The Connecticut Agricultural Experiment Station

123 Huntington Street

New Haven, CT 06511

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Rogers Lake

Old Lyme, CT

Aquatic Vegetation Survey
Water Chemistry
Aquatic Plant Management Options

2021

Gregory J. Bugbee

Summer E. Stebbins

Department of Environmental Sciences

The Connecticut Agricultural Experiment Station

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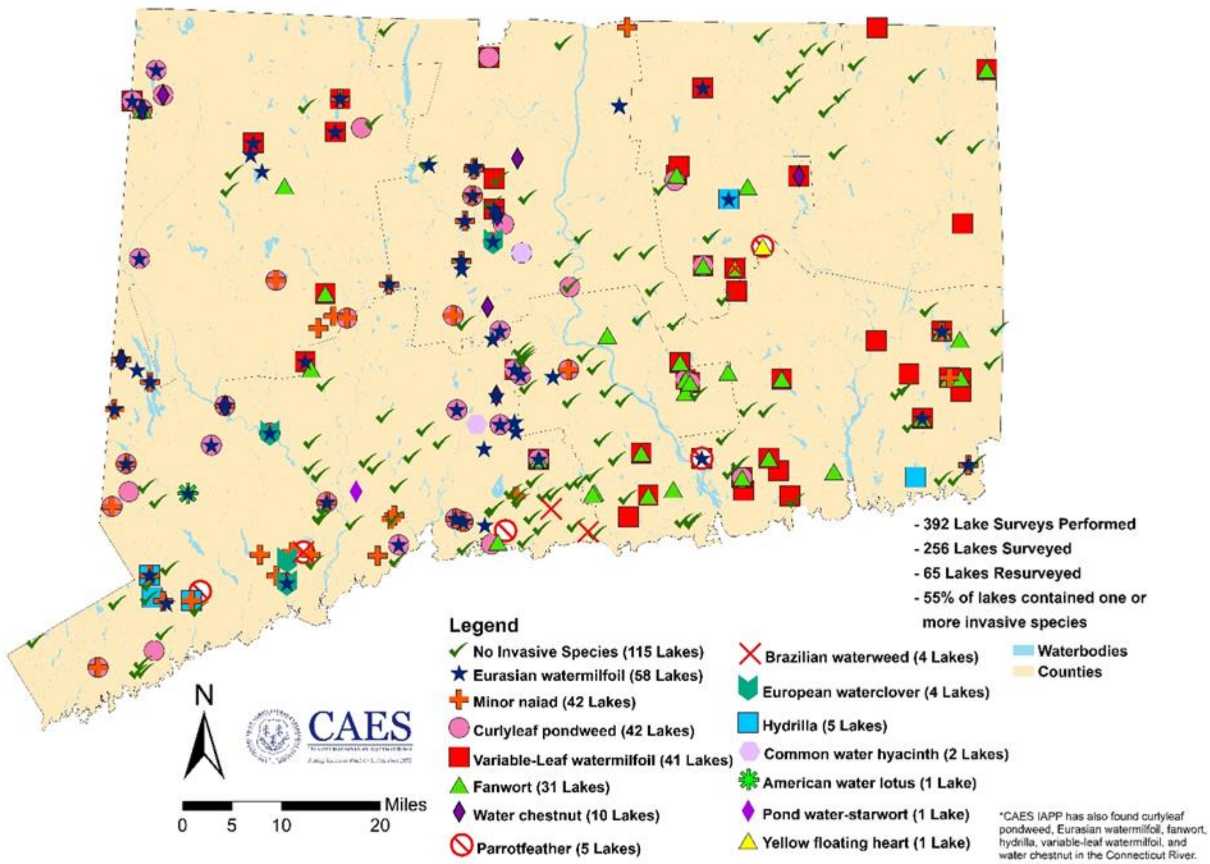


Figure 1. Locations of invasive aquatic plants found by CAES IAPP from 2004 – 2021.

Introduction:

Since 2004, the Connecticut Agricultural Experiment Station (CAES) Invasive Aquatic Plant Program (IAPP) has surveyed or resurveyed aquatic vegetation and monitored water chemistry in nearly 250 Connecticut lakes, ponds, and rivers (Figure 1). Approximately 55% of the waterbodies contain invasive (non-native) plant species that can cause rapid deterioration of their aquatic ecosystems, recreational value, and nearby home values. The presence of invasive species is related to water chemistry, public boat launches, random events, and climate change (Rahel and Olden 2008, June-Wells et al. 2013). The CAES IAPP information is stored online where stakeholders can view digitized vegetation maps, detailed transect data, and temperature and dissolved oxygen profiles as well as water test results for clarity, pH, alkalinity, conductivity, and total phosphorus (portal.ct.gov/caes-iapp). This information allows citizens, government officials, and scientists to view past conditions, compare them with current conditions, and make educated management decisions.

Rogers Lake is a 260-acre waterbody located on the border of Lyme and Old Lyme in southeastern Connecticut. The average depth of the lake is 19 feet, with a maximum depth of 63 feet. There is a state boat launch and most of the shoreline is developed by private residences. A town park is located on Rogers Lake's south shore. Management of nuisance aquatic vegetation with herbicides has been ongoing since at least 2014 with All Habitat Services, LLC and SOLitude Lake Management performing the treatments. SWCA Environmental Consultants (SWCA) has surveyed and mapped the aquatic plants in 2014, 2018, and 2020 (SWCA 2020, LymeLine.com 2017). CAES IAPP surveyed Rogers Lake for aquatic vegetation in 2006 when in addition to the overall survey 13 georeferenced transects, each with 10 sampling points, were setup. The following report containing the identical survey methodology allows an accurate assessment of the changes over the past 15 years.

Objectives:

- Survey of Rogers Lake for aquatic vegetation and test water to quantify water chemistry.
- Compare with our 2006 survey.
- Assess past and future aquatic plant management options.

Materials and Methods:

Aquatic Plant Surveys and Mapping:

We surveyed Rogers Lake for aquatic vegetation on July 14, 15, 19-21, 23 and August 6 & 10, 2021. The survey utilized methods established by CAES IAPP and were similar in 2021 and 2006. Surveys were conducted from 16 and 18-foot boats traveling over areas that supported aquatic plants. Plant species were recorded based on visual observation or collections with a long-handled rake or grapple. Lowrance® Hook 5 and HDS 5 sonar systems as well as ground truthing with occasional grapple tosses were used to identify vegetated areas in deep water. Transect locations were the same locations as set up in 2006 and represented the variety of habitats occurring in the lake. Transects were located using a Trimble® R1 GNSS global positioning system with sub-meter accuracy. Sampling data points were taken along each transect at points 0, 5, 10, 20, 30, 40, 50, 60, 70, and 80 m from the shore. We measured depth with a rake handle, drop line, or digital depth finder, and sediment type was estimated. Plant samples were obtained in shallow water with a rake and with a grapple in deeper water. Abundances of species present at each point were ranked on a scale of 1 – 5 (1 = very sparse, 2 = sparse, 3 = moderately abundant, 4 = abundant, 5 = very abundant). When field identifications of plants were questionable, we brought samples back to the lab for review using the taxonomy of Crow and Hellquist (2000*a*, 2000*b*). One specimen of each species collected in the lake was dried and mounted in the CAES IAPP aquatic plant herbarium. Digitized mounts can be viewed online (portal.ct.gov/caes-iapp). Plant species are referred to by common name in the text of this report; however, corresponding scientific names can be found in Table 1. We post-processed the GPS data in Pathfinder® 5.85 (Trimble Navigation Limited, Sunnyvale, CA) and then imported it into ArcGIS® Pro 2.9.0 (ESRI Inc., Redlands, CA). Data were then overlaid onto recent high-resolution (1m or better) aerial imagery for the continental United States made available by the USDA Farm Services Agency.

Water Analysis:

Water was analyzed from the deepest part of the lake. Water temperature and dissolved oxygen were measured 0.5 m beneath the surface and at 1 m intervals to

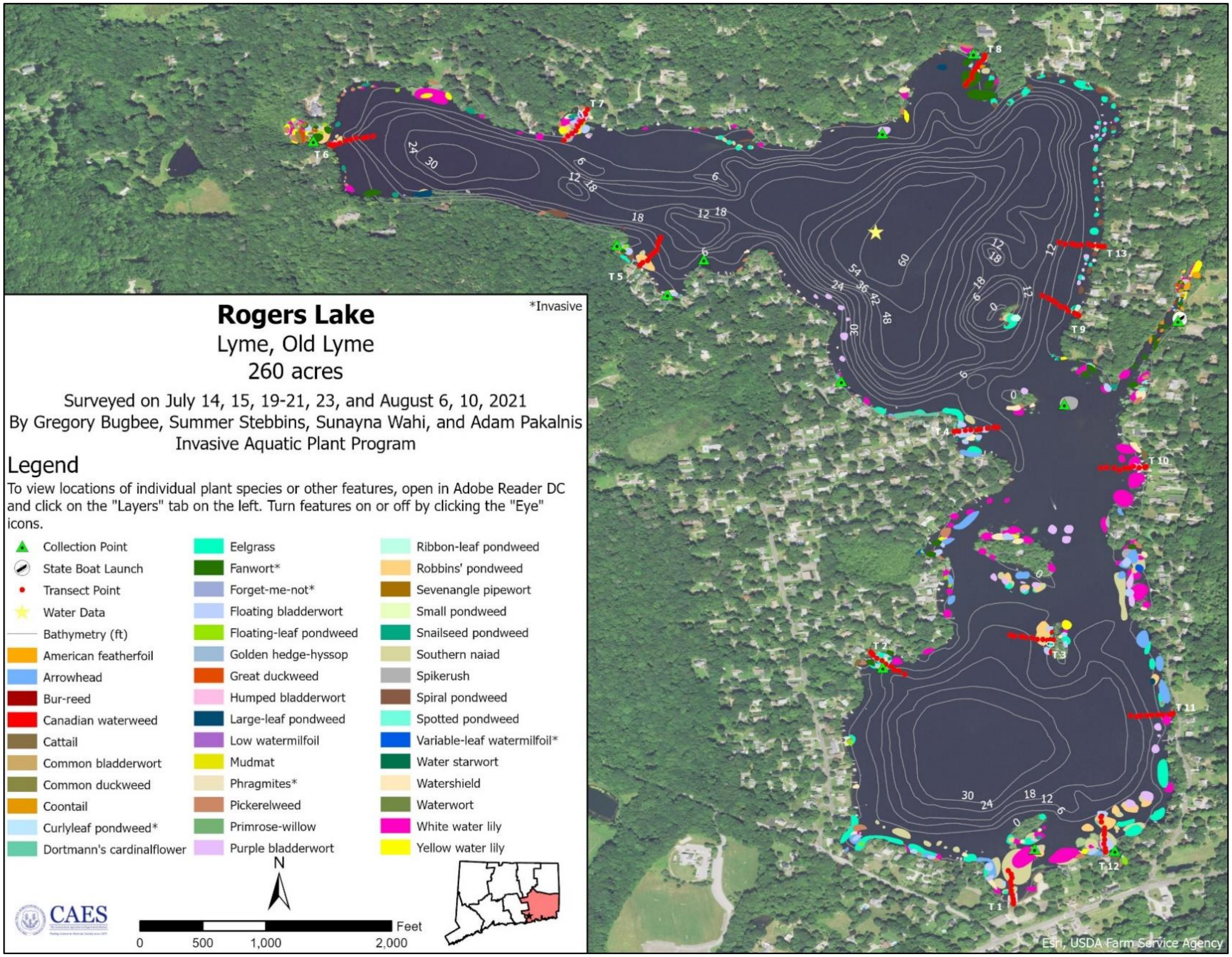


Figure 2. 2021 aquatic plant survey of Rogers Lake

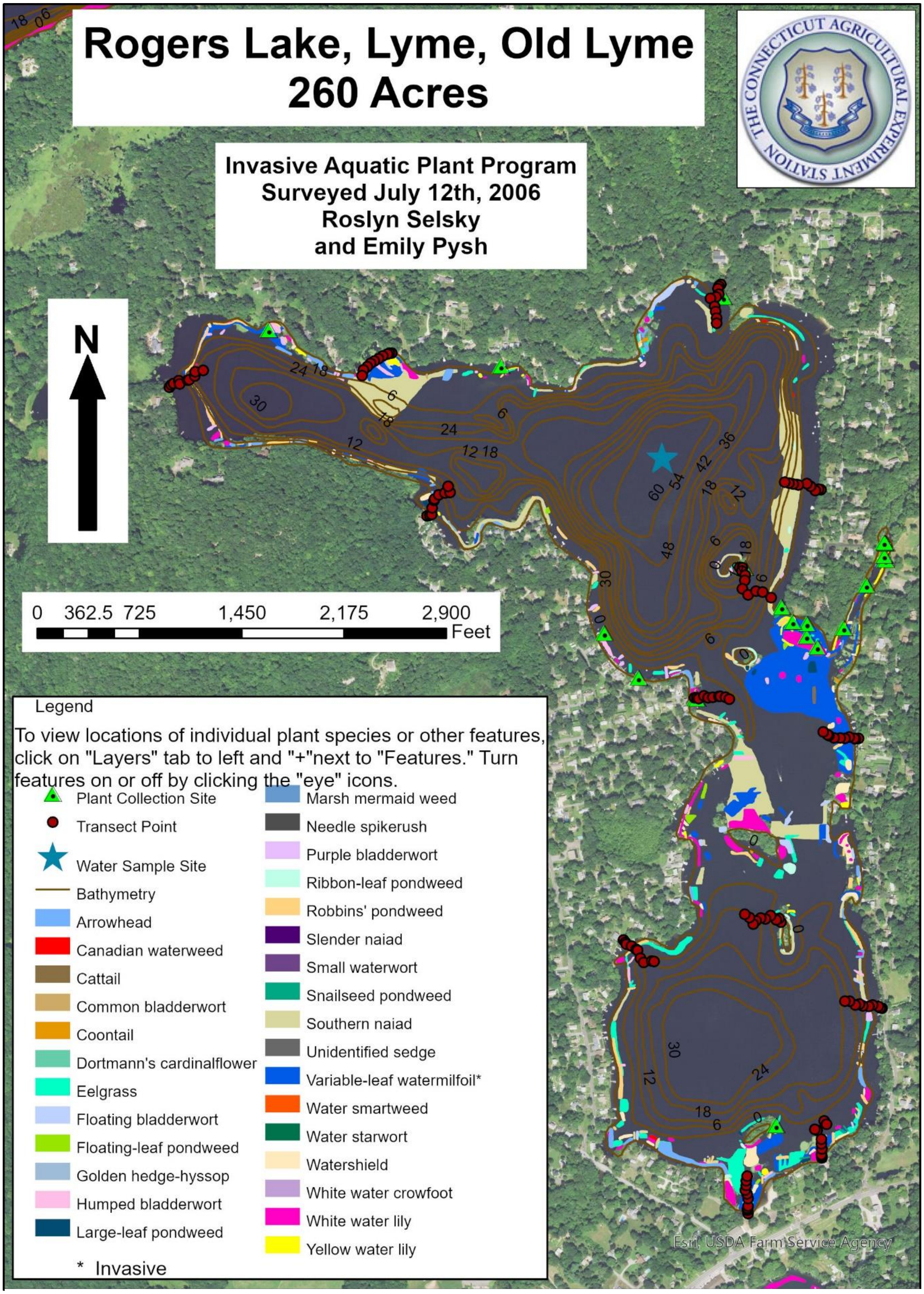


Figure 3. 2006 aquatic plant survey of Rogers Lake

Table 1. Plants present in Rogers Lake in 2006 and 2021. Present indicates the species presence in the lake while Frequency of Occurrence (FOQ) indicates presence of a species on transects.

Species (invasives in bold)		**2006**		**2021**	
Common Name	**Scientitic Name**	**Present**	**FOQ** (%/point)	**Present**	**FOQ** (%/point)
American featherfoil	*Hottonia inflata*			X	0
Arrowhead	*Sagittaria* species	X	6	X	2
Bur-reed	*Sparganium* species	X	0.8	X	3
Canadian waterweed	*Elodea canadensis*	X	5	X	0.8
Common bladderwort	*Utricularia macrorhiza*	X	3	X	
Coontail	*Ceratophyllum demersum*	X	0	X	0.8
Curlyleaf pondweed	***Potamogeton crispus***			**X**	**0**
Dortmann's cardinalflower	*Lobelia dortmanna*	X	0	X	0
Eelgrass	*Vallisneria americana*	X	16	X	12
Fanwort	***Cabomba caroliniana***			**X**	**4**
Floating bladderwort	*Utricularia radiata*	X	18	X	21
Floating-leaf pondweed	*Potamogeton natans*	X	0	X	4
Golden hedge-hyssop	*Gratiola aurea*	X	0	X	0
Great duckweed	*Spirodela polyrhiza*			X	0
Humpled bladderwort	*Utricularia gibba*	X	21	X	2
Large-leaf pondweed	*Potamogeton amplifolius*	X	2	X	0
Low watermilfoil	*Myriophyllum humile*			X	0
Marsh mermaid-weed	*Proserpinaca palustris*	X	3		
Mudmat	*Glossostigma cleistanthum*	X	2	X	0
Pickerelweed	*Pontederia cordata*			X	5
Primrose-willow	*Ludwigia* species			X	0.8
Purple bladderwort	*Utricularia purpurea*	X	8	X	
Quillwort	*Isoetes* species	X	0.8		
Ribbon-leaf pondweed	*Potamogeton epihydrus*	X	2	X	0.8
Robbins' pondweed	*Potamogeton robbinsii*	X	17	X	17
Sevenangle pipewort	*Eriocaulon aquaticum*			X	0.8
Slender naiad	*Najas flexilis*	X	0		
Small pondweed	*Potamogeton pusillus*	X	0	X	0.8
Snailseed pondweed	*Potamogeton bicupulatus*	X	0	X	8
Southern naiad	*Najas guadalupensis*	X	31	X	21
Spikerush	*Eleocharis* species	X	0	X	8
Spiral pondweed	*Potamogeton spirillus*			X	0
Variable-leaf watermilfoil	***Myriophyllum heterophyllum***	**X**	**14**	**X**	**2**
Water smartweed	*Polygonum amphibium*	X	0		
Water starwort	*Callitriche* species	X	0	X	0
Watershield	*Brasenia schreberi*	X	8	X	4
Waterwort	*Elatine* species	X	2	X	0.8
White water crowfoot	*Ranunculus longirostris*	X	0		
White water lily	*Nymphaea odorata*	X	8	X	11
Yellow water lily	*Nuphar variegata*	X	5	X	2
Total Species Richness	40	31	20	35	23
Total Native Species Richnesss	37	30	19	32	21
Total Invasive Species Richness	**3**	**1**	**1**	**3**	**2**

the bottom. Water samples (250 mL) for pH, alkalinity, conductivity, total phosphorus, and total nitrogen testing were obtained from 0.5 m beneath the surface and 0.5 m above the bottom. The samples were stored at 38˚C until testing. A Fisher AR20® meter was used to determine pH and conductivity, and alkalinity (expressed as mg/L $CaCO_3$) was quantified by titration with 0.016 N H_2SO_4 to an end point of pH 4.5. We determined total phosphorus using the ascorbic acid method preceded by digestion with potassium persulfate (APHA 1995). Phosphorus was quantified using a Milton Roy Spectronic 20D® spectrometer with a light path of 2 cm and a wavelength of 880 nm. Total Nitrogen was determined with a O-I Analytical 1080® Total Organic Carbon Analyzer. Water was tested for temperature and dissolved oxygen using an YSI 58® meter. Water clarity was measured by lowering a six-inch diameter black and white Secchi disk into the water and determining to what depth it could be viewed.

Results and Discussion:

Aquatic Plant Survey and Transects:

Compared to 2006, Rogers Lake's aquatic vegetation is more sporadic and is less abundant in 2021 (Figures 2 & 3). Navigation was rarely impeded except for a few shallow coves. Vegetation in Rogers Lake was limited to depths of less than 3 m (10 ft.). This is probably the result of herbicide treatments over the last decade. We found three invasive and 32 native plant species in Rogers Lake in 2021 compared to 30 native and one invasive species in 2006 (Table 1). Rogers Lake contains among the greatest number of plant species found in any waterbody surveyed by CAES IAPP (2022). Fanwort, variable-leaf watermilfoil, and curlyleaf pondweed were the invasive species present in 2021 while only variable-leaf watermilfoil occurred in 2006 (see appendix for descriptions). Fanwort was the most common invasive species and was found in the northern section of the lake by Transect 8 and Transect 7, in the cove by the state boat launch, and sporadically along the shore-

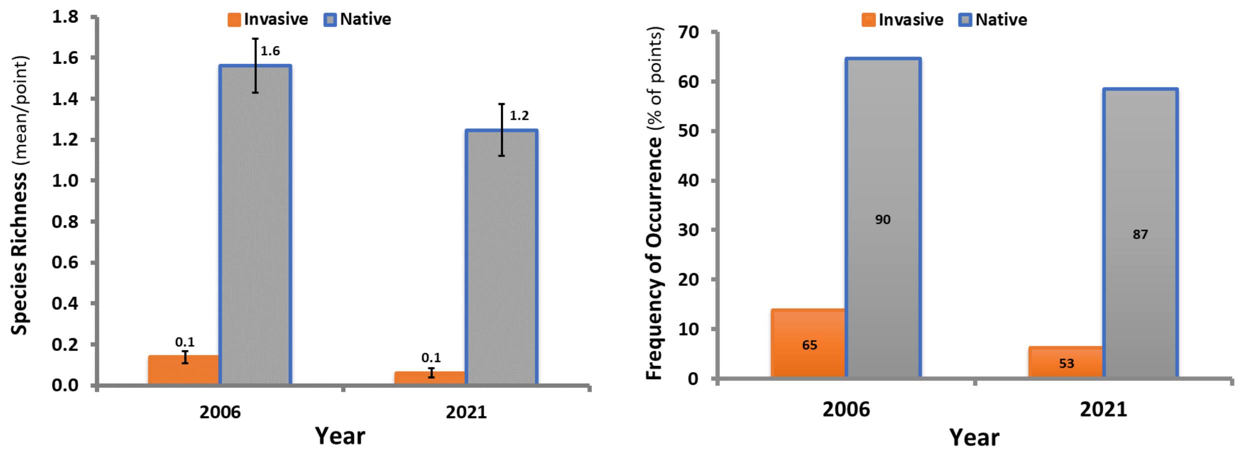


Figure 4. Species richness (left) and frequency of occurrence (right) of aquatic plants in Rogers Lake on transects in 2006 and 2021.

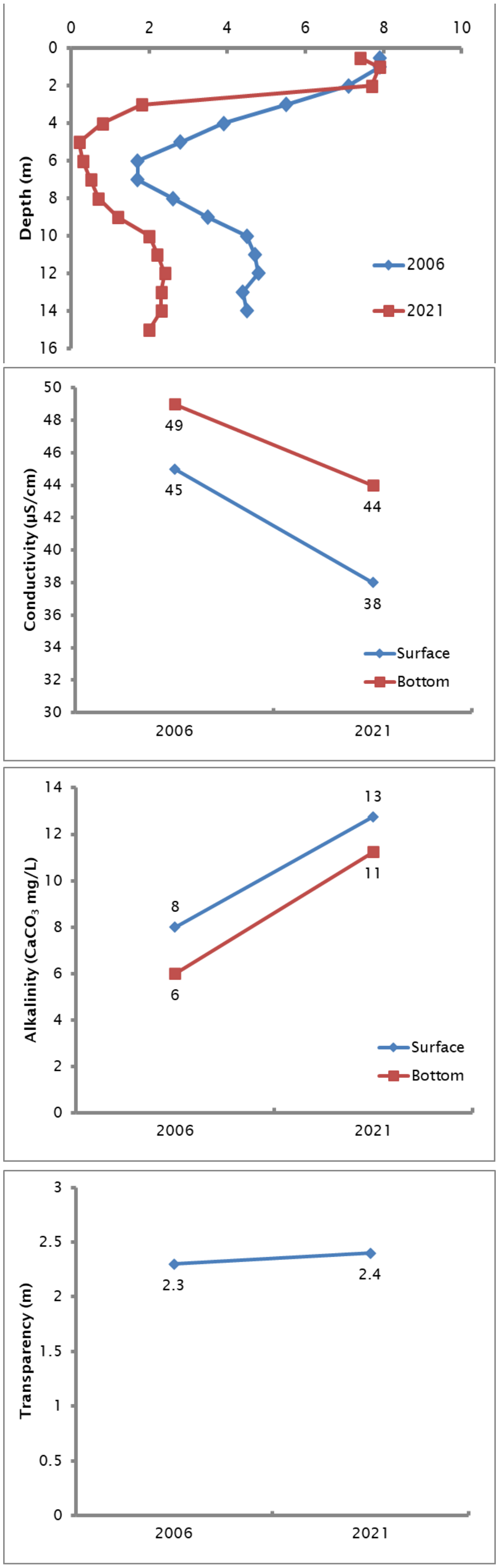
line. Compared to the 2020 SWCA survey (2020), there was a slight increase in fanwort in 2021, but much less than in 2014. SWCA documented curlyleaf pondweed by the state boat launch and in the northwestern cove in 2020. Our 2021 survey found this plant was limited to the boat launch area. Because our survey was conducted after curlyleaf pondweed senescence's in early July, the plant would likely have escaped our detection. Variable-leaf watermilfoil was much less abundant than in the 2006 survey as well as in 2014 and 2018 SWCA surveys (Figures 3 & 4, SWCA 2020). In 2021, it was found sporadically by the state boat launch, Transect 7, Transect 5, the eastern shoreline, and the western shoreline. This is a slight increase from the SWCA 2020 survey (SWCA 2020).

Southern naiad was the most common native species observed in 2021. Although it decreased in abundance compared to 2006, it was extremely dense and to the surface in the southern end of the lake. Low watermilfoil was found in one location near Transect 12 in the southern section of the lake. It is a low growing native species that is commonly confused with variable-leaf watermilfoil. Native species found in 2021 but not in 2006 were American featherfoil, great duckweed, low watermilfoil, pickerelweed, primrose-willow, sevenangle pipewort, and spiral pondweed. Not found in 2021 but present in 2006 were marsh mermaid-weed, quill-wort, slender naiad, water smartweed, and white water crowfoot. The slight increase in native species from 2006 to 2021 suggests the herbicide treatments are having little impact on native plants in the lake. The CAES IAPP website contains digitized survey maps where individual plant layers can be viewed separately (portal.ct.gov/caes-iapp). We also found invasive phragmites (*Phragmites australis*) and forget-me-not (*Myosotis scorpioides*) in Rogers Lake, but they are not included in Table 1 because, although they are of interest, they are not classified as aquatic plants. Information on the native species and invasive species not in the appendix can be found at the USDA "About PLANTS" website (https://plants.usda.gov/about_plants.html).

Native aquatic plant species richness (number of species) per transect point decreased slightly from 1.6 in 2006 to 1.2 in 2021while invasive species richness held constant at 0.1(Figure 4, left). The similarities in invasive species richness between years is likely because off the herbicide management program that controlled fanwort and curlyleaf pondweed which appeared after our 2006 survey. The slight decrease in native species richness on transects may be due to the herbicide treatments, but because they are minor, there are likely no negative effects on the native plant community.

Comparisons of the frequency of occurrence (FOQ) of native and invasive plants on transect points found a slight decrease in total native species and total invasive species from 2006 to 2021 (Figure 4, right, see appendix for transect data). The most frequently found native plants in 2021 were southern naiad (21%), floating bladderwort (21%), and Robbins' pondweed (17%) (Table 1). Variable-leaf watermilfoil FOQ decreased substantially on transects from 14% in 2006 to 2% in 2021 while fanwort increased from 0% in 2006 to 4% in 2021.

During our survey work, many residents were out on the lake boating, fishing, swimming, and we heard no complaints. There was also an abundance of turtles.



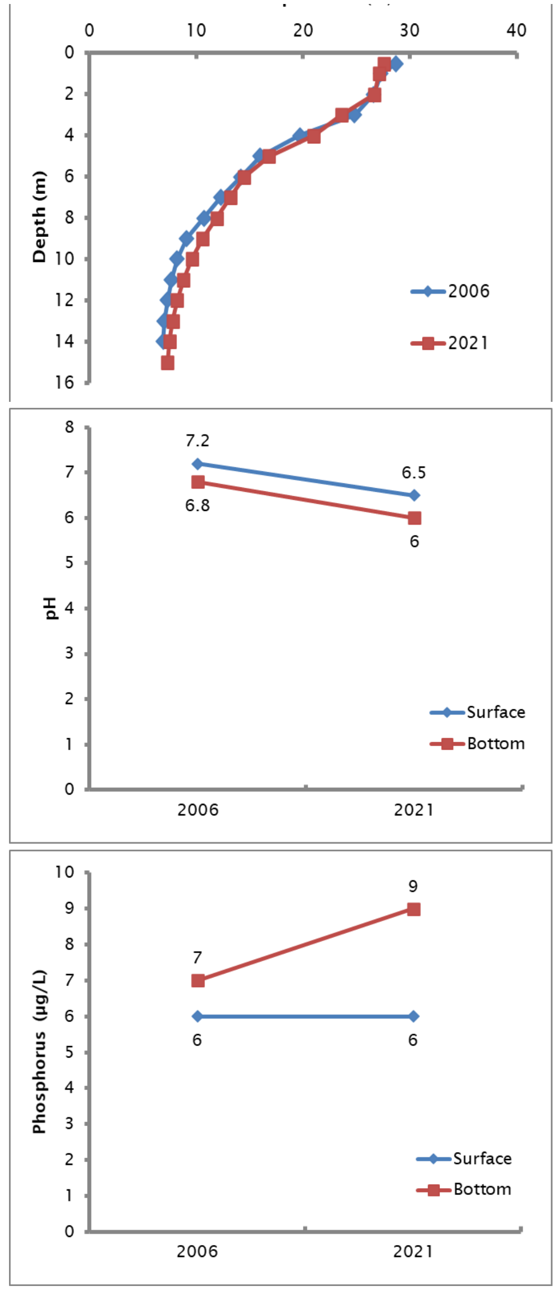


Figure 5. Water chemistry for Rogers Lake in 2006 and 2021.

Large groups of geese were present on the islands which is a concern due to nutrient enrichment from their excrement. Consultation with the CT DEEP Wildlife Division regarding goose management is suggested.

Water Chemistry:

Water clarity in Connecticut's lakes ranged from 0.3 - 10 m (1 – 33 ft) with an average of 2.3 m (8 ft) (CAES IAPP 2022). Rogers Lake had a water clarity of 2.4 m (8 ft) in 2021 compared to 2.3 m (7.5 ft) in 2006 (Figure 5). In 2021, water clarity was limited by the tea color produced by naturally occurring organic extracts. Rogers Lake is a relatively deep Connecticut lake; this results in significant summertime stratification of temperature and dissolved oxygen (Figure 5). Dissolved oxygen concentrations in 2006 and 2021 were high near the surface, declined to near zero between 4 – 8 m (13 - 21 ft) and then increased slightly. Our equipment was unable to reach the bottom of the lake, but it is likely that dissolved oxygen returned to near zero at the bottom. This anoxic zone does not support fish but is typical in most CT lakes. The temperature profile between 2021 and 2006 were remarkably similar with temperatures near 28˚ C (82˚ F) to a depth of about 2 m (7 ft) and a thermocline from 2 – 12 m (7 - 40 ft) where the temperature gradually dropped to near 8°C (46°F). Deeper water exhibited little further temperature change. The pH was near neutral (6.0 – 7.2) and only decreased slightly from 2006. The alkalinity of 6 - 13 mg/L $CaCO_3$ is low for Connecticut lakes which range from near 0 to >170 (CAES IAPP, 2022). Low alkalinity waterbodies are more prone to pH change due to outside influences such as watershed activities and acid rain. Conductivity is an indicator of dissolved ions that come from natural and man-made sources (mineral weathering, organic matter decomposition, fertilizers, septic systems, road salts, etc.). Connecticut waterbodies typically have conductivities that range from 50 -250 µS/cm. Rogers Lake's conductivity in 2021 was 44 µS/cm at the surface and 38 µS/cm at the bottom which is slightly lower than the 49 µS/cm at the surface and 44 µS/cm at the bottom observed in 2006. These values place Rogers Lake as having among the lowest conductivities in Connecticut.

A key parameter used to categorize a lake's trophic state is the concentration of phosphorus (P) in the water column. High levels of P can lead to nuisance or toxic algal blooms (Frink and Norvell 1984, Wetzel 2001). Rooted macrophytes are less dependent on P from the water column as they obtain a majority of their nutrients from the sediment (Bristow and Whitcombe 1971). Lakes with P levels from 0 - 10 μg/L are considered nutrient-poor or oligotrophic. When P concentrations reach 15 - 25 μg/L, lakes are classified as moderately fertile or mesotrophic and when P reaches 30 - 50 μg/L they are considered fertile or eutrophic (Frink and Norvell 1984). Lakes with P concentrations >50 μg/L are categorized as extremely fertile or hyper-eutrophic. Rogers Lake's P concentration in 2021 was 6 μg/L at surface and 9 μg/L near the bottom, which classifies the lake as oligotrophic (Figure 5). Oligotrophic lakes are rare in CT and further testing is needed to confirm this. We tested total nitrogen (TN) for the first time in 2021 and found 540 μg/L the surface and 697 μg/L near the bottom. Although nitrogen is likely less limiting to the growth of aquatic plants and algae compared to terrestrial plants, it may play a role in lake productivity. Frink and Norvell (1984) found TN in Connecticut lakes ranged from 193 - 1830 μg/L and averaged 554 μg/L placing Rogers Lake in the middle.

CAES IAPP has found that the occurrence of invasive plants in lakes can be attributed to specific water chemistries (June-Wells et al. 2013). For instance, lakes with higher alkalinities and conductivities are more likely to support Eurasian watermilfoil, minor naiad, and curlyleaf pondweed while lakes with lower values support fanwort and variable-leaf watermilfoil. Invasive zebra mussels (*Dreissena polymorpha*) are becoming a problem in several lakes in western Connecticut and have similar water chemistry preferences. Rogers Lake has lower alkalinity and conductivity and currently has both fanwort and variable-leaf watermilfoil as June-Wells et al. would suggest (2013).

Aquatic Vegetation Management Options:

Figure 6. Eco-Harvester removing aquatic plants. Photo Credit: Givens Shorescapes

Managing nuisance invasive aquatic vegetation in Rogers Lake has been ongoing with some success. There are state-listed plant and animal species in the lake that may need protecting. Native vegetation does not appear to be at nuisance levels. In addition, large numbers of residents utilize the lake for recreational activities, particularly fishing, boating, and swimming without being impeded by vegetation. The main concern is the invasive aquatic plant species. Options include harvesting, herbicides, biological controls, and benthic barriers (Cooke et al. 2005).

Mechanical harvesting could be a viable option; however, knowledge of the pros and cons is recommended prior to making large purchases of the necessary machinery. Major benefits of mechanical harvesting include quick results, the ability to target areas and avoid damage to species needing protection, avoidance of aquatic herbicides, and removal of nutrients contained in the harvested vegetation. Drawbacks include the initial expense of the harvesting machine, maintenance costs, rapid regrowth, the need for follow-up work, and costs for vegetation removal and disposal. New mechanical harvesting machines are now available that offer promise for better removal root systems, but this will vary by plant species and sediment type (Figure 6). Reports from users in Connecticut are lacking and therefore the pros and cons of the new technology needs further investigation.

Aquatic herbicides can be effective in controlling unwanted aquatic vegetation. Lakes and ponds are considered “waters of the State” and products introduced into

Figure 7. Grass carp introduction into Candlewood Lake in 2015 (left). By 2018 the fish had shown consider-able growth (right).

them for weed control require approval from the CT DEEP. If state listed species are present additional clearance must be attained from the CT DEEP Natural Diversity Database. Local wetland agencies also need to be informed. Herbicides must be chosen carefully as some have efficacy on certain target species and not others. Also, any desirable plants, including state-listed species, may need to be tolerant. Specifics on the use of aquatic herbicides in Connecticut are found in the CT DEEP publication entitled "Nuisance Aquatic Vegetation Management: A Guidebook" (CTDEP 2005). In 2018, CAES IAPP tested a new herbicide called ProcellaCOR to control variable-leaf watermilfoil in Bashan Lake with excellent results. Rogers Lake has utilized herbicides since at least 2014 and this report suggest they have effectively controlled unwanted vegetation without substantial harm to the lake's native plant community.

Although efforts are underway to find biological controls for nuisance aquatic vegetation, breakthroughs have been limited. To date the only biological control used in Connecticut is grass carp (*Ctenopharyngodon idella*, Figure 7). Grass carp are herbivorous fish that feed on most submersed aquatic plants The introduction of grass carp into Connecticut lakes requires approval by CT DEEP. In Connecticut, only sterile (triploid) grass carp are permitted. Introducing grass carp Rogers Lake

Figure 8. CAES IAPP testing of short-term benthic barriers in Lake Beseck.

could cause damage to non-target plants necessary to maintain the current fishery. Over-stocking in some waterbodies has led to an undesirable reduction in plants needed for fish and other wildlife. CAES has worked with officials from the United States Department of Agriculture to find new plant pathogens and insects that control nuisance aquatic plants with little success.

Benthic barriers or “bottom blankets” are effective at eliminating nuisance vegetation in small areas such as swim zones, around docks, and pioneer infestations. CAES IAPP has tested short-term placement (<30 days) of the barriers in Lake Quonnipaug, Bashan Lake, and Lake Beseck (Figure 8). Season-long control for Eurasian watermilfoil (*Myriophyllum spicatum*) and fanwort was achieved. Although labor intensive, benthic barriers may be able to be moved from place to place during a season for effective control. They can also be used over multiple years, reducing cost of materials.

Conclusions:

Our 2021 aquatic vegetation survey of Rogers Lake found only small changes in aquatic vegetation compared to our 2006 survey. Between the two surveys invasive fanwort and possibly curlyleaf pondweed became established. Concern over deteriorating lake conditions prompted herbicide treatments starting around 2014. These treatments have largely returned Rogers Lake to 2006 conditions except for the benefit of less invasive variable-leaf watermilfoil. Native species richness remains robust with 35 species documented in 2021. Rogers Lake ranks among the most species rich lakes in Connecticut. Phragmites and forget-me-not are invasive wetland plants also found in a few locations on the shoreline. Most of the coves and shallow areas contained abundant aquatic vegetation; however, depth limited vegetation in most of the lake. Recreation in Rogers Lake is minimally impaired by aquatic vegetation. Our water tests found Rogers Lake to be classified as a nutrient poor oligotrophic lake although additional testing is suggested to confirm this unusual condition for a Connecticut waterbody. Water clarity was limited by the tea color produced by naturally occurring organic extracts.

Acknowledgments:

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Appendix

Invasive Plant Descriptions

Cabomba caroliniana

Common names:
Fanwort
Carolina fanwort

Origin:
Southeast United States
South America

Key features:
Plants are submersed

Stems: Can be 6 feet (2 m) long

Leaves: Dissected, opposite leaves 0.8-2 inches (2-5 cm) are fan-like and made up of forked leaflets attached to the stem by a petiole. Floating leaves 0.2-0.8 inches (6-20 mm) wide are oblong and produced on flower shoots

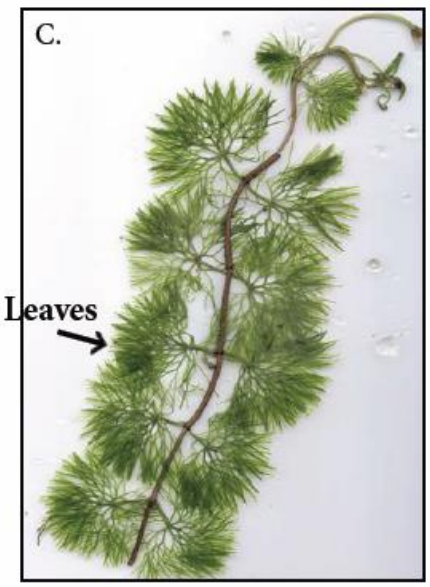
Flowers: Small, solitary flowers are usually white to pinkish

Fruits/Seeds: Flask shaped

Reproduction: Seed and fragmentation

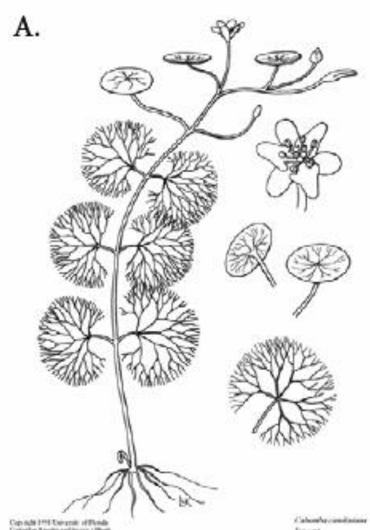
Easily confused species:
Watermilfoils: *Myriophyllum* spp.
White water crowfoot: *Ranunculus longirostris*
Water marigold: *Megalodonta beckii*

C.



Opposite Leaves

A.



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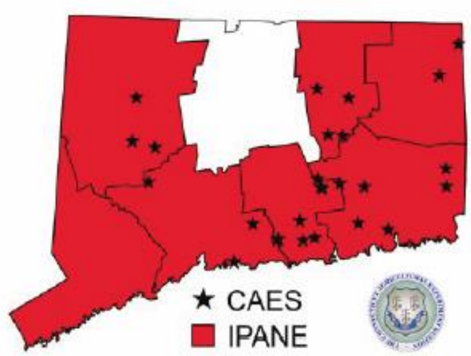
A. Copyright 1991 Univ. of Florida, Center for Aquatic and Invasive Plants
B. Copyright 2002 Univ. of Florida, Photo by A. Murray
C. Photo by A. Smagula



Myriophyllum heterophyllum

Common names:
Variable-leaf watermilfoil
Variable watermilfoil
Two-leaf watermilfoil

Origin:
Southern United States

Key features:
Plants are submersed

Stems: Dark brown stems extend to the water's surface and spread to form large mats

Leaves: Triangular with ≤ 11 pairs of leaflets. Leaves are dissected and whorled (4-6 leaves/whorl) resulting in a feathery appearance with leaf whorls < 1 inch apart giving it a ropy appearance

Flowers: Inflorescence spike 2-14 inches (5-35 cm) long extend beyond the water's surface with flowers in whorls of four with reddish petals

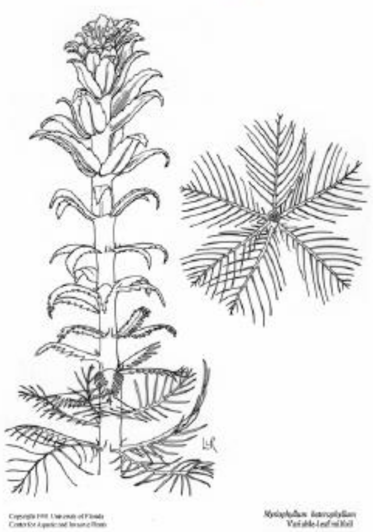
Fruits/Seeds: Fruits are almost round, with a rough surface

Reproduction: Fragmentation and seeds

Easily confused species:
Eurasian watermilfoil: *Myriophyllum spicatum*
Low watermilfoil: *Myriophyllum humile*


Photo by CAES IAPP


Photo by CAES IAPP



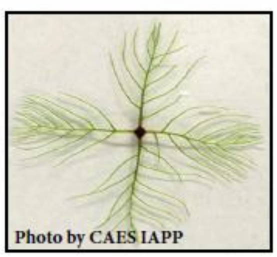


Photo by CAES IAPP


Leaves collapse out of water

Photo by CAES IAPP

Potamogeton crispus


Photo by CAES IAPP

Common names:
Curly leaf pondweed
Crispy-leaved pondweed
Crisped pondweed

Origin:
Asia, Africa, and Europe

Key features:
Plants are submersed

Stems: Stems are flattened, can form dense stands in water up to 15 feet (5 m) deep

Leaves: Alternate leaves 0.3-1 inches (3-8 cm) wide with wavy edges (similar to lasagna) with a prominent mid-vein

Flowers: Brown and inconspicuous

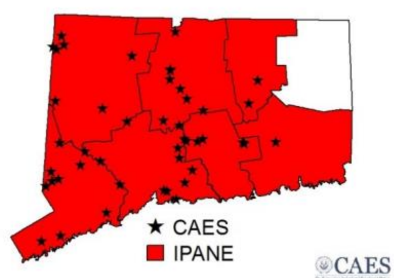
Fruits/Seeds: Fruit is oval 0.1 inches (3 mm) long

Reproduction: Turions (right) and seeds

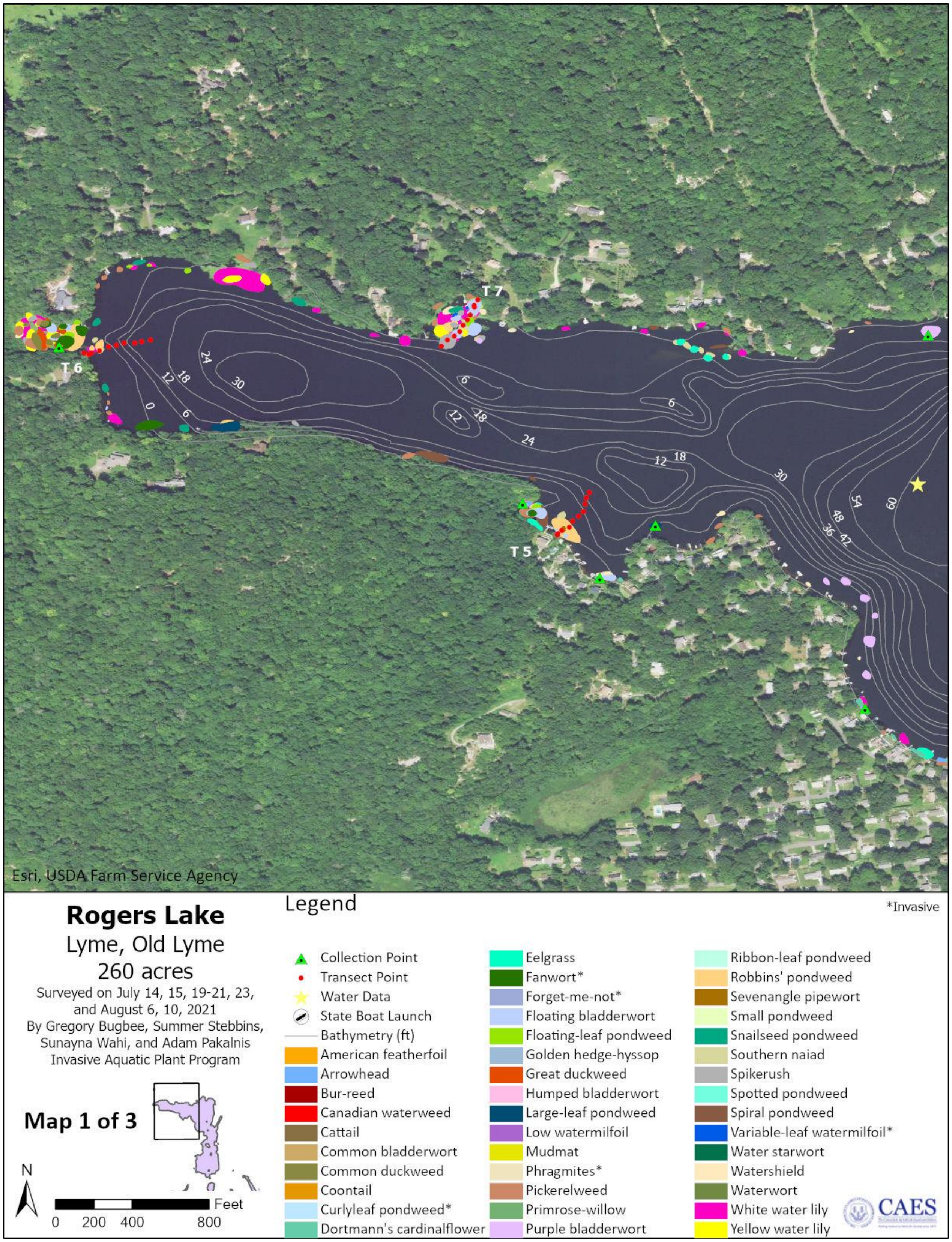
Photo by CAES IAPP

Easily confused species:
None

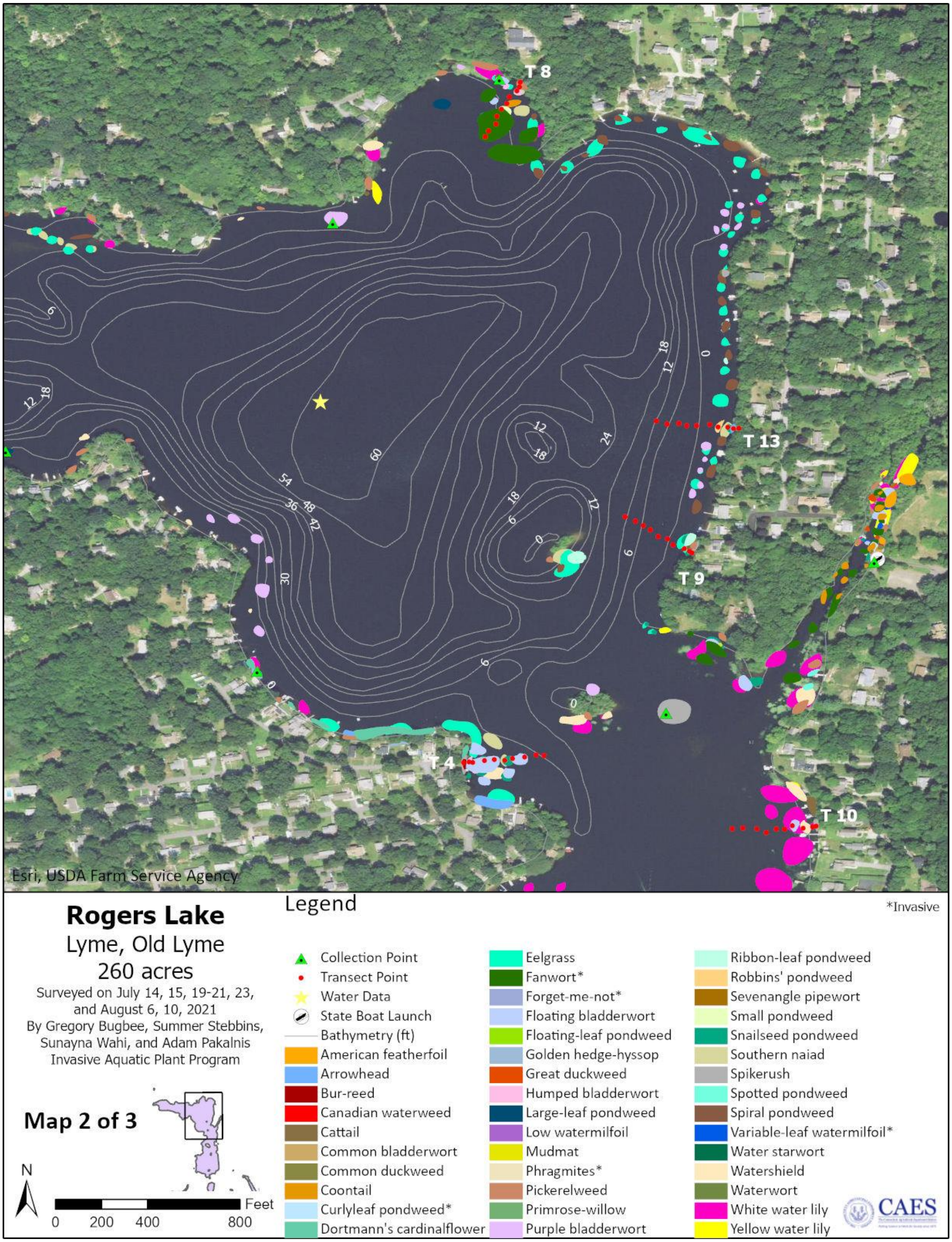

Photo by Leslie J. Mehrhoff

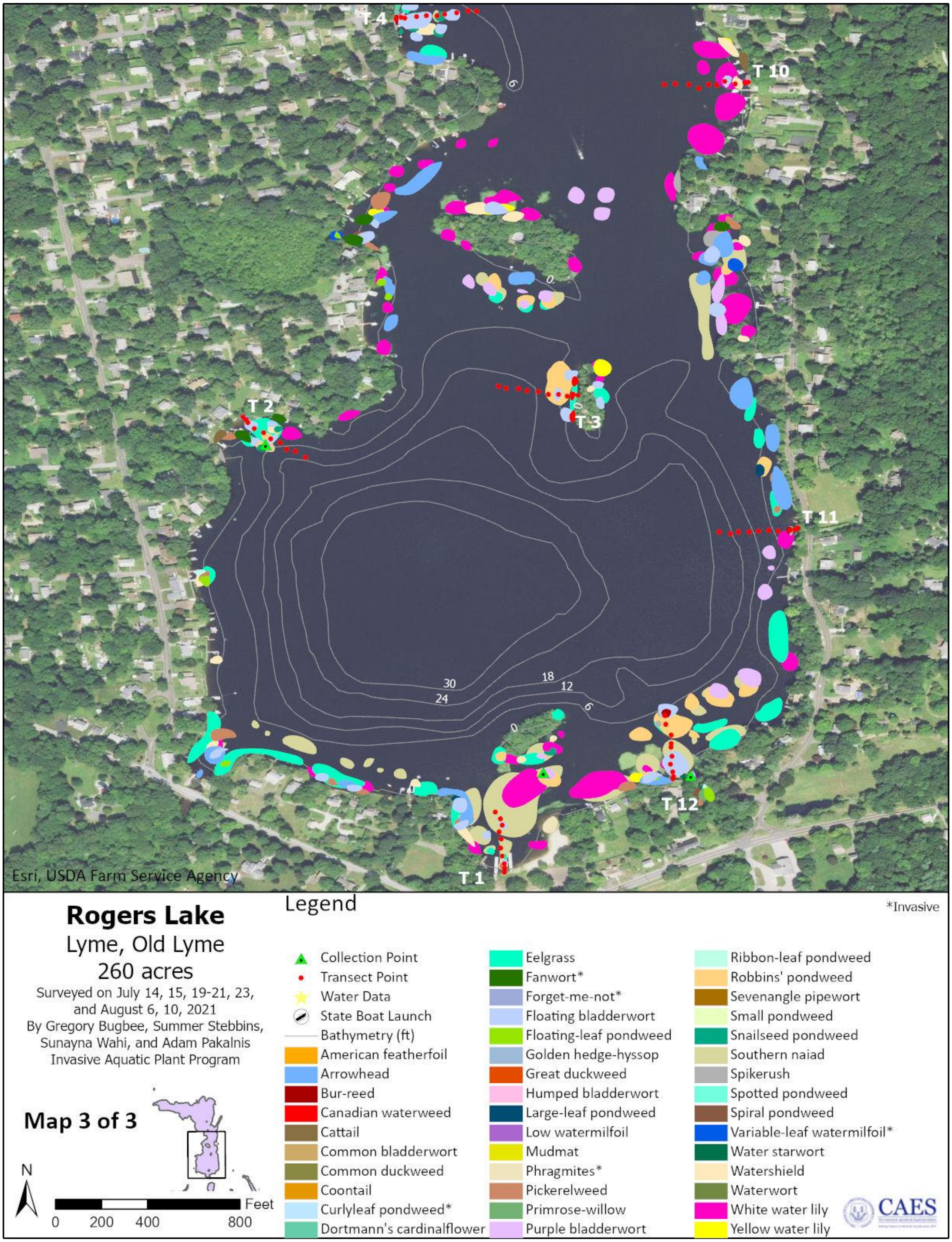


Aquatic Plant Survey Maps by Section



T 7
T 6
T 5
Esri, USDA Farm Service Agency
Rogers Lake
Lyme, Old Lyme
260 acres
Surveyed on July 14, 15, 19-21, 23, and August 6, 10, 2021
By Gregory Bugbee, Summer Stebbins, Sunayna Wahi, and Adam Pakalnis
Invasive Aquatic Plant Program
Map 1 of 3
N
0 200 400 800 Feet
Legend
*Invasive
Collection Point
Transect Point
Water Data
State Boat Launch
Bathymetry (ft)
American featherfoil
Arrowhead
Bur-reed
Canadian waterweed
Cattail
Common bladderwort
Common duckweed
Coontail
Curlyleaf pondweed*
Dortmann's cardinalflower
Eelgrass
Fanwort*
Forget-me-not*
Floating bladderwort
Floating-leaf pondweed
Golden hedge-hyssop
Great duckweed
Humped bladderwort
Large-leaf pondweed
Low watermilfoil
Mudmat
Phragmites*
Pickerelweed
Primrose-willow
Purple bladderwort
Ribbon-leaf pondweed
Robbins' pondweed
Sevenangle pipewort
Small pondweed
Snailseed pondweed
Southern naiad
Spikerush
Spotted pondweed
Spiral pondweed
Variable-leaf watermilfoil*
Water starwort
Watershield
Waterwort
White water lily
Yellow water lily
CAES


T 8
T 13
T 9
T 4
T 10
Esri, USDA Farm Service Agency
Rogers Lake
Lyme, Old Lyme
260 acres
Surveyed on July 14, 15, 19-21, 23, and August 6, 10, 2021
By Gregory Bugbee, Summer Stebbins, Sunayna Wahi, and Adam Pakalnis
Invasive Aquatic Plant Program
Map 2 of 3
N
Feet
0 200 400 800
Legend
*Invasive
Collection Point
Transect Point
Water Data
State Boat Launch
Bathymetry (ft)
American featherfoil
Arrowhead
Bur-reed
Canadian waterweed
Cattail
Common bladderwort
Common duckweed
Coontail
Curlyleaf pondweed*
Dortmann's cardinalflower
Eelgrass
Fanwort*
Forget-me-not*
Floating bladderwort
Floating-leaf pondweed
Golden hedge-hyssop
Great duckweed
Humped bladderwort
Large-leaf pondweed
Low watermilfoil
Mudmat
Phragmites*
Pickerelweed
Primrose-willow
Purple bladderwort
Ribbon-leaf pondweed
Robbins' pondweed
Sevenangle pipewort
Small pondweed
Snailseed pondweed
Southern naiad
Spikerush
Spotted pondweed
Spiral pondweed
Variable-leaf watermilfoil*
Water starwort
Watershield
Waterwort
White water lily
Yellow water lily
CAES


T 4
T 10
T 2
T 3
T 11
T 12
T 1
6
0
30
24
18
12
Esri, USDA Farm Service Agency
Rogers Lake
Lyme, Old Lyme
260 acres
Surveyed on July 14, 15, 19-21, 23, and August 6, 10, 2021
By Gregory Bugbee, Summer Stebbins, Sunayna Wahi, and Adam Pakalnis
Invasive Aquatic Plant Program
Map 3 of 3
N
Feet
0 200 400 800
Legend
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Eelgrass
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Forget-me-not*
Floating bladderwort
Floating-leaf pondweed
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Humped bladderwort
Large-leaf pondweed
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Mudmat
Phragmites*
Pickerelweed
Primrose-willow
Purple bladderwort
Ribbon-leaf pondweed
Robbins' pondweed
Sevenangle pipewort
Small pondweed
Snailseed pondweed
Southern naiad
Spikerush
Spotted pondweed
Spiral pondweed
Variable-leaf watermilfoil*
Water starwort
Watershield
Waterwort
White water lily
Yellow water lily
CAES

Transect Data

Appendix Rogers Lake Transect Data (1 of 3)

Transect	Point	Distance from Shore (m)	Surveyor	Latitude	Longitude	Date	Depth (m)	Substrate	Notes	Brasch	CabCar	CerDem	ElaSpp	EleSpp	EloCan	EriAqu	LudSpp	MyrHet	NajGua	NupVar	NymOdo	PonCor	PotBic	PotEpi	PotNat	PotPus	PotRob	SagSpp	SpaSpp	UtrGib	UtrRad	ValAme
1	1	0.5	Greg Bugbee	41.34936	-72.29884	7/21/2021	0.1	Sand	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	2	5	Greg Bugbee	41.34941	-72.29884	7/21/2021	1.0	Sand		4	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0
1	3	10	Greg Bugbee	41.34946	-72.29884	7/21/2021	1.5	Organic		3	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	2	0	0	0	2	0
1	4	20	Greg Bugbee	41.34955	-72.29886	7/21/2021	1.5	Organic		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	2
1	5	30	Greg Bugbee	41.34965	-72.29889	7/21/2021	1.3	Muck		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
1	6	40	Greg Bugbee	41.34975	-72.29888	7/21/2021	1.6	Muck		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
1	7	50	Greg Bugbee	41.34984	-72.29891	7/21/2021	1.9	Muck		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
1	8	60	Greg Bugbee	41.34992	-72.29887	7/21/2021	1.8	Muck		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	2	0	0	2	0
1	9	70	Greg Bugbee	41.35000	-72.29889	7/21/2021	1.8	Muck		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
1	10	80	Greg Bugbee	41.35007	-72.29895	7/21/2021	1.8	Muck		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0.5	Greg Bugbee	41.35477	-72.30194	7/20/2021	0.2	Sand		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2	2	5	Greg Bugbee	41.35473	-72.30191	7/20/2021	1.1	Sand		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	3	10	Greg Bugbee	41.35470	-72.30189	7/20/2021	1.3	Organic		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
2	4	20	Greg Bugbee	41.35463	-72.30181	7/20/2021	1.7	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
2	5	30	Greg Bugbee	41.35458	-72.30170	7/20/2021	2.0	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3
2	6	40	Greg Bugbee	41.35451	-72.30161	7/20/2021	2.7	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	1	3
2	7	50	Greg Bugbee	41.35446	-72.30150	7/20/2021	3.2	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	8	60	Greg Bugbee	41.35438	-72.30143	7/20/2021	3.8	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	9	70	Greg Bugbee	41.35436	-72.30132	7/20/2021	4.3	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	10	80	Greg Bugbee	41.35428	-72.30120	7/20/2021	5.0	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0.5	Greg Bugbee	41.35503	-72.29797	7/20/2021	0.4	Gravel	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	2	5	Greg Bugbee	41.35503	-72.29802	7/20/2021	1.8	Gravel		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
3	3	10	Greg Bugbee	41.35501	-72.29809	7/20/2021	2.0	Gravel	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
3	4	20	Greg Bugbee	41.35503	-72.29820	7/20/2021	3.0	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
3	5	30	Greg Bugbee	41.35503	-72.29832	7/20/2021	4.0	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
3	6	40	Greg Bugbee	41.35507	-72.29844	7/20/2021	4.8	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
3	7	50	Greg Bugbee	41.35508	-72.29858	7/20/2021	5.5	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
3	8	60	Greg Bugbee	41.35510	-72.29867	7/20/2021	5.5	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
3	9	70	Greg Bugbee	41.35511	-72.29882	7/20/2021	5.0	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
3	10	80	Greg Bugbee	41.35513	-72.29891	7/20/2021	5.2	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
4	1	0.5	Greg Bugbee	41.35950	-72.30013	7/20/2021	0.3	Gravel		0	0	0	2	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	1	0
4	2	5	Greg Bugbee	41.35951	-72.30007	7/20/2021	1.2	Gravel		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3
4	3	10	Greg Bugbee	41.35950	-72.30002	7/20/2021	2.0	Gravel	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
4	4	20	Greg Bugbee	41.35952	-72.29988	7/20/2021	2.2	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0
4	5	30	Greg Bugbee	41.35953	-72.29977	7/20/2021	2.6	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
4	6	40	Greg Bugbee	41.35953	-72.29964	7/20/2021	2.9	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
4	7	50	Greg Bugbee	41.35955	-72.29955	7/20/2021	2.9	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0
4	8	60	Greg Bugbee	41.35957	-72.29941	7/20/2021	3.5	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
4	9	70	Greg Bugbee	41.35959	-72.29927	7/20/2021	3.5	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	10	80	Greg Bugbee	41.35958	-72.29917	7/20/2021	3.2	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	1	0.5	Greg Bugbee	41.36306	-72.30697	7/20/2021	0.2	Gravel	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	2	5	Greg Bugbee	41.36308	-72.30696	7/20/2021	1.8	Gravel		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
5	3	10	Greg Bugbee	41.36312	-72.30690	7/20/2021	2.0	Gravel		0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
5	4	20	Greg Bugbee	41.36317	-72.30680	7/20/2021	3.0	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0
5	5	30	Greg Bugbee	41.36326	-72.30675	7/20/2021	4.5	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	6	40	Greg Bugbee	41.36333	-72.30666	7/20/2021	5.5	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	7	50	Greg Bugbee	41.36339	-72.30659	7/20/2021	6.2	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	8	60	Greg Bugbee	41.36350	-72.30657	7/20/2021	6.2	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	9	70	Greg Bugbee	41.36359	-72.30655	7/20/2021	7.5	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	10	80	Greg Bugbee	41.36366	-72.30651	7/20/2021	7.7	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Rogers Lake Transect Data (2 of 3)

Transect	Point	Distance from Shore (m)	Surveyor	Latitude	Longitude	Date	Depth (m)	Substrate	Notes	Brasch	CabCar	CerDem	ElaSpp	EleSpp	EloCan	EriAqu	LudSpp	MyrHet	NajGua	NupVar	NymOdo	PonCor	PotBic	PotEpi	PotNat	PotPus	PotRob	SagSpp	SpaSpp	UtrGib	UtrRad	ValAme
6	1	1	Greg Bugbee	41.36566	-72.31371	44396	0.2	Gravel	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	5	Greg Bugbee	41.36563	-72.31365	7/19/2021	1.0	Gravel		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
6	3	10	Greg Bugbee	41.36565	-72.31361	7/19/2021	1.3	Gravel	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	4	20	Greg Bugbee	41.36569	-72.31349	7/19/2021	2.9	Gravel	Algal Mat	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0
6	5	30	Greg Bugbee	41.36574	-72.31336	7/19/2021	4.0	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	6	40	Greg Bugbee	41.36576	-72.31325	7/19/2021	5.6	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	7	50	Greg Bugbee	41.36579	-72.31314	7/19/2021	6.8	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	8	60	Greg Bugbee	41.36580	-72.31299	7/19/2021	8.9	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	9	70	Greg Bugbee	41.36581	-72.31289	7/19/2021	9.4	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	10	80	Greg Bugbee	41.36584	-72.31276	7/19/2021	11.2	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0.5	Greg Bugbee	41.36641	-72.30810	7/19/2021	0.2	Muck		0	0	0	0	0	0	0	3	2	0	0	1	0	0	0	2	0	0	0	0	0	2	0
7	2	5	Greg Bugbee	41.36633	-72.30815	7/19/2021	0.6	Muck		1	0	0	0	0	0	0	0	2	0	2	1	0	0	0	2	0	0	0	0	0	2	0
7	3	10	Greg Bugbee	41.36631	-72.30815	7/19/2021	1.0	Muck		0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	2	0
7	4	20	Greg Bugbee	41.36620	-72.30821	7/19/2021	1.2	Muck		2	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	2	0
7	5	30	Greg Bugbee	41.36613	-72.30825	7/19/2021	1.2	Muck		0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	3	0	0	0	0	0	0	0
7	6	40	Greg Bugbee	41.36605	-72.30831	7/19/2021	1.4	Muck		0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
7	7	50	Greg Bugbee	41.36596	-72.30836	7/19/2021	1.4	Muck		0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2	0
7	8	60	Greg Bugbee	41.36590	-72.30844	7/19/2021	1.8	Muck		0	0	0	0	2	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	2	0
7	9	70	Greg Bugbee	41.36584	-72.30853	7/19/2021	2.0	Muck		0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0
7	10	80	Greg Bugbee	41.36575	-72.30862	7/19/2021	2.3	Muck		0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	0.5	Greg Bugbee	41.36758	-72.29946	7/19/2021	0.2	Gravel		0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
8	2	5	Greg Bugbee	41.36752	-72.29947	7/19/2021	1.1	Gravel		0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
8	3	10	Greg Bugbee	41.36748	-72.29950	7/19/2021	2.0	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
8	4	20	Greg Bugbee	41.36740	-72.29959	7/19/2021	3.0	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	5	30	Greg Bugbee	41.36733	-72.29962	7/19/2021	3.8	Organic	Charaphyte	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	6	40	Greg Bugbee	41.36726	-72.29968	7/19/2021	4.0	Organic	Charaphyte	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
8	7	50	Greg Bugbee	41.36717	-72.29974	7/19/2021	3.0	Organic	Charaphyte	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0
8	8	60	Greg Bugbee	41.36708	-72.29974	7/19/2021	2.6	Organic		0	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
8	9	70	Greg Bugbee	41.36700	-72.29983	7/19/2021	3.0	Organic		0	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
8	10	80	Greg Bugbee	41.36693	-72.29987	7/19/2021	3.0	Organic		0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0.5	Greg Bugbee	41.36199	-72.29742	7/19/2021	0.2	Gravel		0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	2	5	Greg Bugbee	41.36201	-72.29745	7/19/2021	1.0	Gravel		0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	2
9	3	10	Greg Bugbee	41.36204	-72.29751	7/19/2021	2.0	Gravel	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
9	4	20	Greg Bugbee	41.36209	-72.29764	7/19/2021	4.5	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	5	30	Greg Bugbee	41.36216	-72.29771	7/19/2021	7.0	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	6	40	Greg Bugbee	41.36218	-72.29782	7/19/2021	7.8	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	7	50	Greg Bugbee	41.36226	-72.29791	7/19/2021	7.8	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	8	60	Greg Bugbee	41.36232	-72.29800	7/19/2021	7.8	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	9	70	Greg Bugbee	41.36237	-72.29809	7/19/2021	4.8	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	10	80	Greg Bugbee	41.36242	-72.29821	7/19/2021	4.5	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	0.5	Greg Bugbee	41.35874	-72.29595	7/23/2021	0.3	Sand		0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	5	Greg Bugbee	41.35873	-72.29598	7/23/2021	1.0	Sand		0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
10	3	10	Greg Bugbee	41.35872	-72.29610	7/23/2021	1.5	Muck		3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
10	4	20	Greg Bugbee	41.35875	-72.29622	7/23/2021	1.8	Muck		0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0
10	5	30	Greg Bugbee	41.35871	-72.29632	7/23/2021	1.8	Muck	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	6	40	Greg Bugbee	41.35871	-72.29642	7/23/2021	1.9	Muck	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	7	50	Greg Bugbee	41.35867	-72.29653	7/23/2021	2.0	Muck	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	8	60	Greg Bugbee	41.35871	-72.29665	7/23/2021	2.0	Muck	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	9	70	Greg Bugbee	41.35872	-72.29681	7/23/2021	2.0	Muck	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	10	80	Greg Bugbee	41.35871	-72.29694	7/23/2021	2.0	Muck	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Rogers Lake Transect Data (3 of 3)

Transect	Point	Distance from Shore (m)	Surveyor	Latitude	Longitude	Date	Depth (m)	Substrate	Notes	Brasch	CabCar	CerDem	ElaSpp	EleSpp	EloCan	EriAqu	LudSpp	MyrHet	NajGua	NupVar	NymOdo	PonCor	PotBic	PotEpi	PotNat	PotPus	PotRob	SagSpp	SpaSpp	UtrGib	UtrRad	ValAme
11	1	0.5	Greg Bugbee	41.35345	-72.29536	7/23/2021	0.2	Gravel		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
11	2	5	Greg Bugbee	41.35343	-72.29539	7/23/2021	1.2	Gravel	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	3	10	Greg Bugbee	41.35342	-72.29545	7/23/2021	1.8	Muck		0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
11	4	20	Greg Bugbee	41.35341	-72.29559	7/23/2021	2.6	Muck	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	5	30	Greg Bugbee	41.35342	-72.29570	7/23/2021	4.5	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	6	40	Greg Bugbee	41.35341	-72.29583	7/23/2021	5.5	Organic	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	7	50	Greg Bugbee	41.35340	-72.29593	7/23/2021	6.1	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	8	60	Greg Bugbee	41.35340	-72.29606	7/23/2021	6.8	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	9	70	Greg Bugbee	41.35338	-72.29616	7/23/2021	7.5	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	10	80	Greg Bugbee	41.35340	-72.29629	7/23/2021	7.9	Organic	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0.5	Greg Bugbee	41.35047	-72.29684	7/21/2021	0.3	Bedrock	Boulders	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	5	Greg Bugbee	41.35050	-72.29683	7/21/2021	1.0	Sand		0	0	0	0	0	0	0	0	0	2	0	2	2	0	1	0	0	0	0	0	0	2	0
12	3	10	Greg Bugbee	41.35055	-72.29684	7/21/2021	1.0	Sand		0	0	0	0	0	0	0	0	0	2	2	2	2	0	0	2	0	0	0	0	0	2	0
12	4	20	Greg Bugbee	41.35064	-72.29687	7/21/2021	1.2	Sand		0	0	0	0	0	0	0	0	0	2	0	3	1	0	0	0	0	0	0	0	0	2	0
12	5	30	Greg Bugbee	41.35074	-72.29685	7/21/2021	1.2	Sand		0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0
12	6	40	Greg Bugbee	41.35084	-72.29686	7/21/2021	1.6	Muck	Charaphyte	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
12	7	50	Greg Bugbee	41.35089	-72.29686	7/21/2021	1.6	Muck		0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
12	8	60	Greg Bugbee	41.35099	-72.29686	7/21/2021	1.7	Muck		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	2
12	9	70	Greg Bugbee	41.35112	-72.29692	7/21/2021	1.9	Muck	Charaphyte	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	2
12	10	80	Greg Bugbee	41.35122	-72.29694	7/21/2021	1.9	Muck	Charaphyte	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	2	0	2	0	2	2
13	1	0.5	Greg Bugbee	41.36347	-72.29686	7/21/2021	0.2	Gravel	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	2	5	Greg Bugbee	41.36347	-72.29693	7/21/2021	1.2	Gravel		0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	3
13	3	10	Greg Bugbee	41.36348	-72.29699	7/21/2021	2.0	Gravel		0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	2
13	4	20	Greg Bugbee	41.36348	-72.29711	7/21/2021	3.5	Gravel	Charaphyte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
13	5	30	Greg Bugbee	41.36352	-72.29721	7/21/2021	5.0	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	6	40	Greg Bugbee	41.36350	-72.29736	7/21/2021	7.0	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	7	50	Greg Bugbee	41.36350	-72.29748	7/21/2021	7.7	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	8	60	Greg Bugbee	41.36353	-72.29757	7/21/2021	8.3	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	9	70	Greg Bugbee	41.36352	-72.29771	7/21/2021	8.3	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	10	80	Greg Bugbee	41.36355	-72.29784	7/21/2021	8.0	Silt	Nothing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0