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July 29, 2020

Tim Griswold
First Selectman
52 Lyme Street
Old Lyme, CT 06371

Dennis Overfield
Co-Chairman
Rogers Lake Authority
119 Shore Drive
Lyme, CT 06371

Re: Rogers Lake 2020 Invasive Aquatic Plant Species Survey

Dear Mr. Griswold and Mr. Overfield:

SWCA Environmental Consultants (SWCA) is pleased to provide you with this report summarizing the results of our 2020 invasive plant survey of Rogers Lake in Lyme and Old Lyme, Connecticut. SWCA collected data in June and July of 2020. This report compares pre-treatment data collected during this study with data collected in 2014 and 2018. In general, we have observed a dramatic reduction in invasive species throughout Rogers Lake between 2014 and 2020. Because of the reduced distribution, SWCA is suggesting that future management may only require hand-pulling of invasive aquatic species.

If there are any questions regarding the data or the results of this assessment, please contact Scott Fisher at our office at 413-658-2056 or via email at sfisher@swca.com.

Sincerely,

Steve Johnson, Ph.D.
Senior Ecologist

Scott Fisher
Director

OBJECTIVES AND METHODS

INVASIVE PLANT SURVEYS

SWCA Senior Ecologist Dr. Steve Johnson led five days of aquatic plant surveys on June 23, 24, 25, 30 and July 1 within Rogers Lake in Old Lyme/Lyme, Connecticut. The primary objective of the survey was to determine the current status and distribution of aquatic invasive species within Rogers Lake. SWCA focused survey efforts in shallow-water areas where sunlight was likely to reach the lake bottom (up to 10 feet in depth), but did make passes into deeper waters as well (Figure 1). Most of our survey efforts were located in areas shallow enough to support dense aquatic vegetation which are found around the perimeter of the lake and islands. In general, SWCA observed a dramatic reduction in invasive species throughout Rogers Lake. The reduction in the density of invasive plants has made the general sampling methodology followed by All Habitat Services, LLC (All Habitat) in 2014 less efficient. In many cases, even when a patch of invasive plants was visible, it took numerous tosses of the grapple hook to collect a specimen. Therefore, SWCA relied primarily on visual searches for submerged invasive aquatic species, as random sampling would likely provide numerous false negative results. For observed or suspected invasive plants in water too deep to identify to species from the surface, SWCA utilized a grappling hook attached to approximately 5 meters of rope to obtain a specimen.

SWCA mapped observed invasive aquatic plant locations using a tablet with GPS capabilities, allowing us to create polygons and polylines to depict larger patches of invasive species. A waterproof handheld Garmin etrex 20 GPS unit was used in areas too shallow to reach with a motorboat. In these areas, kayaks were deployed to reach the extent of the invasive species.

The Rogers Lake Associated requested that SWCA document observed patches of phragmites (*Phragmites australis*), an invasive grass species found along the lake shore.

RESULTS

INVASIVE SPECIES

In general, SWCA has witnessed a dramatic decline in invasive aquatic plant species in Rogers Lake since 2014. The only possible exception to this trend is curly-leaf pondweed (*Potamogeton crispus*); however, we suspect that the apparent increase is due to differences in survey effort and timing rather than to an actual increase in this species. It is also possible that curly-leaf pondweed is more visible now that other aquatic invasive species have been reduced. This will be discussed in greater detail below.

Cabomba caroliniana

The distribution and abundance of *Cabomba caroliniana* (fanwort) observed in June of 2020 was greatly reduced from observations made in 2014 (Figure 2). Our 2020 survey identified more *Cabomba* than what was seen in 2018, this is likely due to a modification to the survey approach. Kayaks were used by SWCA in 2020 to extensively survey shallow areas that could not be reached by motor boat. This approach was not used in 2018.

Currently there are two areas with relatively dense concentrations of *Cabomba* in the lake. Both occur within inlet-related coves: the first population extends northeast of the Town Boat Ramp located on the east side of the lake. This population was observed in shallow water between six inches and three feet and only reached high densities at the

upstream end of the two inlets (Photos 1 and 2). Downstream of the boat ramp, only scattered plants were observed along both sides of the inlet, continuing out to the mouth of the inlet. The second large population of Cabomba is in the northwest end of the lake, mixed with white water lily (Photos 3 and 4). This population was also entirely within shallow waters between six inches and three feet at the time of the survey.

The remaining 2020 observations of *Cabomba* all consisted of scattered small clumps, of one to a few dozen plants, ranging in area coverage from less than one square foot, up to four square feet. These plants were all located in relatively shallow waters less than 3.5 feet in depth.

Myriophyllum heterophyllum

Myriophyllum heterophyllum (variable-leaf milfoil) has also diminished significantly since 2014. *M. heterophyllum* is now the least abundant aquatic invasive species observed in the lake (Figure 3). In contrast, it was the most abundant and wide-spread invasive aquatic plant species observed in 2018. In past surveys, *M heterophyllum* populations characteristically consisted of large, dense patches usually hundreds of square feet in size occurring in numerous locations throughout the lake, with few or no other species mixing in. In 2020, we observed *M. heterophyllum* in only two locations. The first location, along the northwestern shoreline, consisted of two ten square foot patches in about three feet of water, while the second site, located approximately 1,700 feet to the southeast, was approximately 150 square feet in size in up to 1.5 feet of water (Photo 5).

Potamogeton crispus

Potamogeton crispus (curly-leaf pondweed) was not documented in Rogers Lake prior to June of 2018. The 2018 observations consisted of four small populations, three within the Town Boat Ramp inlet, and one across the lake along the western shore (Figure 4). *P. crispus* was still present within the Town Boat Ramp inlet in 2020, but in a much more scattered nature with only one or two plants occurring together. The largest concentration of *P. crispus* observed in 2020 was located along the north shore where several small scattered patches, and one larger 36 square foot patch were found (Photos 6). A single three-foot diameter patch was observed almost directly across the lake from the concentrated area, and four additional small patches consisting of one to three plants were observed (and pulled) at the northwest end of the lake.

We suspect that the apparent increase in *P. crispus* is due in large part to the increase in survey efforts made in 2020. In 2018, SWCA spent two days surveying during the growing season when P. crispus would be most readily apparent, compared to five survey days in 2020. Based on our 2020 observations of this species, it is also likely that *P. crispus* was occurring within larger populations of other species in 2018, making it more difficult to observe (Photo 7).

Phragmites australis

Phragmites australis (common reed) is not a truly aquatic species and had not been documented on the lake shoreline until the fall of 2018. At that time three small populations were mapped. A small patch along the north shore, and a second patch along the east shore each consisted of only 10 to 20 stems, while the third and larger patch was located at the south end of the lake just east of the beach area. This patch was approximately 325 square feet (30 square meters) in size. The two small patches to the north were not found in 2020, while the size of the larger *Phragmites* patch at the south end of the lake appears to be relatively unchanged (Photo 8). The difference in the apparent shape of this population is likely due to the improved GPS technology used during the 2020 survey.

NATIVE SPECIES

While invasive aquatic plant species were the focus of the 2020 survey, SWCA did make note of some native aquatic plant species observations that are worth mentioning here. Several residents around the lake inquired about a pond weed that they had not noticed prior to this year (Photo 9). SWCA took samples and identified the plant as *Potamogeton bicupulatus*, as well as possibly the very similar *P. spirillus* both native pond weeds that have likely been in the lake for some time, but are now more readily apparent with the reduction in invasive species cover. We also noted the presence of another species of *Potamogeton, P. robbinsii*, throughout many areas previously dominated by *M. heterophyllum*. This too is a native species that generally does not grow to the lake surface (Photo 10). We also noted an apparent increase in a native alga species that closely resembles a vascular plant (Photo 11). This alga was located on the lake bottom in several areas that had once been dominated by *M. heterophyllum* and *Cabomba*. SWCA has not yet identified this alga to species.

SWCA observed four eastern pondmussels (*Ligumia nasuta*), a species of Special Concern in Connecticut. All four mussels were found close to three of the islands surveyed for invasive plants and appeared to be in good condition. We also noted the presence of numerous dense mussel beds of common native freshwater mussels that also appeared to be healthy (Photos 12 and 13).

SUMMARY AND CONCLUSIONS

In June and early July of 2020, SWCA conducted botanical surveys to document and map the distribution of invasive plant species within Rogers Lake in Lyme and Old Lyme, Connecticut (Figure 6). Comparisons between the data collected from this survey effort made with surveys from 2014 and 2018 indicate that the three aquatic invasive species previously identified within the lake, *Cabomba caroliniana, Myriophyllum heterophyllum*, and *Potamogeton crispus*, have been greatly reduced through herbicide applications to very manageable levels. The majority of aquatic invasive plant species observed in 2020 occurred in low enough densities and in shallow waters where management through hand-pulling would likely be both feasible and effective.

The only possible exception to this approach would be the two dense patches of *Cabomba* observed in the northwest end of the lake and above the Town Boat Ramp. However, restricted boat traffic in these areas should reduce the *Cabomba* from spreading from these areas to other portions of the lake. Additionally, the *Cabomba* observed at these locations was in relatively shallow waters and could be hand-pulled as well by personnel in kayaks. The larger two populations may require a more long-term effort than invasive aquatic plant species in other parts of the lake; however, hand-pulling may still be the preferred option for reducing *Cabomba* in these areas, rather than an herbicide application.

The fourth invasive species mapped during the 2020 surveys, *Phragmites australis*, was only observed at one of its three previous observed locations. The remaining stand of this reed at the southern end of the lake is still quite small and would likely respond well to herbicide applications.

Water Sample 1

Lyme

Old Lyme

Water Sample 2

Water Sample Location

Survey Track

Town Boundary

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Figure 1
2020 Survey Tracks and Water Sampling

Rogers Lake
Lyme & Old Lyme, CT

15 Jul 2020

SWCA Job # 48737

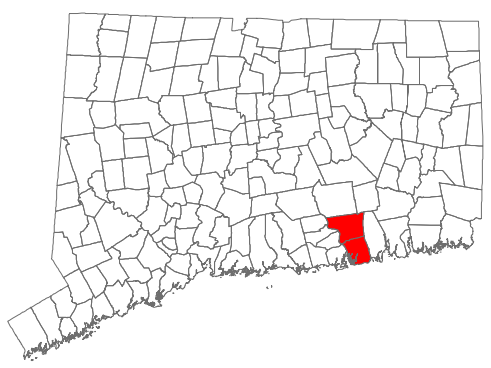
Data Source: Connecticut Environmental Conditions Online

6-in Color Digital Ortho Image 2019
Tiled Service

0 500 Feet

N

Latitude 41° 21' 36" N
Longitude 72° 18' 4" W



2014 Cabomba Point Observation
2014 Cabomba Area Observation
2018 Cabomba Observation
2020 Cabomba Point Observation
2020 Cabomba Line Observation
2020 Cabomba Area Observation

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Figure 2
2014-2020
Cabomba caroliniana
Observations

Rogers Lake
Lyme & Old Lyme, CT

15 Jul 2020

SWCA Job # 48737

Data Source: Connecticut Environmental Conditions Online

6-in Color Digital Ortho Image 2019
Tiled Service

0 500 Feet

N

Latitude 41° 21' 36" N
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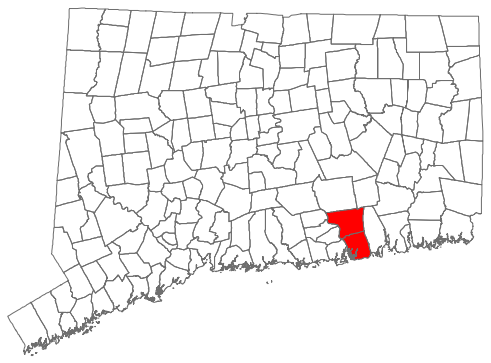

2014 M. heterophyllum Area Observation

2018 M. heterophyllum Point Observation

2018 M. heterophyllum Area Observation

2020 M. heterophyllum Observation

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Figure 3
2014-2020 Myriophyllum heterophyllum Observations

Rogers Lake
Lyme & Old Lyme, CT

15 Jul 2020

SWCA Job # 48737

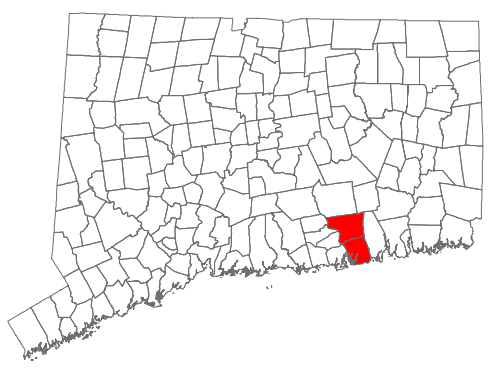
Data Source: Connecticut Environmental Conditions Online

6-in Color Digital Ortho Image 2019
Tiled Service

0 500 Feet

N

Latitude 41° 21' 36" N
Longitude 72° 18' 4" W



2018 P. crispus Observation

2020 P. crispus Observation

2020 P. crispus Line Observation

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Figure 4
2018-2020
Potamogeton crispus
Observations

Rogers Lake
Lyme & Old Lyme, CT

15 Jul 2020

SWCA Job # 48737

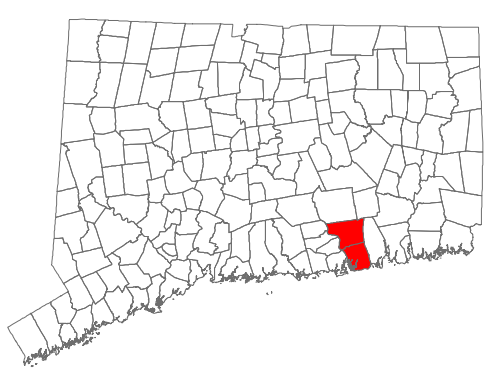
Data Source: Connecticut Environmental Conditions Online

6-in Color Digital Ortho Image 2019
Tiled Service

0 500 Feet

N

Latitude 41° 21' 36" N
Longitude 72° 18' 4" W



2018 Phragmites Area Observation

2020 Phragmites Area Observation

Feet
0 20

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Figure 5
2018-2020 Phragmites australis Observations

Rogers Lake
Lyme & Old Lyme, CT

15 Jul 2020

SWCA Job # 48737

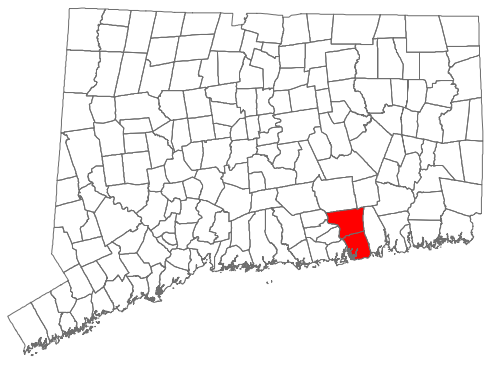
Data Source: Connecticut Environmental Conditions Online

6-in Color Digital Ortho Image 2019
Tiled Service

Feet
0 500

N

Latitude 41° 21' 36" N
Longitude 72° 18' 4" W



Phragmites Area Observation
P. crispus Observation
P. crispus Line Observation
M. heterophyllum Observation
Cabomba Point Observation
Cabomba Line Observation
Cabomba Area Observation

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Figure 6
2020
Invasive Species Observations

Rogers Lake
Lyme & Old Lyme, CT

29 Jul 2020

SWCA Job # 48737

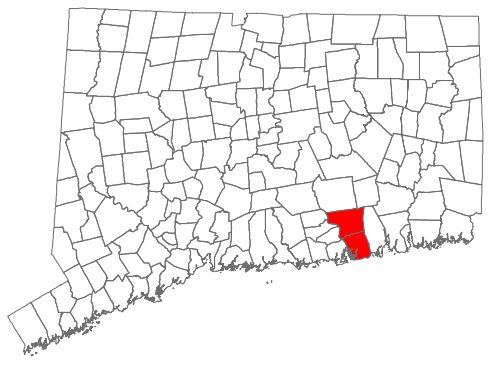
Data Source: Connecticut Environmental Conditions Online

6-in Color Digital Ortho Image 2019
Tiled Service

0 500 Feet

N

Latitude 41° 21' 36" N
Longitude 72° 18' 4" W



APPENDIX A

Representative Photographs from 2020 Invasive Plant Survey

Photo 1. Narrow cove north of Town Boat Ramp where *Cabomba caroliniana* was observed.

Photo 2. *Cabomba caroliniana* observed amongst lily pads north of Town Boat Ramp.

Photo 3. Shallow cove at northwest end of Rogers Lake where a large patch of *Cabomba caroliniana* was observed.

Photo 4. *Cabomba caroliniana* observed amongst lily pads at northwest end of Rogers Lake.

Photo 5. The largest patch of *Myriophyllum heterophyllum* observed in 2020. Note that this patch was located in very shallow water.

Photo 6. The invasive species *Potamogeton crispus.*

Photo 6. The invasive *Potamogeton crispus* amongst native *Potamogeton* species.

Photo 7. Stand of *Phragmites australis* located just east of the southern beach area.

Photo 8. The native *Potamogeton bicupulatus*, observed throughout much Rogers Lake in 2020.

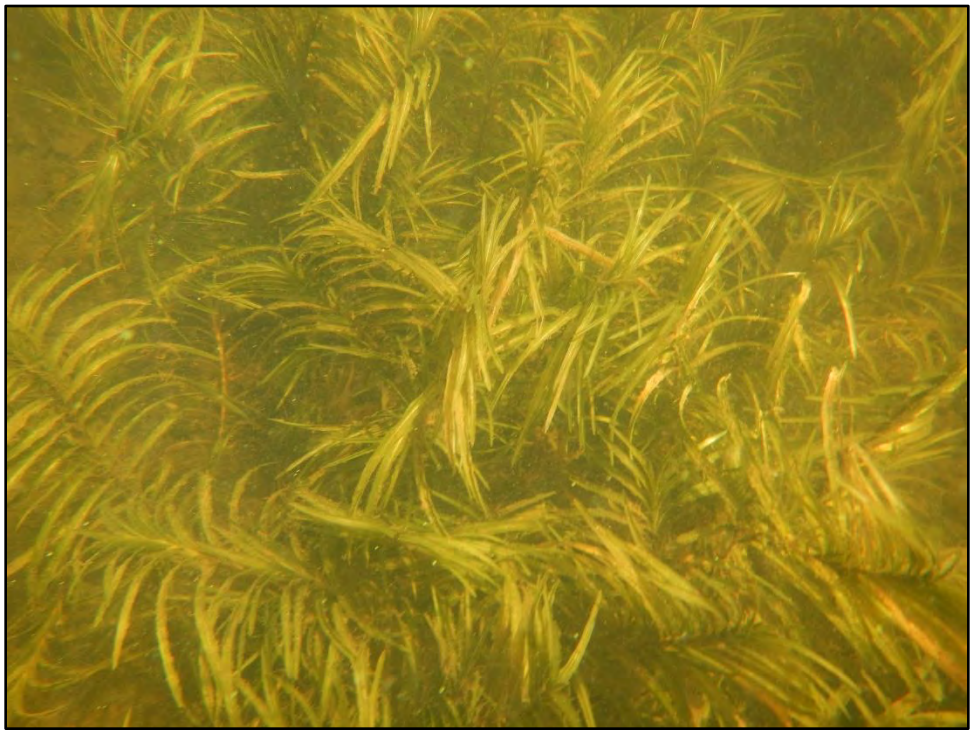


Photo 9. The native *Potamogeton robbinsii*, observed along the lake bottom in several areas previously dominated by invasive species.

Photo 10. Unidentified alga observed on lake bottom in several locations.

Photo 11. Filtering eastern pondmussel, a species of Special Concern in Connecticut.

Photo 12. Female eastern pondmussel observed near one of the islands within Rogers Lake.