typically recommended for controlling these invasive aquatic plants.
2. **Nutrient Remediation Efforts:** Alum applications, which involve adding aluminum sulfate to water bodies, are used to reduce phosphorus levels and control algal blooms by precipitating phosphorus and preventing its availability to algae. Despite their effectiveness in improving water quality, alum treatments are not permitted in New York State due to regulatory and environmental concerns. Currently, To ensure lake health and effectively control algal blooms, implementing comprehensive nutrient mitigation strategies is essential. These strategies should focus on reducing the input of excess nutrients, particularly nitrogen and phosphorus, which often drive the growth of harmful algal blooms. Key approaches include promoting agricultural best management practices (BMPs) such as cover cropping, buffer strips, and precision fertilization to minimize nutrient runoff. Urban areas can benefit from enhanced stormwater management systems that capture and treat runoff before it reaches water bodies. Restoring and preserving wetlands and riparian zones are also critical, as these areas naturally filter and absorb nutrients. Additionally, encouraging the use of septic system

maintenance programs can reduce nutrient leaching into lakes. Public education and community involvement are vital components, fostering awareness and support for nutrient reduction efforts. Regular water quality monitoring and adaptive management practices should be employed to assess the effectiveness of these strategies and make necessary adjustments. By addressing nutrient sources comprehensively, we can protect lake health, prevent algal blooms, and maintain balanced aquatic ecosystems.

3. **Surveys:** Conduct regular surveys to monitor the abundance and distribution of aquatic macrophytes and algae. These surveys should include mapping the extent of invasive species and assessing changes in their population dynamics over time.

Survey Recommendations:

1. **Continued Comprehensive Surveys:** Maintain regular surveys throughout the year to capture seasonal variations in macrophyte growth and algae blooms. Include detailed observations on species composition, abundance levels (trace, sparse, moderate), and habitat preferences. Perform a Point-Intercept survey at least once a year using historical points. Potentially expand comprehensive survey to include Frequency of Occurrence.
2. **Water Quality Monitoring:** Expand water quality monitoring efforts to include additional metrics such as:
    - **Nutrient Levels (Nitrogen and Phosphorus):** Assessing nutrient concentrations helps understand potential drivers of algal blooms and invasive species growth. High nutrient concentrations can promote the growth of invasive species and algal blooms, indicating potential management priorities for nutrient reduction strategies.
    - **Dissolved Oxygen Profiles:** Monitoring DO levels provides insights into habitat suitability for aquatic organisms and potential impacts of vegetation on oxygen dynamics. Understanding DO levels helps assess habitat quality and potential impacts of vegetation on oxygen availability, critical for fish and other aquatic organisms.
    - **pH and Turbidity:** These metrics can indicate changes in water clarity and acidity, influencing plant growth and community structure. Changes in pH and turbidity can affect plant growth and community composition, guiding management decisions to maintain water clarity and stability.
    - **Algal Monitoring:** Incorporating algae monitoring into ongoing water quality assessments is crucial for comprehensively understanding and managing aquatic ecosystems. Implementing regular algae monitoring programs allows for the timely detection of changes in algal abundance, composition, and potential blooms. This can be achieved through methods such as chlorophyll-a analysis, microscopy for taxonomic identification, and measurement of algal biomass and community structure. By tracking algae dynamics, including benthic filamentous algae and planktonic species, managers can assess nutrient enrichment, sediment stability, and potential impacts on water quality and ecosystem health. This information is vital for implementing targeted management strategies, such as nutrient management plans and sediment control measures, to mitigate adverse effects and maintain balanced aquatic ecosystems.

2024-2025 Management Timeline:

Timeframe	Management Strategy	Description
Fall 2024 - Spring 2025	Obtain NYSDEC Article 24 and Article 15 permits	Article 15 and Article 24 permits allowing for the use of herbicides to control aquatic invasive species in Lake Como
Spring 2025	Recurring Point-Intercept Survey and visual pre-treatment survey and report	Comprehensive aquatic plant survey using recurring points established in 2024 including documentation of all Eurasian Watermilfoil occurrences beyond points
Summer 2025	Perform herbicide applications to target nuisance vegetation	Application of ProcellaCOR EC to control Eurasian Watermilfoil and SeClear to control algae
Late Summer - Fall 2025	Post-treatment efficacy survey	Visual survey to assess herbicide application efficacy

By integrating these management and survey recommendations, The Lake Como Association can effectively monitor and manage aquatic ecosystems, promoting biodiversity conservation and maintaining water quality for recreational and ecological purposes. Regular monitoring and adaptive management approaches will be essential for responding to dynamic changes in aquatic plant communities and environmental conditions throughout the year and into the future. SOLitude Lake Management looks forward to continuing a partnership and is available for any questions regarding the Lake Como Aquatic Plant Management Program.

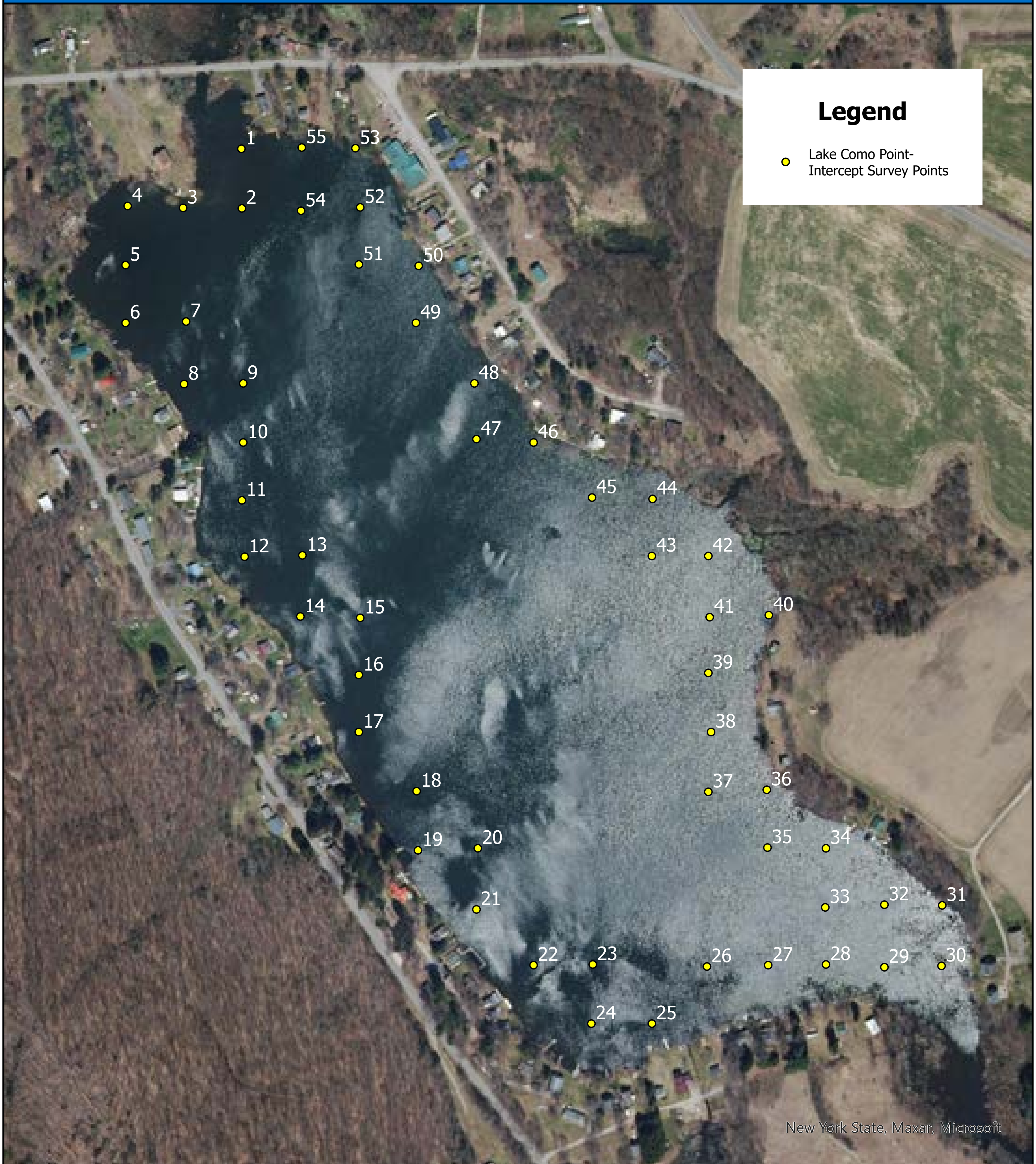
APPENDIX

Attachments:

- Survey Maps
  - Figure 1. Point-Intercept Locations
  - FIgure 2. Overall Density
  - Figure 3. Eurasian Watermilfoil
  - Figure 4. Curly-leaf Pondweed
  - Figure 5. Benthic Filamentous Algae
  - Figure 6. Coontail
  - Figure 7. Common Waterweed
  - Figure 8. Leafy Pondweed
  - Figure 9. White Waterlily
  - Figure 10. Wild Celery
  - Figure 11. Bassweed
  - Figure 12. Arrowhead
  - Figure 13. Spatterdock
  - Figure 14. Muskgrass
  - Figure 15. White Water Crowfoot
- Lake Como Vegetation and Algae Index
- 2024 Raw Comprehensive Survey Data

Figure 1. Lake Como Point-Intercept Survey Points

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

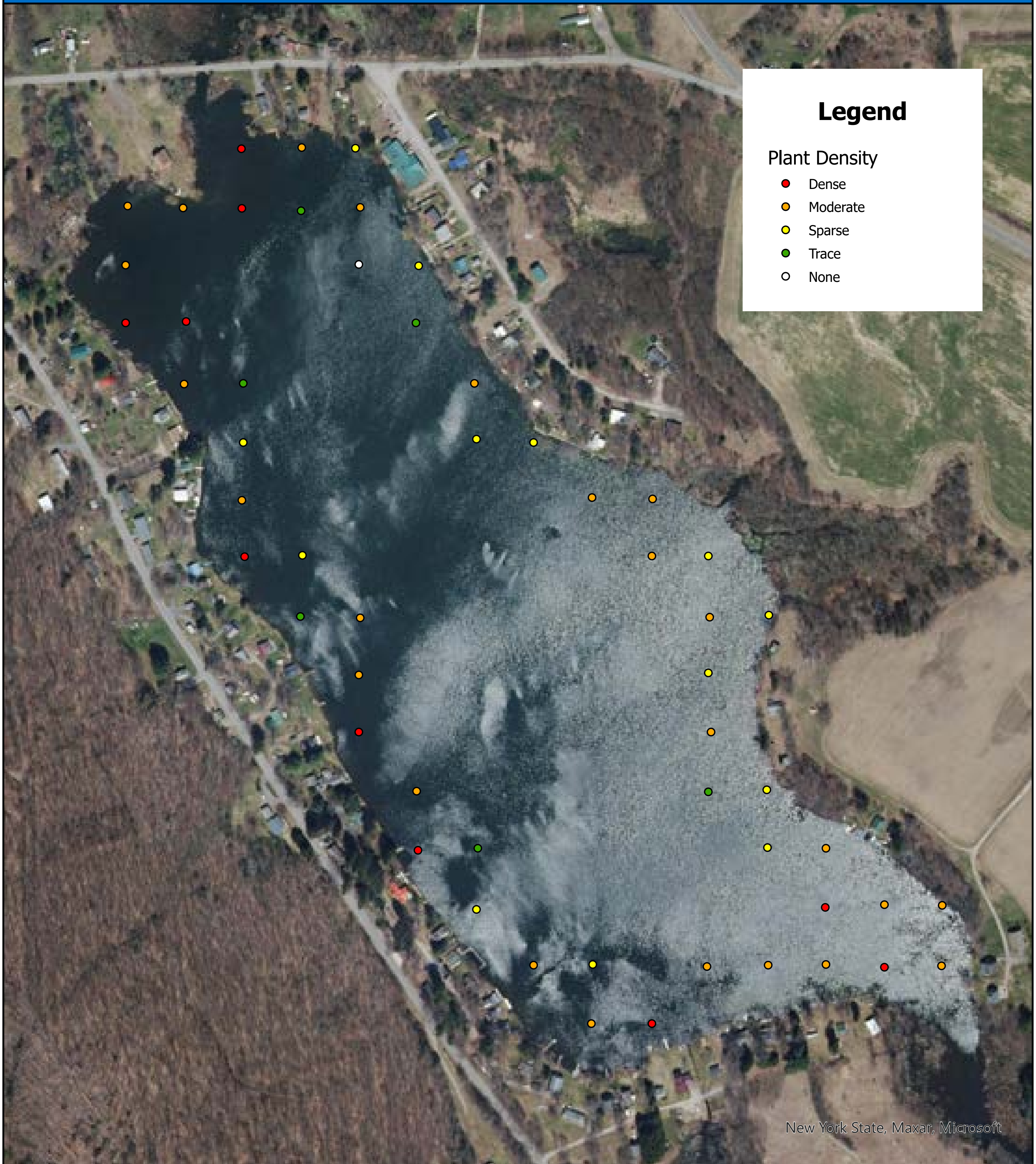
N

LAKE COMO
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 2. Lake Como Overall Plant Density

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

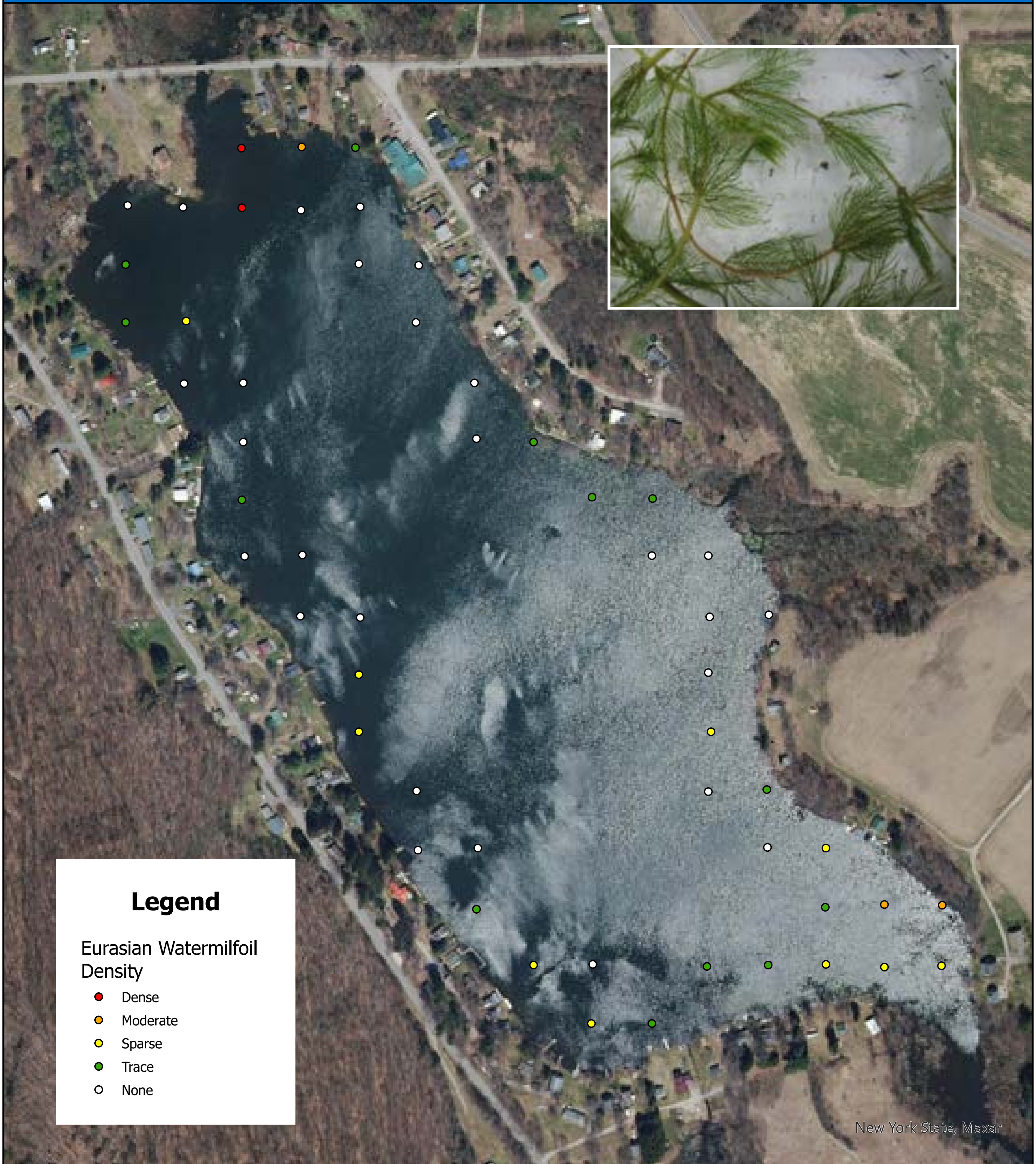
N

LAKE COMO
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 3. Lake Como Eurasian Watermilfoil Density and Distribution *(Myriophyllum spicatum)*

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

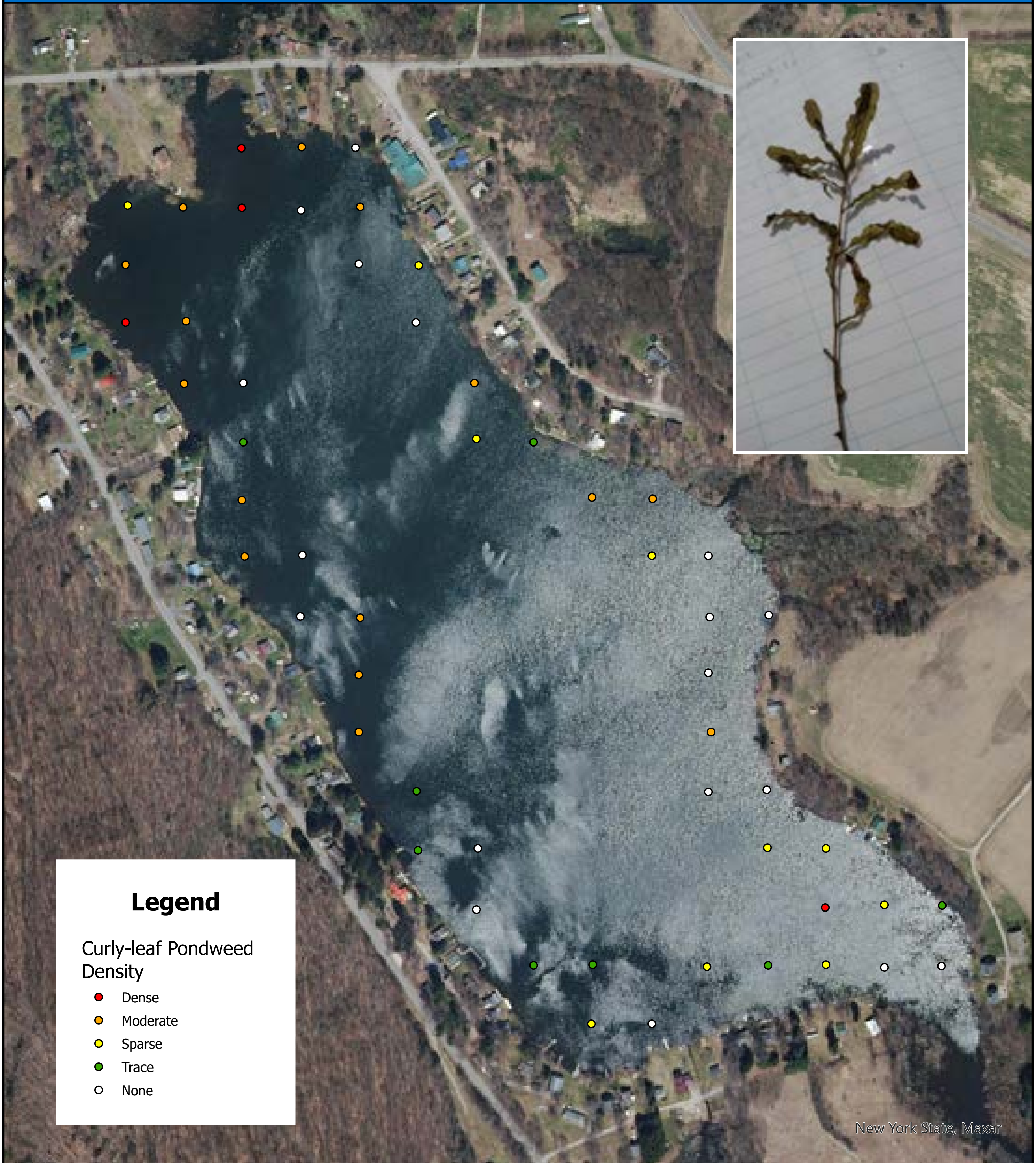
LAKE COMO

0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 4. Lake Como Curly-Leaf Pondweed Density and Distribution
(Potamogeton crispus)

SOLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

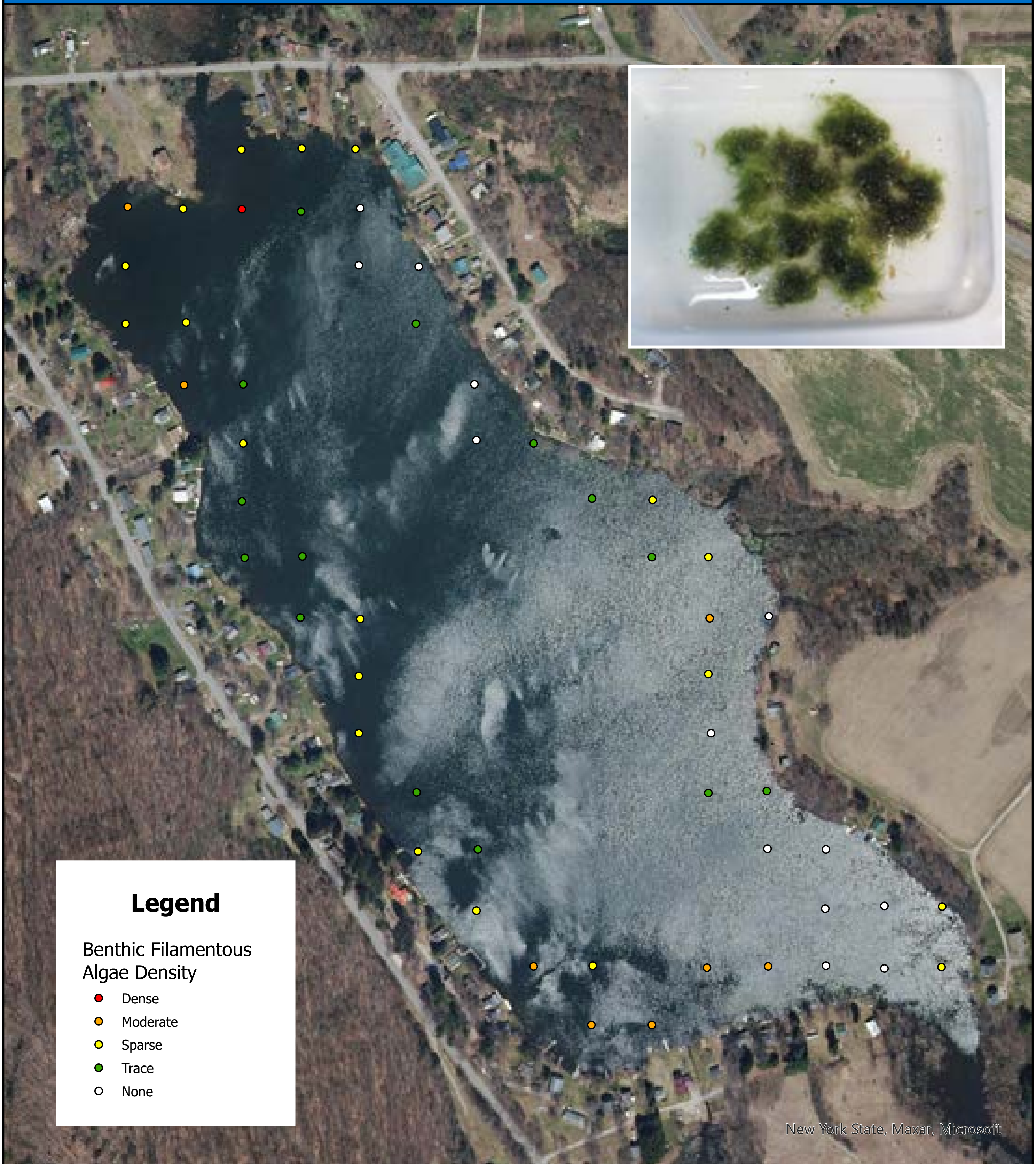
N

LAKE COMO
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 5. Lake Como Benthic Filamentous Algae Density and Distribution *(Various Species)*

SŌLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

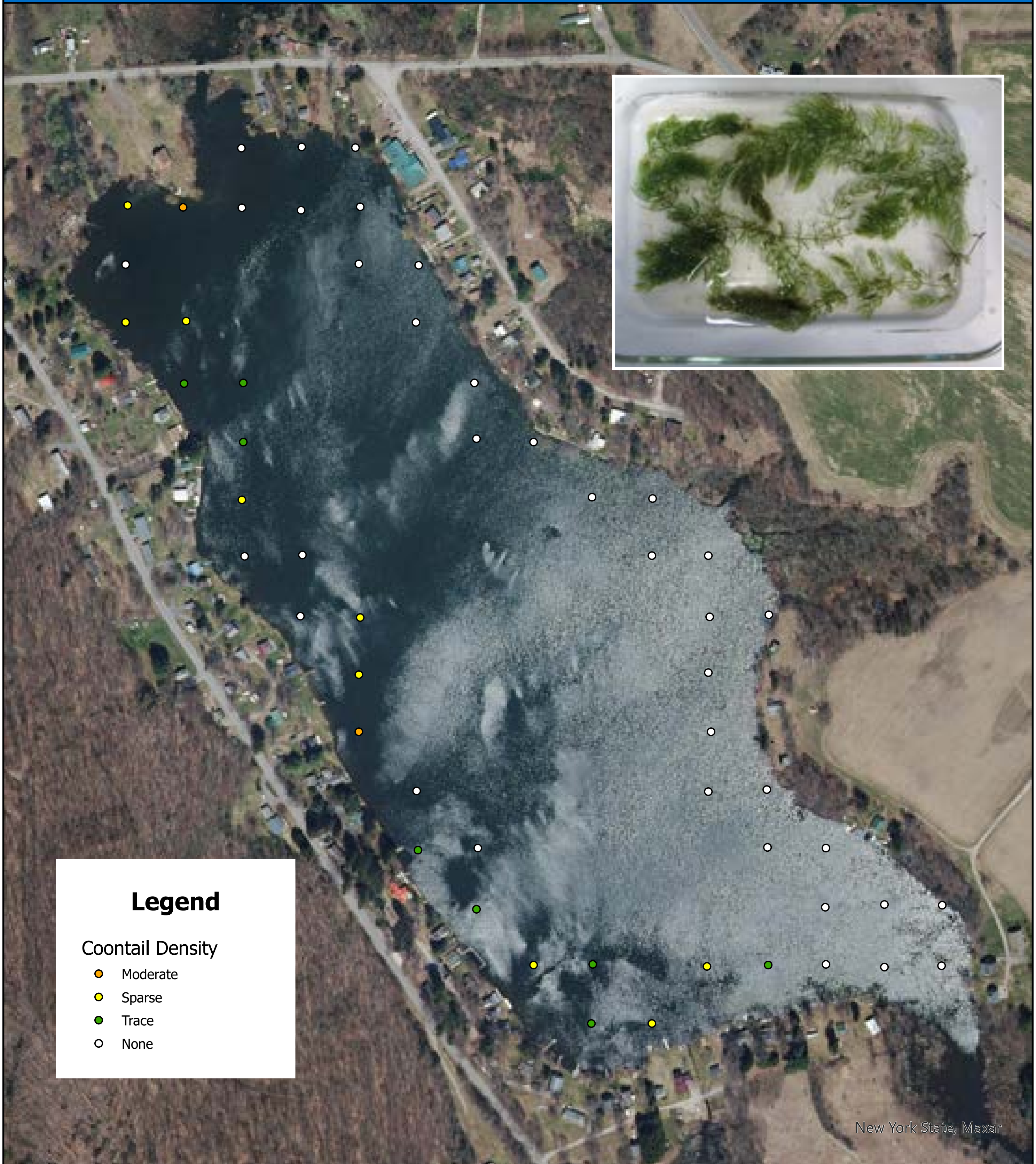
LAKE COMO

0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 6. Lake Como Coontail Density and Distribution *(Ceratophyllum demersum)*

888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

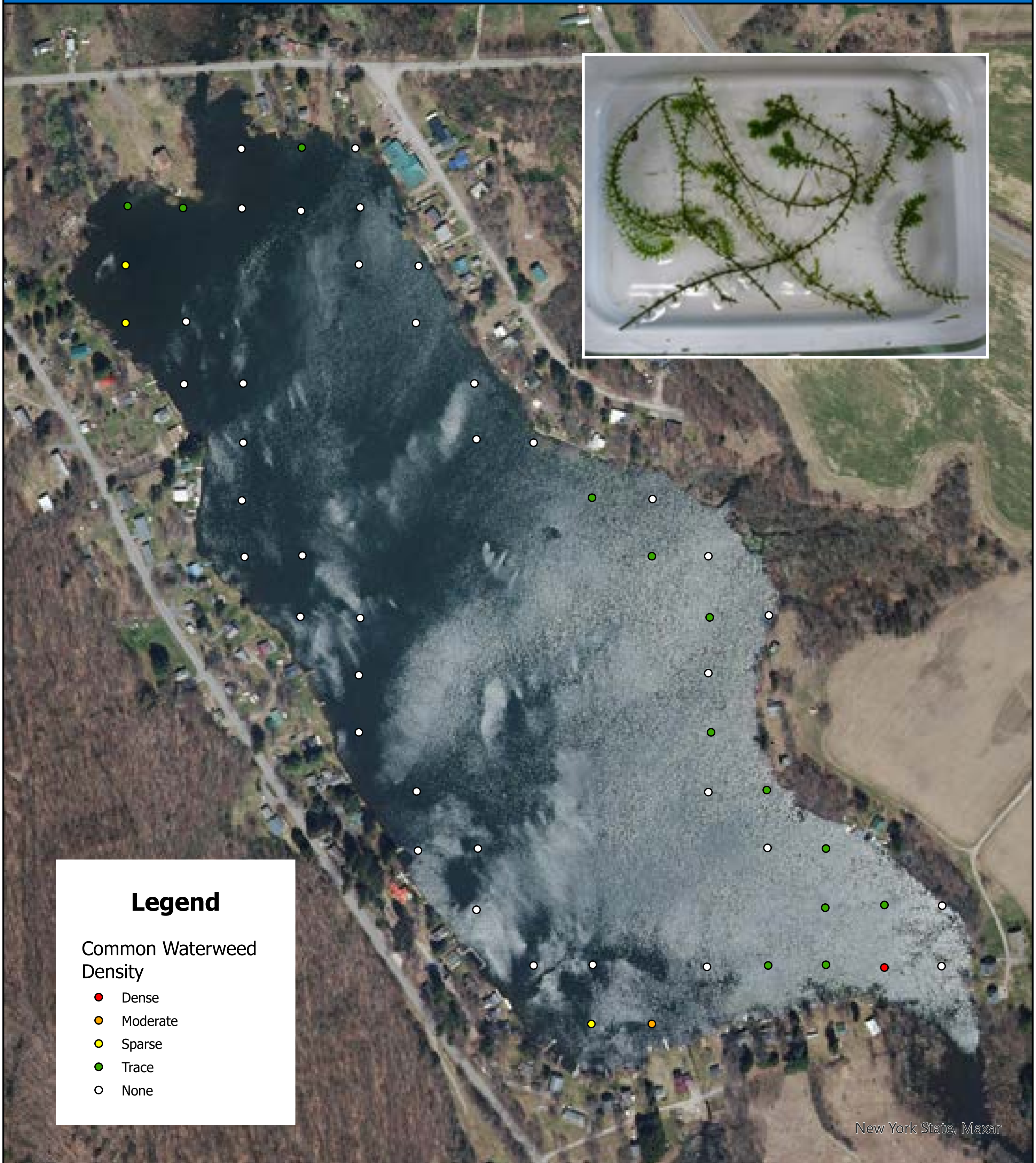
LAKE COMO

0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 7. Lake Como Common Waterweed Density and Distribution *(Elodea canadensis)*

SŌLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

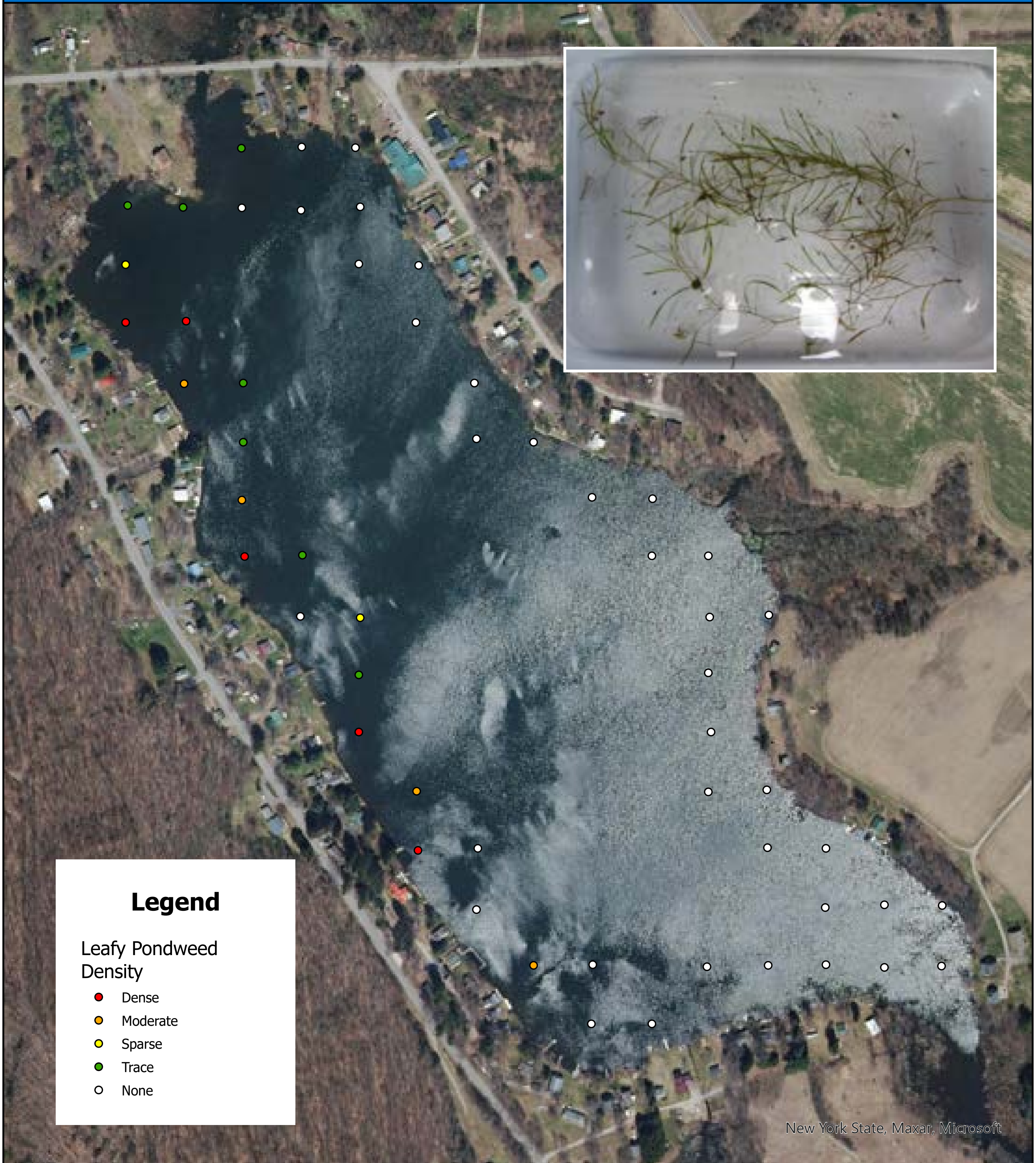
N

LAKE COMO
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 8. Lake Como Leafy Pondweed Density and Distribution
(Potamogeton foliosus)

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

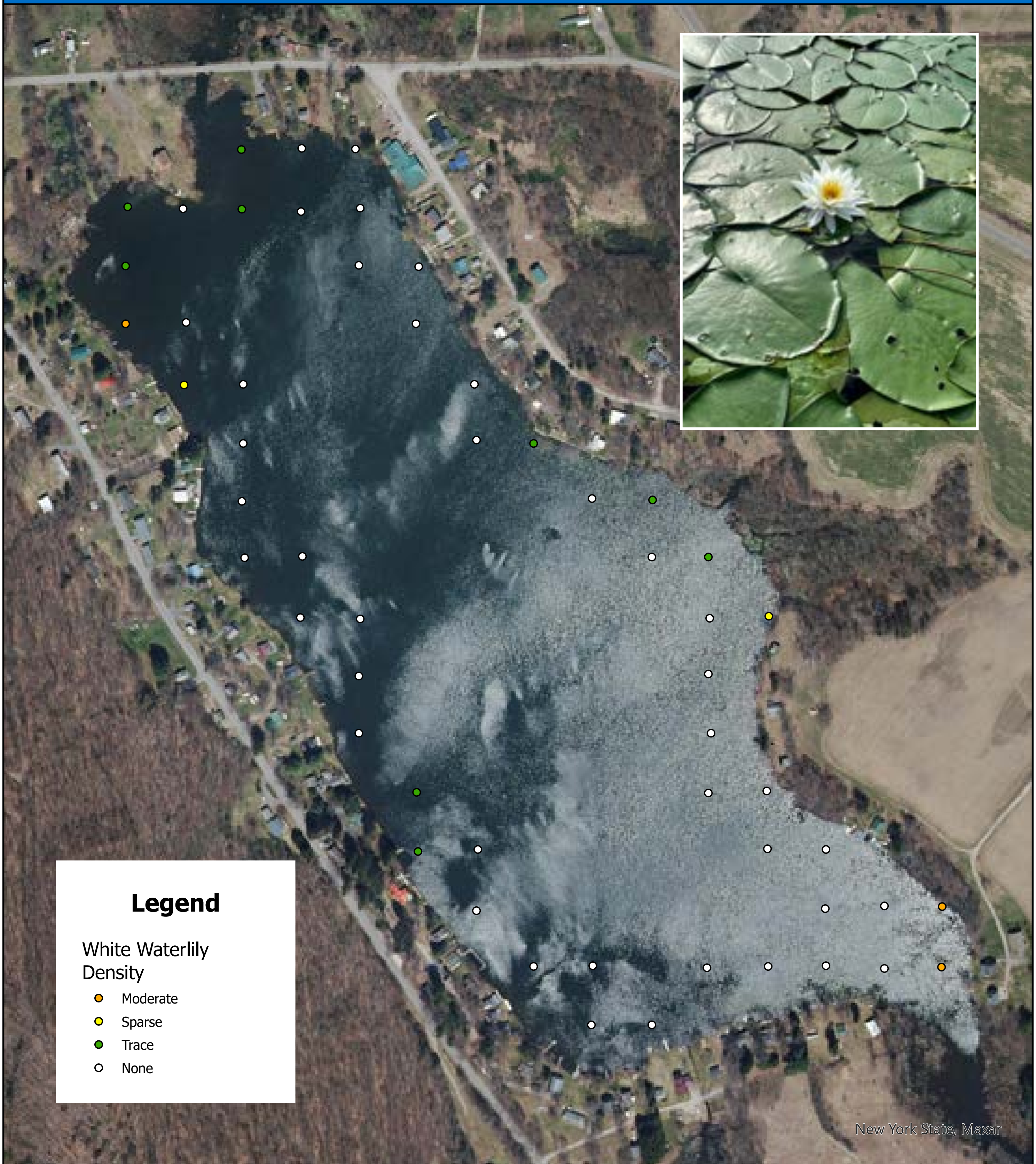
LAKE COMO

0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 9. Lake Como White Waterlily Density and Distribution *(Nymphaea odorata)*

LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

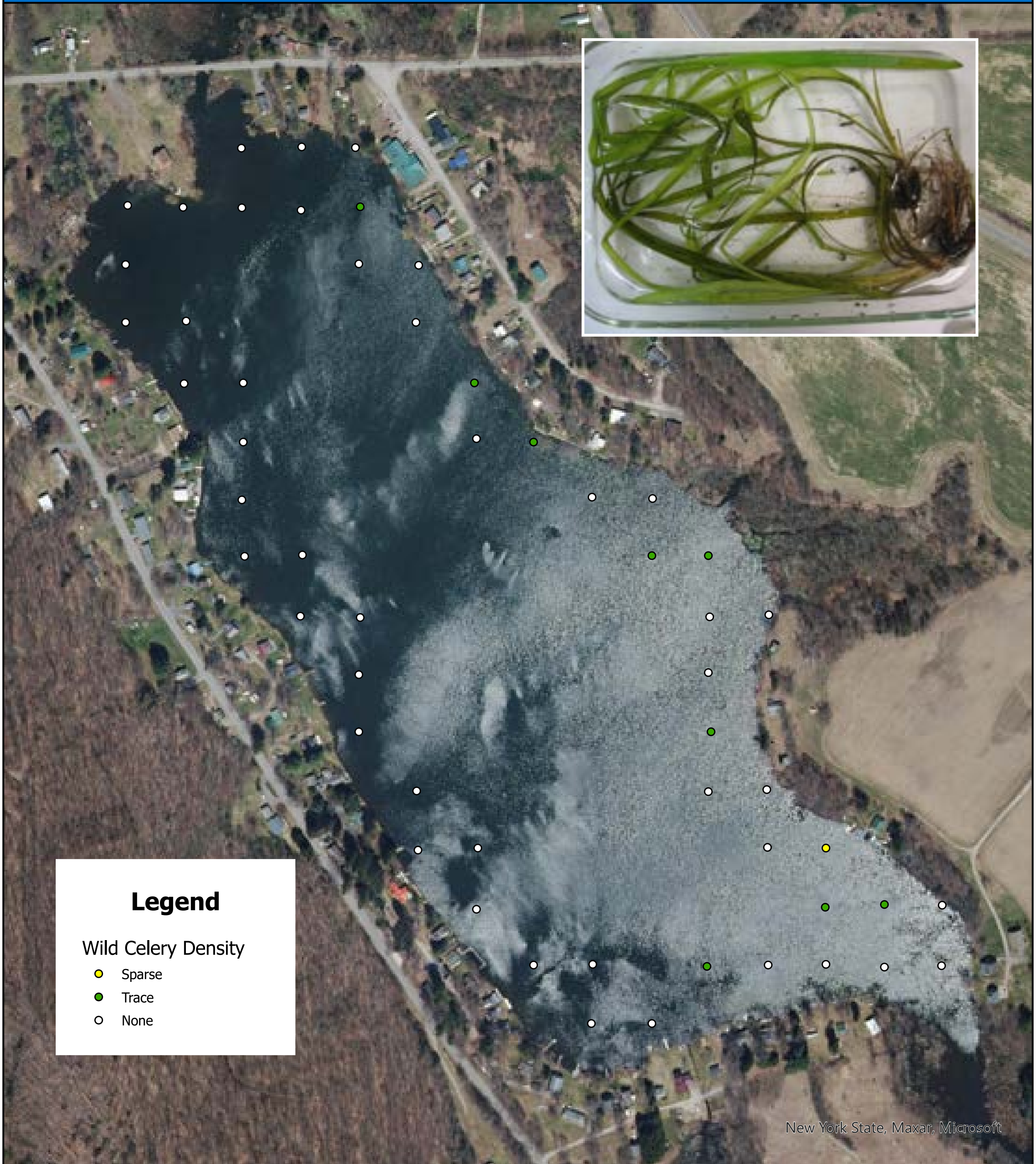
LAKE COMO

0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 10. Lake Como Wild Celery Density and Distribution
(Vallisneria americana)

SŌLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



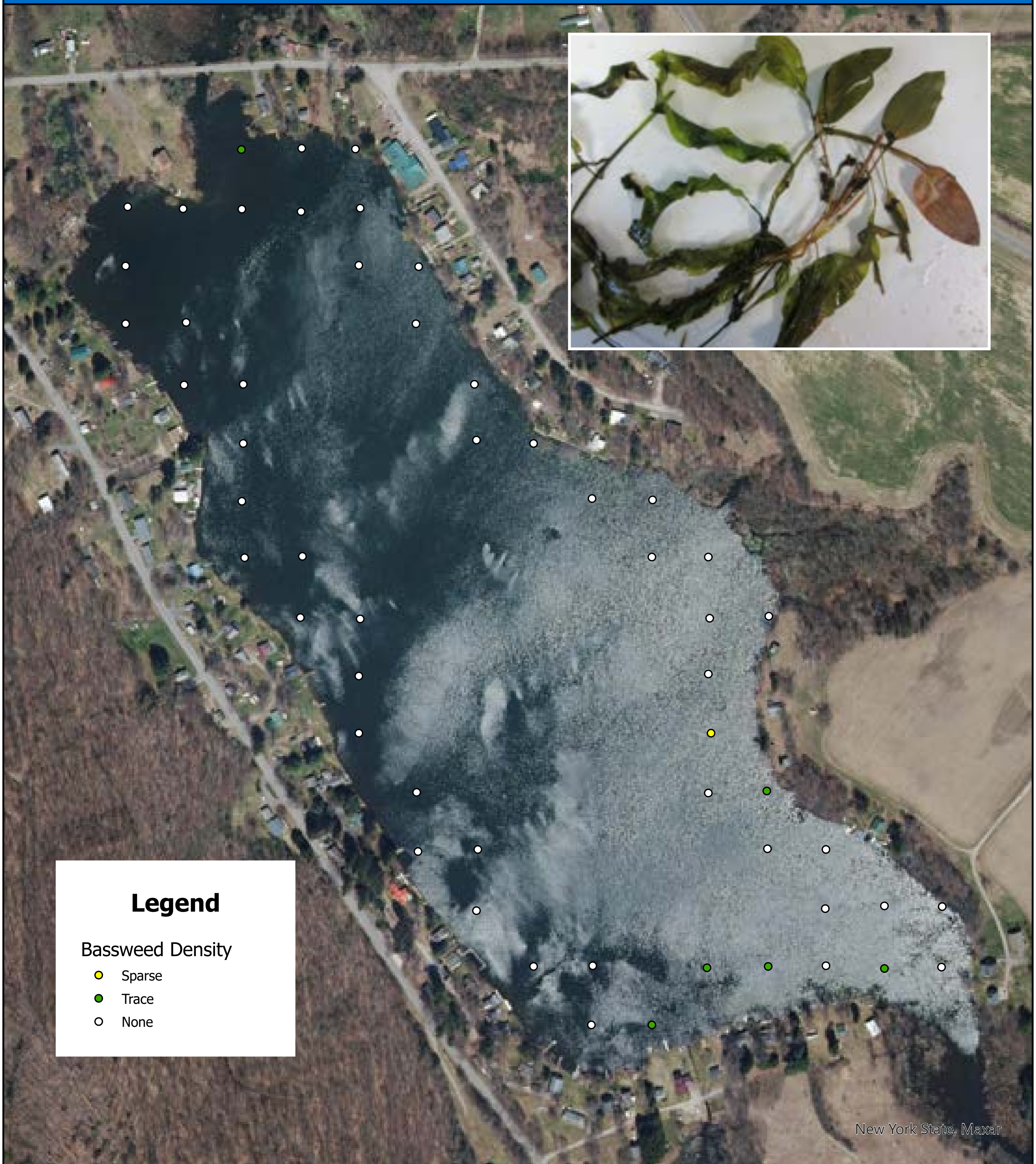
Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513
N

LAKE COMO
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 11. Lake Como Bassweed Density and Distribution
(Potamogeton amplifolius)

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

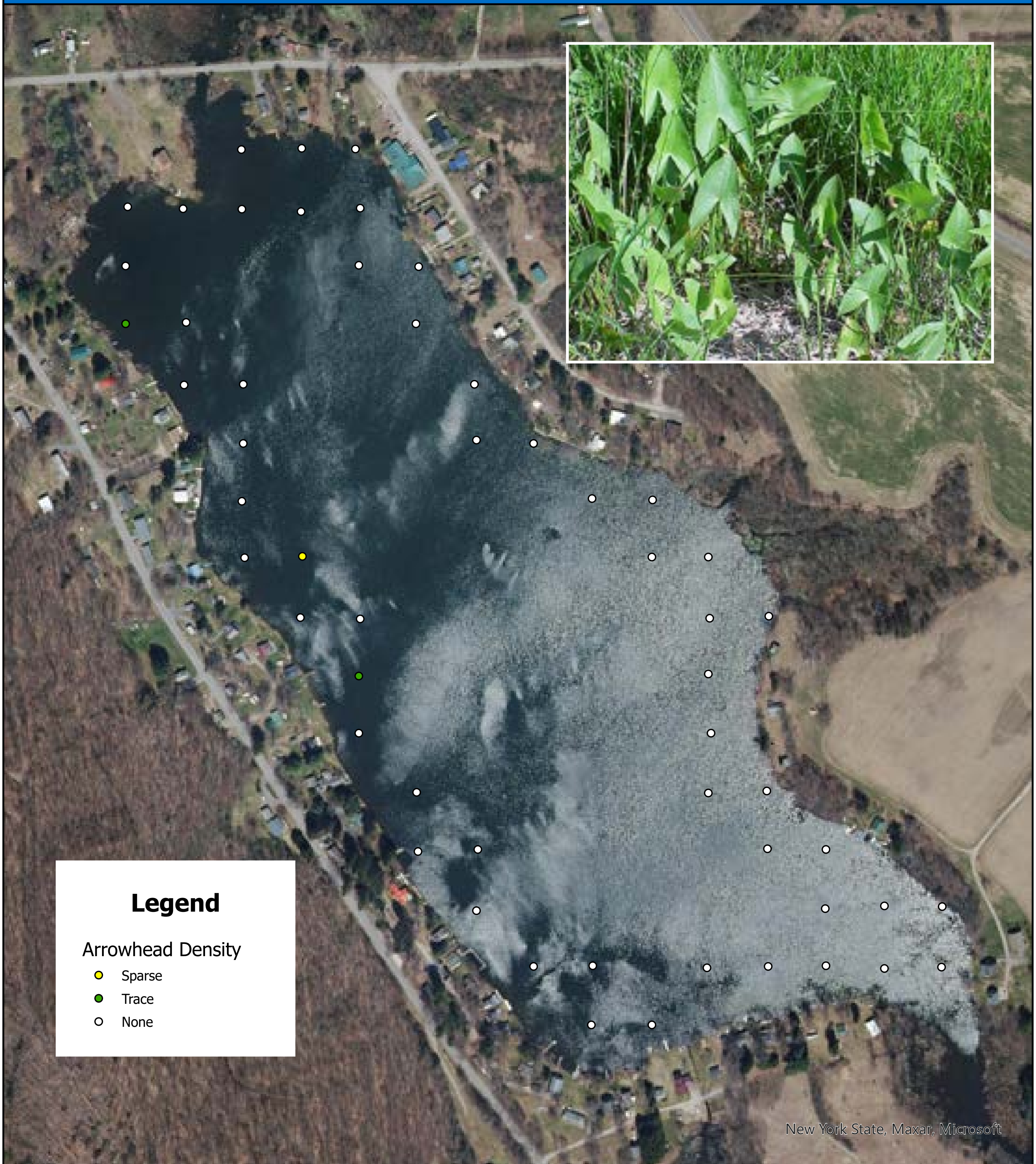
LAKE COMO

0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 12. Lake Como Arrowhead Density and Distribution
(Sagittaria latifolia)

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



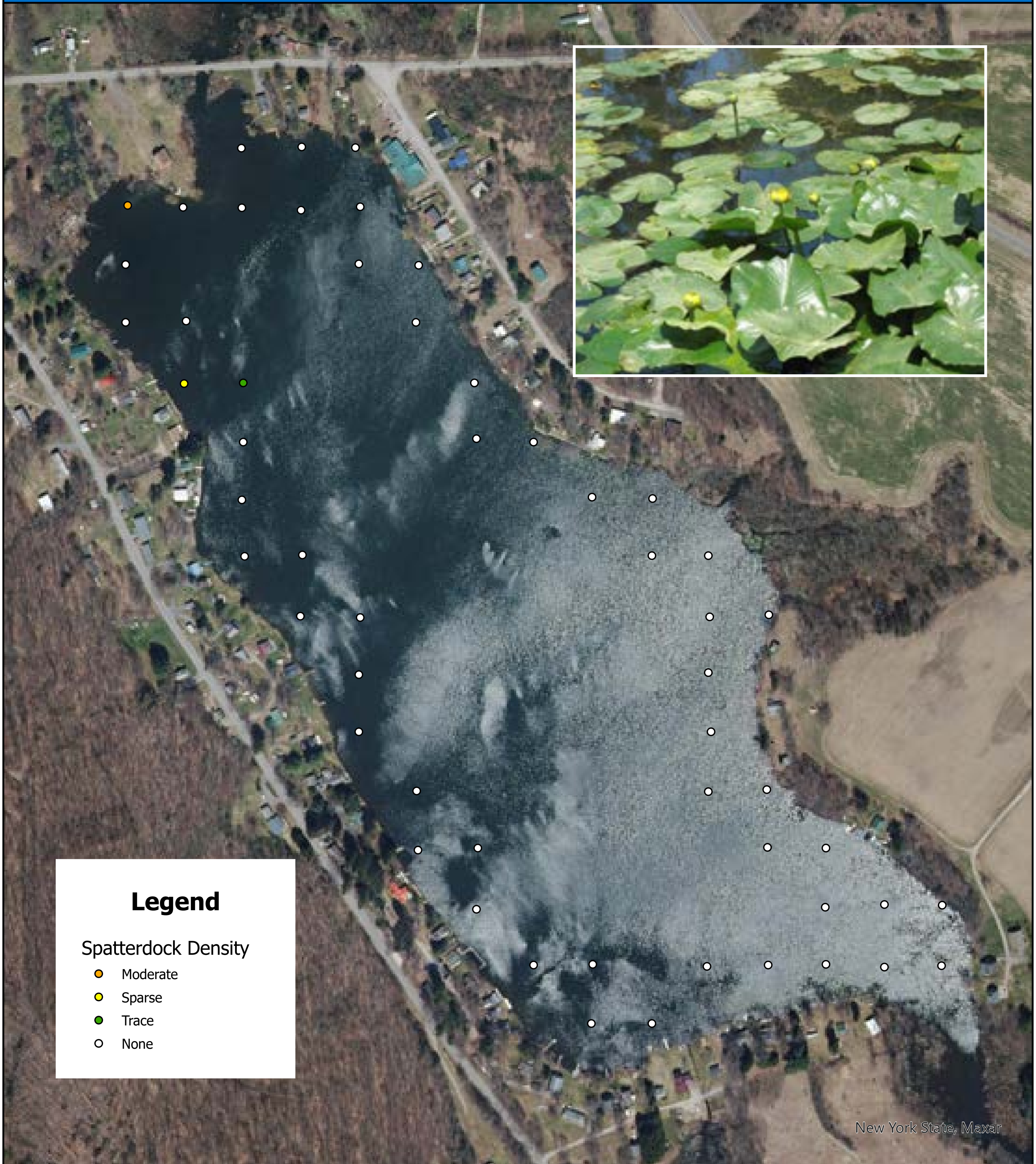
Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513
N

LAKE COMO
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 13. Lake Como Spatterdock Density and Distribution *(Nuphar advena)*

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

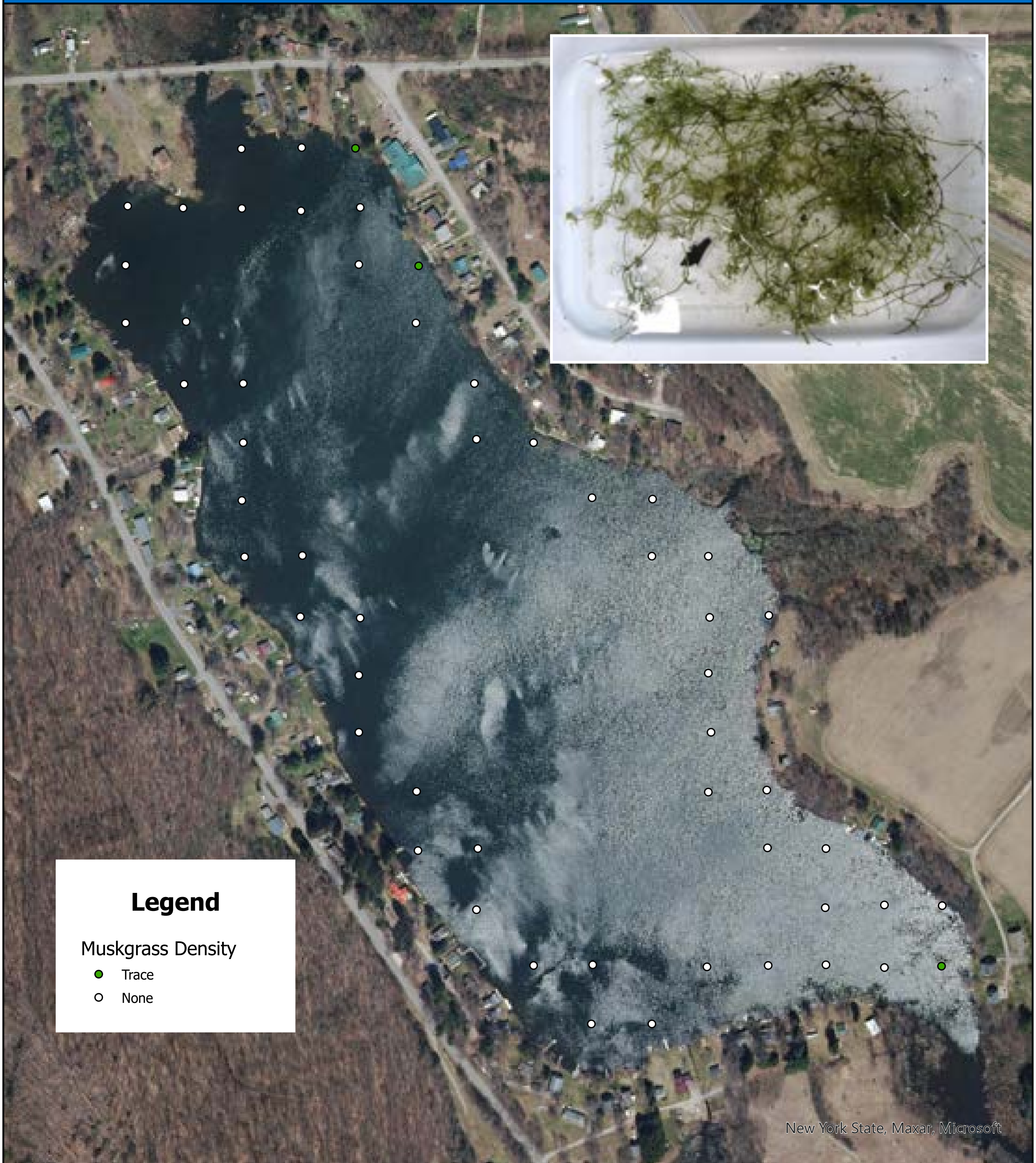
LAKE COMO

0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 14. Lake Como Muskgrass Density and Distribution
(Chara spp.)

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

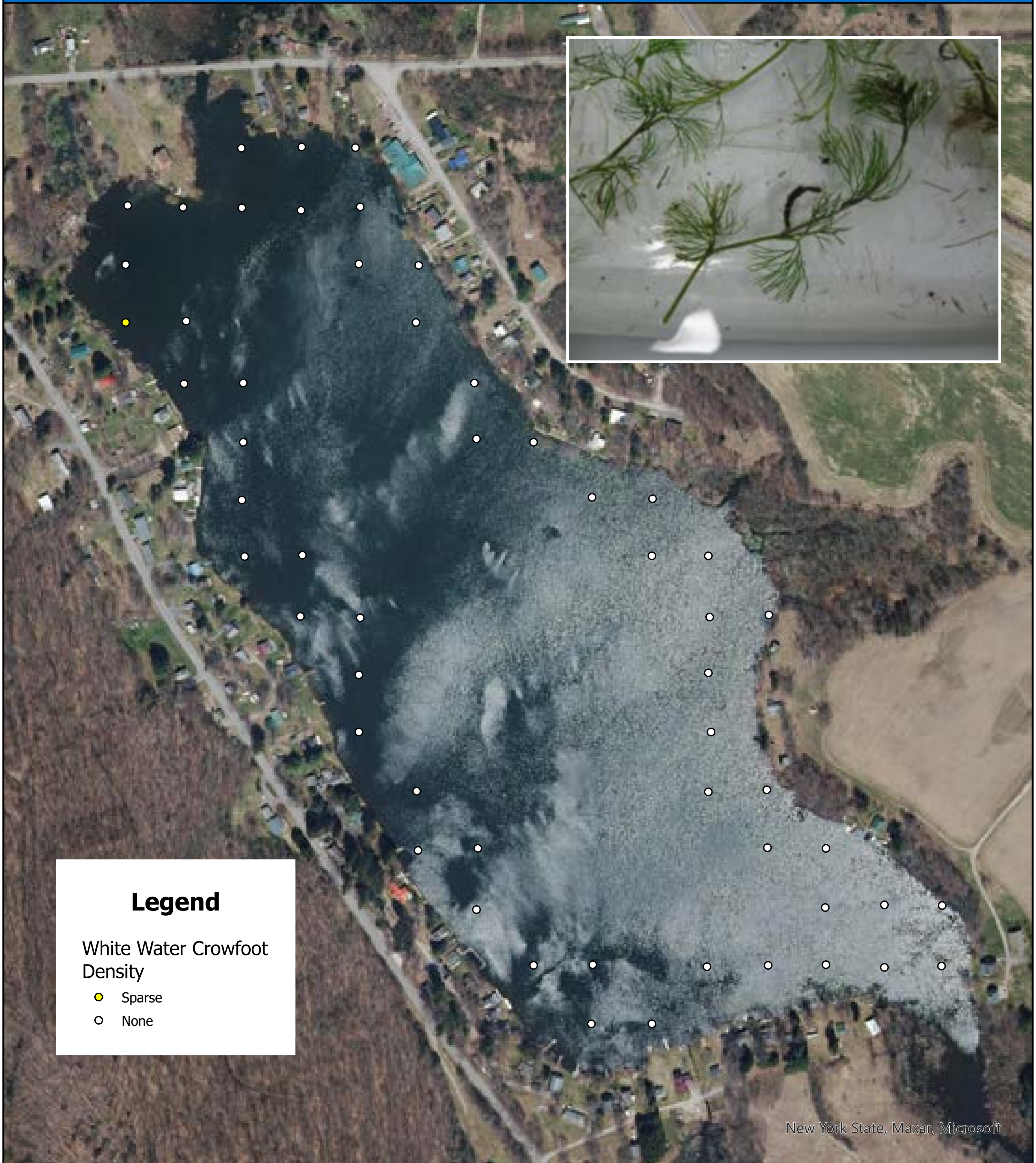
LAKE COMO

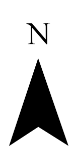
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Figure 15. Lake Como White Water Crowfoot Density and Distribution
(Ranunculus aquatilis)

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com





Lake Como
New York
Center: 76°18'9"W 42°40'40"N
Scale: 1:4,513

N

LAKE COMO
0 250 500 US Feet

Survey Date: May 31, 2024
Prepared by: E. Vulgamore
Office: SHREWSBURY, MA

Benthic Filamentous Algae
Various species

Benthic filamentous algae are multicellular organisms that form dense mats or strands on submerged substrates in aquatic environments. Characterized by their filamentous structure composed of interconnected cells, these algae thrive in diverse habitats ranging from freshwater lakes to rivers and estuaries. Their biology involves rapid growth through fragmentation and spore formation, adapting to varying environmental conditions such as light availability, nutrient concentrations, and water movement. Ecologically, benthic filamentous algae play pivotal roles in nutrient cycling by absorbing and releasing nutrients, stabilizing sediments, and providing habitat for microorganisms and small invertebrates. While beneficial in moderate amounts, excessive growth can indicate nutrient enrichment and degrade water quality by reducing oxygen levels and light penetration, potentially leading to detrimental impacts on aquatic ecosystems and biodiversity. Monitoring and managing benthic filamentous algae are essential for maintaining balanced aquatic habitats and preserving water quality for both ecological health and human use.

Curly-Leaf Pondweed
Potamogeton crispus

Curly-leaf pondweed is an invasive, submersed aquatic plant notable for its distinctive curly leaves and ability to thrive in a variety of freshwater habitats. Its biology includes perennial growth from a rhizomatous base, with elongated stems bearing submerged and floating leaves. This species reproduces through both seeds and vegetative propagation, allowing it to rapidly colonize new areas and form dense stands under favorable conditions. Its aggressive growth can outcompete native vegetation, potentially altering ecosystem dynamics and reducing biodiversity. Managing curly-leaf pondweed is crucial for maintaining balanced aquatic ecosystems and preserving water quality, often requiring integrated approaches that may include mechanical removal, herbicide treatments, and habitat restoration efforts. Regular monitoring and adaptive management strategies are essential to mitigate its impacts while promoting overall ecosystem health.

Eurasian Water Milfoil
Myriophyllum spicatum

Eurasian watermilfoil is an invasive, submersed aquatic plant recognized for its delicate, feathery leaves arranged in whorls around the stem. Native to Europe and Asia, it has become invasive in many freshwater ecosystems worldwide, including North America. Its biology features perennial growth from rooted stems that spread horizontally across sediments, enabling rapid vegetative reproduction through fragmentation and root formation. This reproductive strategy allows Eurasian watermilfoil to form dense mats that outcompete native vegetation and alter habitat structure. Dense growth can impede water flow, reduce light penetration, and diminish oxygen levels, potentially leading to adverse impacts on native species diversity and overall ecosystem health. Effective management of Eurasian watermilfoil often involves integrated approaches, including herbicide treatments, mechanical removal, and biological control methods, supplemented by ongoing monitoring to assess population dynamics and ecosystem responses.

Coontail
Ceratophyllum demersum

Coontail is a submersed aquatic plant characterized by its bushy appearance with densely packed, forked leaves arranged in whorls around the stem. Native to North America, it thrives in a wide range of freshwater habitats, from ponds and lakes to slow-moving streams. Coontail exhibits a unique biology with stems that can grow up to several meters long, rooting in sediment or freely floating. It reproduces vegetatively through fragmentation and also produces seeds, enabling rapid spread and colonization of new areas. Ecologically, coontail serves various roles in aquatic ecosystems: it provides shelter and spawning grounds for fish and invertebrates, contributes to nutrient cycling by absorbing dissolved nutrients from the water, and helps stabilize sediments. Its dense growth can improve water clarity by reducing suspended sediment and algae levels, benefiting water quality and supporting diverse aquatic communities. As a native species, coontail plays a vital role in maintaining balanced aquatic ecosystems, although excessive growth can sometimes lead to management challenges, particularly in nutrient-rich environments prone to algal blooms. Regular monitoring and management efforts are essential to preserve the ecological integrity and functional diversity of habitats where coontail thrives.

Common Waterweed
Elodea canadensis

Common Waterweed is a submersed aquatic plant native to North America and widely distributed across freshwater habitats globally. Its biology features slender, branching stems with whorls of bright green, oval-shaped leaves arranged in groups of three. Common Waterweed reproduces both sexually through flowers and asexually through stem fragments, allowing it to rapidly colonize new areas and form dense stands. This species is known for its role in oxygenating water through photosynthesis and providing habitat and food for aquatic organisms. Ecologically, it plays a crucial role in nutrient cycling by absorbing dissolved nutrients from the water column, thereby improving water clarity and quality. Its dense growth can also help stabilize sediments and reduce erosion. While beneficial for ecosystem health, Common Waterweed can become invasive in certain regions, outcompeting native vegetation and altering habitat dynamics. Effective management strategies often involve mechanical removal, herbicide treatments, and promoting biodiversity to ensure a balanced aquatic ecosystem. Monitoring its distribution and abundance is essential for understanding its impacts and implementing appropriate management actions to maintain aquatic biodiversity and water quality.

Leafy Pondweed

Potamogeton foliosus

Leafy Pondweed is a submersed aquatic plant found in freshwater habitats across North America. It is characterized by its long, slender stems and lanceolate leaves that are arranged alternately along the stem. This species reproduces vegetatively through rhizomes and also produces seeds, enabling both rapid spread and establishment in a variety of aquatic environments. Leafy Pondweed is adapted to a wide range of water depths and substrate types, making it a versatile component of freshwater ecosystems.Ecologically, Leafy Pondweed plays important roles in aquatic habitats. It provides habitat and refuge for fish, invertebrates, and other aquatic organisms, contributing to overall biodiversity. Its dense growth can help stabilize sediments, reduce erosion, and improve water clarity by trapping suspended particles. Leafy Pondweed also participates in nutrient cycling, absorbing nutrients such as nitrogen and phosphorus from the water column, which can help mitigate eutrophication in nutrient-rich environments.

White Waterlily
Nymphaea odorata

White Waterlily is a floating-leaved aquatic plant native to North America and widely distributed across freshwater habitats. It is characterized by its large, round leaves that float on the water surface and fragrant white flowers that bloom above the water. White Waterlily reproduces through rhizomes, which anchor the plant to the sediment, and it spreads vegetatively as well as by seeds dispersed through water or animals. This plant is adapted to shallow, nutrient-rich waters and can form dense colonies in suitable habitats. Ecologically, White Waterlily plays significant roles in aquatic ecosystems. Its floating leaves provide shade and shelter for fish, amphibians, and invertebrates, while its submerged portions offer refuge for aquatic organisms seeking protection from predators. The large, fragrant flowers attract pollinators such as bees and beetles, contributing to local biodiversity. White Waterlily also contributes to nutrient cycling by absorbing dissolved nutrients from the water column, helping to maintain water clarity and quality. Its presence can stabilize sediments and reduce erosion along shorelines, enhancing habitat stability. thrives.

Wild Celery
Vallisneria americana

Wild Celery is a submersed aquatic plant native to North America and commonly found in freshwater habitats such as lakes, ponds, and slow-moving rivers. It is characterized by long, ribbon-like leaves that grow from a root system buried in the sediment, with slender, branching stems that extend towards the water surface. Wild Celery reproduces through seeds and vegetative propagation, forming dense underwater meadows under favorable conditions. Ecologically, Wild Celery plays crucial roles in aquatic ecosystems. Its dense growth provides habitat and shelter for fish, invertebrates, and other aquatic organisms, contributing significantly to biodiversity. The submerged leaves and stems offer refuge for small organisms and juvenile fish, protecting them from predators. Wild Celery also enhances water quality by stabilizing sediments and reducing turbidity, thereby improving light penetration for other aquatic plants and enhancing habitat for bottom-dwelling organisms.

Additionally, Wild Celery participates in nutrient cycling by absorbing dissolved nutrients from the water column, which helps to mitigate nutrient pollution and maintain water clarity. Its presence can also contribute to oxygenation of the water through photosynthesis, benefiting overall ecosystem health.

Bassweed

Potamogeton amplifolius

Bassweed, scientifically known as *Amblystegium riparium*, is a common aquatic moss found in freshwater habitats worldwide. It typically grows in dense mats or patches along the edges of ponds, lakes, and slow-moving streams. Bassweed reproduces vegetatively through fragmentation, where small pieces of the moss can break off and establish new colonies, aided by water flow and suitable substrate conditions. This moss is adapted to humid environments and thrives in areas with consistent moisture and nutrient availability. Ecologically, Bassweed plays important roles in aquatic ecosystems. Its dense growth provides habitat and shelter for small aquatic organisms, including insects, small fish, and amphibians. The mats formed by Bassweed can stabilize sediments and reduce erosion along shorelines, contributing to the overall stability of the aquatic habitat. Additionally, Bassweed can contribute to nutrient cycling by absorbing and retaining nutrients from the water column, influencing nutrient availability for other aquatic plants and organisms.

Arrowhead
Sagittaria latifolia

Arrowhead is a group of emergent aquatic plants found in various freshwater habitats across North America and beyond. These plants are characterized by their arrow-shaped leaves, which emerge from a central stem and are often submerged or partially floating. Arrowhead reproduces through seeds and rhizomes, forming dense colonies in shallow waters with muddy or sandy substrates. Ecologically, Arrowhead plays important roles in aquatic ecosystems. Its dense growth provides habitat and food for a variety of wildlife, including waterfowl, fish, and amphibians. The large, showy flowers of Arrowhead attract pollinators such as bees and butterflies, contributing to local biodiversity. Arrowhead also stabilizes sediments with its extensive root systems, reducing erosion and improving water clarity by trapping suspended particles. Additionally, its presence can create complex microhabitats that support a diverse array of aquatic organisms.

Spatterdock
Nuphar advena

Spatterdock is a floating, perennial aquatic plant native to North America, commonly found in ponds, lakes, and slow-moving streams. It is characterized by its large, round leaves that float on the water surface and yellow, globe-shaped flowers that rise above the water on sturdy stalks. Spatterdock reproduces through seeds and thick rhizomes that anchor the plant in muddy or silty substrates, enabling it to form dense colonies in shallow water.Ecologically, Spatterdock plays significant roles in freshwater habitats. Its floating leaves provide shade and shelter for fish, amphibians, and aquatic invertebrates, while its submerged portions offer refuge for small organisms seeking protection. The large, fragrant flowers attract pollinators such as bees and beetles, contributing to local biodiversity. Spatterdock also plays a crucial role in nutrient cycling by absorbing dissolved nutrients from the water column, which helps improve water clarity and quality. Its extensive root system stabilizes sediments, reducing erosion and maintaining shoreline stability.

Muskgrass (Maco Algae)
Chara spp.

Muskgrass is a genus of green algae commonly known as stoneworts, found in various freshwater habitats worldwide. These macroalgae are characterized by their distinctive appearance, with branched, calcified stems that resemble submerged plants. Chara species reproduce through fragmentation and sexual reproduction, producing oospores that can withstand harsh environmental conditions and aid in dispersal. They thrive in nutrient-rich, alkaline waters with ample sunlight and firm substrates, such as sand or gravel. Ecologically, Chara plays critical roles in aquatic ecosystems. Its dense growth provides habitat and refuge for aquatic organisms, including fish, insects, and small invertebrates. The calcified stems of Chara contribute to sediment stabilization, reducing erosion and improving water clarity by trapping sediment particles. Additionally, Chara participates in nutrient cycling by absorbing dissolved nutrients from the water column, which helps maintain water quality and mitigate eutrophication in nutrient-enriched environments. While beneficial for biodiversity and ecosystem health, Chara can become problematic in some areas, forming dense mats that interfere with recreational activities and water flow. Management strategies typically involve monitoring Chara populations and implementing mechanical removal techniques as needed to control its abundance. Conservation efforts often focus on maintaining a balanced aquatic plant community and preserving the ecological functions provided by Chara in freshwater habitats. Regular assessment and adaptive management practices are essential for sustaining healthy aquatic ecosystems where Chara thrives.

White Water Crowfoot

Ranunculus aquatilis

White Water Crowfoot is a submersed aquatic plant native to North America, Europe, and Asia, commonly found in ponds, lakes, and slow-moving streams. It is characterized by its delicate, finely divided leaves and small white flowers that float on the water's surface or rise slightly above it. White Water Crowfoot reproduces through seeds and vegetative propagation, forming dense colonies in shallow water with muddy or silty substrates. Ecologically, White Water Crowfoot plays significant roles in freshwater habitats. Its submerged and floating foliage provides habitat and shelter for aquatic organisms, including fish, amphibians, and invertebrates. The plant's extensive root system stabilizes sediments and reduces erosion, contributing to the overall stability of the aquatic ecosystem. Additionally, White Water Crowfoot contributes to nutrient cycling by absorbing dissolved nutrients from the water column, helping to maintain water clarity and quality. Its presence can also create complex microhabitats that support a diverse array of aquatic organisms.

Lake Como
Aquatic Vegetation Survey
May 31, 2024

STATION	SAMPLE#	LATITUDE	LONGITUDE	OVERALL	Wild Celery	Eurasian Water Milfoil	Common Waterweed	Coontail	Benthic Filamentous Algae	Curly-Leaf Pondweed	Leafy Pondweed	White-Water Lily	Arrowhead	Spatterdock	White-Water Crowfoot	Bassweed	Muskgrass
1	A			D		D			S	D	T	T				T	
1	B			D		D			S	D	T	T					
1	M	894975.4344	976966.2711	D		D			S	D	T	T				T	
2	A			D		D			D	D		T					
2	B			D		D			D	D		T					
2	M	894976.6586	976798.5631	D		D			D	D		T					
3	A			S			S	S	T	S	T						
3	B			M				M	S	M	T						
3	M	894811.3989	976799.7872	M			T	M	S	M	T						
4	A			M				T	M	S	T	T		S			
4	B			M			S	S	M	S	T	T		M			
4	M	894655.4733	976805.2194	M			T	S	M	S	T	T		M			
5	A			S			S		T	S	T	T					
5	B			M		T	S		S	M	S						
5	M	894649.7351	976638.8121	M		T	S		S	M	S	T					
6	A			D		T	S	S	S	M	D	S	T		T		
6	B			D		T	S	S	T	D	D	M			M		
6	M	894649.7351	976476.2302	D		T	S	S	S	D	D	M	T		S		
7	A			D		S		T	S	M	D						
7	B			D		T		S	S	M	D						
7	M	894819.9679	976480.0557	D		S		S	S	M	D						
8	A			M					S	M	M	S		S			
8	B			M				S	M	M	M	T		S			
8	M	894814.2297	976304.0847	M				T	M	M	M	S		S			
9	A			T				T	T		T						
9	B			T					T		T			T			
9	M	894980.637	976305.9974	T				T	T		T			T			
10	A			S				T	S	T	T						
10	B			T					T		T						
10	M	894980.637	976139.5901	S				T	S	T	T						
11	A			M		T		S	T	M	M						
11	B			S		T		T	T	S	S						
11	M	894976.8116	975977.0082	M		T		S	T	M	M						
12	A			D					T	M	D						
12	B			D					T	S	D						
12	M	894984.4625	975818.2518	D					T	M	D						
13	A			S					T		T		S				
13	B			S					T				S				
13	M	895147.0444	975822.0773	S					T		T		S				
14	A			T					T								
14	B			T					T								
14	M	895141.3062	975649.9318	T					T								
15	A			M				M	T	M	T						
15	B			M					S	M	S						
15	M	895309.6262	975646.1063	M				S	S	M	S						
16	A			M		T		T	S	M	T						
16	B			M		S		M	T	M	T		T				
16	M	895305.8008	975485.4372	M		S		S	S	M	T		T				
17	A			M		S		M	S	S	M						
17	B			D		T		M	S	D	D						
17	M	895305.8008	975324.7681	D		S		M	S	M	D						
18	A			M					T	S	M	T					
18	B			M					T		M						
18	M	895468.3826	975158.3608	M					T	T	M	T					
19	A			D					T	T	D						
19	B			D				S	S	T	D	T					
19	M	895472.2081	974991.9534	D				T	S	T	D	T					
20	A			T					T								
20	B			T					T								
20	M	895640.5281	974997.6916	T					T								
21	A			T					T								
21	B			S		S		S	S								
21	M	895636.7027	974825.5461	S		T		T	S								
22	A			M		S		S	S		M						
22	B			M		S		S	M	T	S						
22	M	895797.3718	974668.7024	M		S		S	M	T	M						
23	A			S				T	S								
23	B			T					T	T							
23	M	895963.7791	974670.6152	S				T	S	T							
24	A			M		T	M	S	S	S							
24	B			M		S			M	S							
24	M	895959.9537	974504.2078	M		S	S	T	M	S							

Lake Como
Aquatic Vegetation Survey
May 31, 2024

STATION	SAMPLE#	LATITUDE	LONGITUDE	OVERALL	Wild Celery	Eurasian Water Milfoil	Common Waterweed	Coontail	Benthic Filamentous Algae	Curly-Leaf Pondweed	Leafy Pondweed	White-Water Lily	Arrowhead	Spatterdock	White-Water Crowfoot	Bassweed	Muskgrass
25	A			M			T	S	M								
25	B			D		S	D	S	M							T	
25	M	896130.1865	974504.2078	D		T	M	S	M							T	
26	A			M	T			T	M	T						T	
26	B			M		S		S	M	S							
26	M	896285.1174	974664.877	M	T	T		S	M	S						T	
27	A			M		T			M	T						T	
27	B			M			T	T	M	T							
27	M	896457.2629	974668.7024	M		T	T	T	M	T						T	
28	A			D		T				D							
28	B			S		S	T										
28	M	896619.8448	974670.6152	M		S	T			S							
29	A			D			D										
29	B			M		M	M									S	
29	M	896784.3394	974662.9643	D		S	D									T	
30	A			S		S			T			S					
30	B			M		S			M			M					T
30	M	896945.0085	974666.7897	M		S			S			M					T
31	A			M		M			S	T		M					
31	B			M		M			S	T		M					
31	M	896946.9212	974837.0225	M		M			S	T		M					
32	A			S	T	S	T										
32	B			D		M				D							
32	M	896784.3394	974838.9352	M	T	M	T			S							
33	A			D		T	T			D							
33	B			D	T		T			D							
33	M	896617.932	974831.2843	D	T	T	T			D							
34	A			M	T	M	T			T							
34	B			S	S		T			S							
34	M	896619.8448	974997.6916	M	S	S	T			S							
35	A			S						S							
35	B			S						S							
35	M	896455.3502	974999.6043	S						S							
36	A			S		S	T									S	
36	B			S			T		S								
36	M	896453.4374	975162.1862	S		T	T		T							T	
37	A			T					T								
37	B																
37	M	896288.9429	975156.448	T					T								
38	A			M	S	M				S							
38	B			M			S			M						M	
38	M	896296.5938	975324.7681	M	T	S	T			M						S	
39	A			S					S								
39	B			S					S								
39	M	896288.9429	975491.1754	S					S								
40	A			S								S					
40	B			S								S					
40	M	896459.1756	975653.7573	S								S					
41	A			M			T		M								
41	B			M					M								
41	M	896292.7683	975648.0191	M			T		M								
42	A			S	T				S			T					
42	B			S					S			T					
42	M	896288.9429	975820.1646	S	T				S			T					
43	A			M	T		S			M							
43	B			S	T				S	T							
43	M	896130.1865	975820.1646	M	T		T		T	S							
44	A			M					M	M							
44	B			M		T				M		T					
44	M	896132.0992	975980.8337	M		T			S	M		T					
45	A			M		S	T			M							
45	B			M			T		S	M							
45	M	895961.8664	975984.6592	M		T	T		T	M							
46	A			S	T				S								
46	B			S		T				S		T					
46	M	895797.3718	976139.5901	S	T	T			T	T		T					
47	A			S						S							
47	B			S						S							
47	M	895636.7027	976149.1537	S						S							
48	A			M	T					M							
48	B			S	T					S							
48	M	895630.9645	976305.9974	M	T					M							

Lake Como
Aquatic Vegetation Survey
May 31, 2024

STATION	SAMPLE#	LATITUDE	LONGITUDE	OVERALL	Wild Celery	Eurasian Water Milfoil	Common Waterweed	Coontail	Benthic Filamentous Algae	Curly-Leaf Pondweed	Leafy Pondweed	White-Water Lily	Arrowhead	Spatterdock	White-Water Crowfoot	Bassweed	Muskgrass
49	A			T					T								
49	B			T					T								
49	M	895466.4699	976476.2302	T					T								
50	A			S						S							T
50	B			S						S							
50	M	895474.1208	976636.8993	S						S							T
51	A																
51	B																
51	M	895305.8008	976640.7248														
52	A			M	T					M							
52	B			M						M							
52	M	895309.6262	976801.3939	M	T					M							
53	A			S		S			T								
53	B			S					S								T
53	M	895296.2371	976967.8012	S		T			S								T
54	A			T					T								
54	B			T					T								
54	M	895143.2189	976791.8303	T					T								
55	A			M		S	T			M							
55	B			M		M			M	M							
55	M	895145.1316	976969.714	M		M	T		S	M							