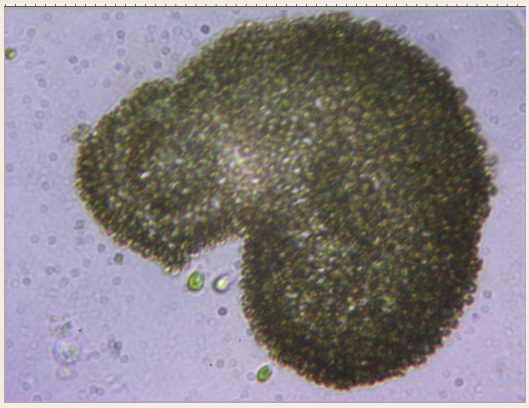
WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Manchaug Pond - October 2021

Sampling Conditions

October 16th was a breezy, cloudy Saturday at 68℉. There was no rainfall the day before the sample was collected. The water was 64℉ and clear with some leaves and pine needles on the surface. Three mallard ducks were observed at the sampling location.

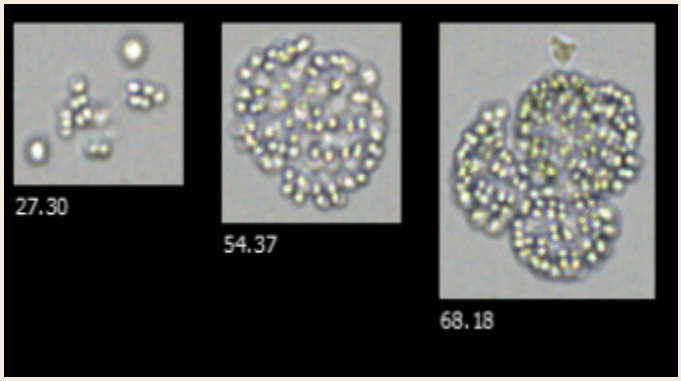
Microscopic Findings from the Plankton NET



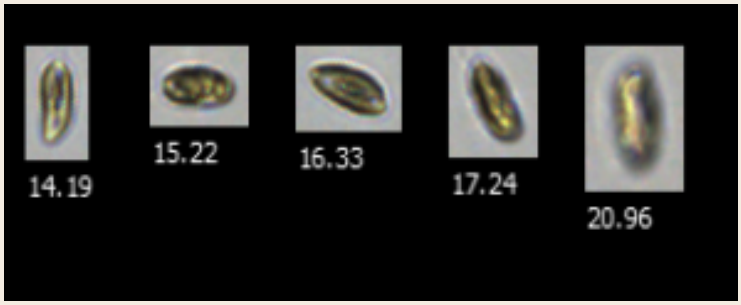
Microcystis Cyanobacteria

FlowCam Findings from the GRAB Sample

The particle density at Manchaug Pond was 37 particles/ml in October, down from 606 particles/ml in September, according to the FlowCam. Of these particles, most were cryptomonads and other small particles, and only a few Snowella cyanobacteria were detected



Snowella Cyanobacteria



Cryptomonads

Fluorimetry Data from the Integrated Tube Sample

We used the fluorometer to find the amount of phycocyanin in the sample, which we can use as an indicator of cyanobacteria. In October, Manchaug Pond had undetectable levels of phycocyanin pigment, much like it had in September. A pond becomes at risk for a bloom when it is at levels above 50 Au.

WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Manchaug Pond - September 2021

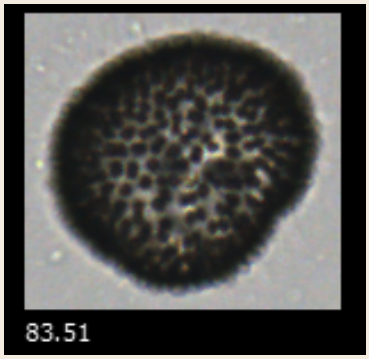
Sampling Conditions

September 25th was a calm, sunny Saturday at 66℉. There were 2 inches of rainfall the day before the sample was collected. The water was 78℉ and clear. Three bluegills were observed at the sampling location.

Microscopic Findings from the Plankton NET

Zooplankton

Unidentified Particle



Flowcam images of Green Algae and Woronichinia cyanobacteria

FlowCam Findings from the GRAB Sample

The particle density at Manchaug Pond was 606 particles/ml in September, according to the FlowCam, which was higher than it was in August. Unlike August, however, the sample had few cyanobacteria, with only several images of Woronichinia observed. The sample contained mostly debris, and several green algae.

Fluorimetry Data from the Integrated Tube Sample

We used the fluorometer to find the amount of phycocyanin in the sample, which we can use as an indicator of cyanobacteria. In September, Manchaug Pond had undetectable levels of phycocyanin pigment, which is less than in August, when it had 18 Au. A pond becomes at risk for a bloom when it is at levels above 50 Au.

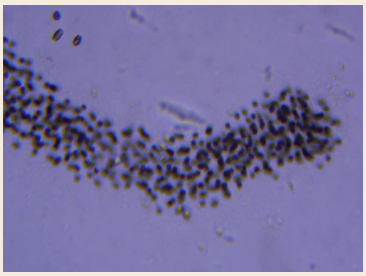
WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Manchaug Pond - August 2021

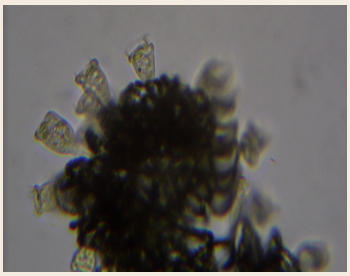
Sampling Conditions

August 21st was a partly cloudy Saturday at 80℉ with a light breeze. There were 3.2 inches of rainfall two days prior to the meeting.

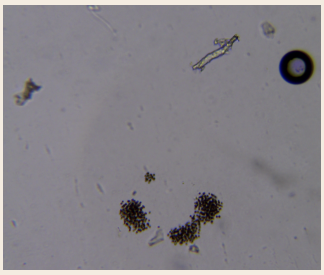
Microscopic Findings from the Plankton NET



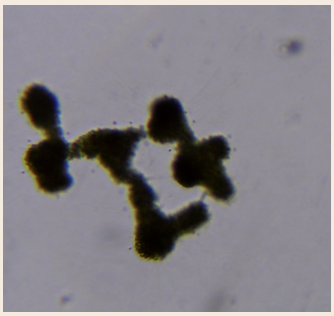
Aphanocapsa



Dolichospermum



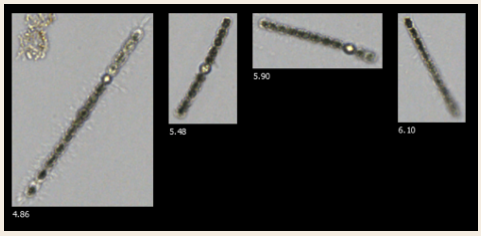
Dolichospermum



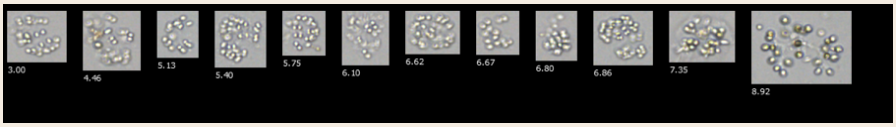
Microcystis

FlowCam Findings from the GRAB Sample

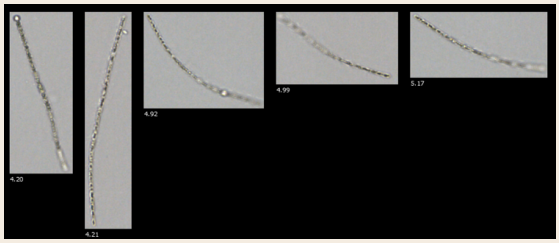
The particle density at Manchaug Pond was 304 particles/ml in August, according to the FlowCam, which was lower than it was in July. The sample was dominated by various genera of cyanobacteria, including *Aphanizomenon*, *Dolichospermum*, and *Snowella*. While not ideal, fluorometry results show that cyanobacteria are not yet reaching bloom levels, and a diversity of cyanobacteria genera is better than having just one. We will keep an eye on the lake.



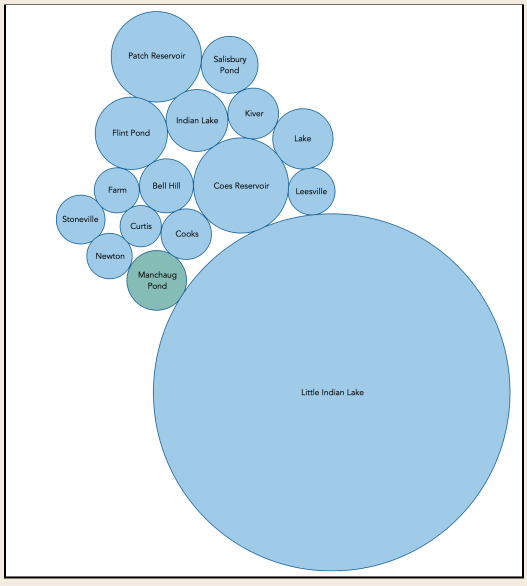
Dolichospermum



Snowella



Aphanizomenon



Fluorimetry Data from the Integrated Tube Sample

Using the fluorometer to find phycocyanin levels, the following graph represents the relative cyanobacteria pigment in each pond. Manchaug Pond rose from undetectable levels in the month of July to 18 Au in the month of August. A pond becomes at risk for a bloom when it is at levels above 50 Au.

WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Manchaug Pond - July 2021

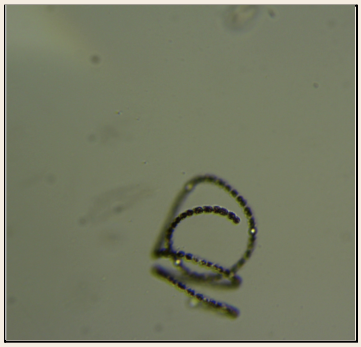
Sampling Conditions

July 17th was a partly cloudy Saturday at 73℉ with no wind activity. Manchaug Pond's sample was taken at the dock along the southeast shore where there were .4 inches of rainfall the day before. The temperature of the water's surface was 78℉ and the water was calm with no wave activity. The water was clear with no odor, and no evidence of scum. One fishing boat was spotted in the pond.

Microscopic Findings from the Plankton NET on July 17th

Dolichospermum - 100x

Woronichinia - 100x

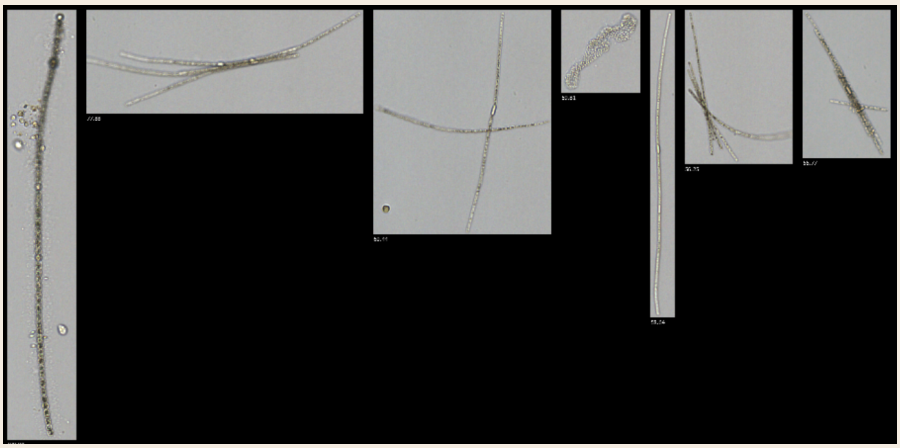


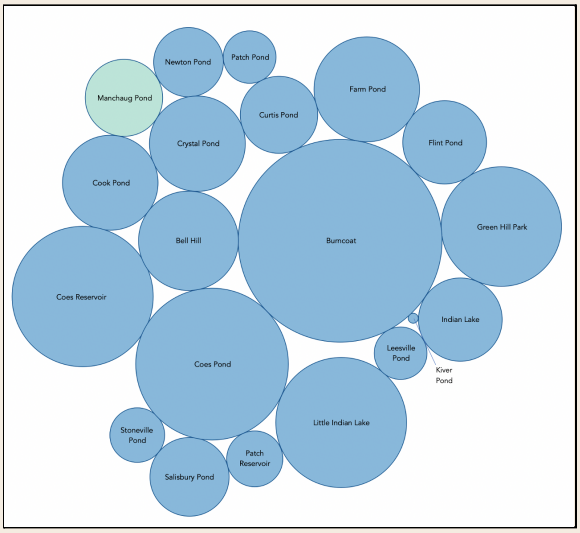
Dolichospermum - 100x

Aphanizomenon - 100x

FlowCam Findings from the GRAB Sample

The FlowCam, an advanced microscopy technology, was run for all organisms in the water sample including green algae, golden algae, cyanobacteria, diatoms, and debris. The particle density at Manchaug Pond was 350 particles/ml in July, which is a decrease from 405 particles/ml in June. The figure provides a snapshot of some of the images that were seen by the camera at this lake.





Fluorimetry Data from the Integrated Tube Sample

Using the fluorometer to find phycocyanin levels, the following graph represents the relative cyanobacteria pigment in each pond. Manchaug Pond has remained at undetectable limits in the months of June and July. A pond becomes at risk for a bloom when levels rise above 50 Au.

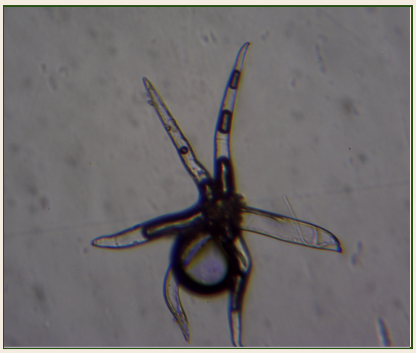
WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Manchaug Pond - June 2021

Sampling Conditions

June 19th was a cloudy Saturday at 70℉. There was a light breeze coming from the southwest direction. Manchaug Pond's sample was taken at the dock along the shore where there was no rain in the past 48 hours. Surface temperature was 72℉ and the water had average wave activity. The water was clear with no odor, and no evidence of scum. One fishing boat was spotted in the pond.

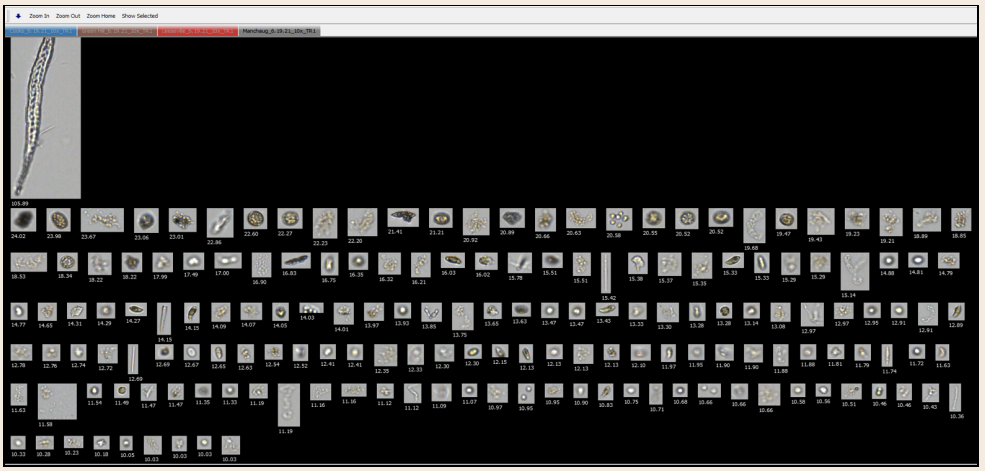
Microscopic Findings from Plankton NET on June 19th



Trichrome - 100x

FlowCam Findings from GRAB Sample

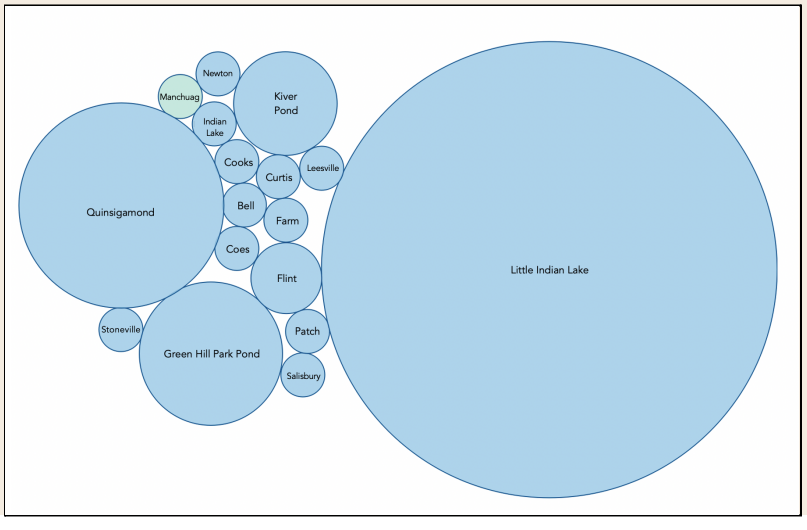
The FlowCam is advanced microscopy technology that uses a high speed camera to photograph individual cells as they pass through a thin flow cell. The computer's image recognition technology will then sort the cells based on parameters used to distinguish cyanobacteria from other organisms, and eventually count them. While we still have some work to do to train the computer to cell counts, we were able to do an initial scan on June's samples.



The particle density at Manchaug was 405 particles/ml. Keep in mind that this number includes all organisms in the water sample, including green algae, golden algae, cyanobacteria, diatoms, and debris. Further work with the FlowCam will allow us to tease the groups apart, but for now, this figure can be used to help us understand how productive the water is. Here also is a snapshot of some of the images that were seen by the camera at this lake.

Fluorimetry Data from IT Tube

A spectrometer is a scientific instrument used to measure specific fluorescent components of a substance. Using this machine, we are able to measure the amounts of phycocyanin - a pigment specific to cyanobacteria - in a water sample. From these measurements we are able to determine the relative amounts of cyanobacteria in Worcester's waters. The graph provides the relative amounts of cyanobacteria found in the month of June. This month, only five water bodies presented with a distinguishable amount of cyanobacteria: Flint, Kiver, Quinsigamond, Green Hill, and Little Indian Lake. All other ponds, including Manchaug Pond, showed no distinguishable levels of phycocyanin.



WORCESTER CYANOBACTERIA MONITERING COLLABORATIVE

Manchaug Pond

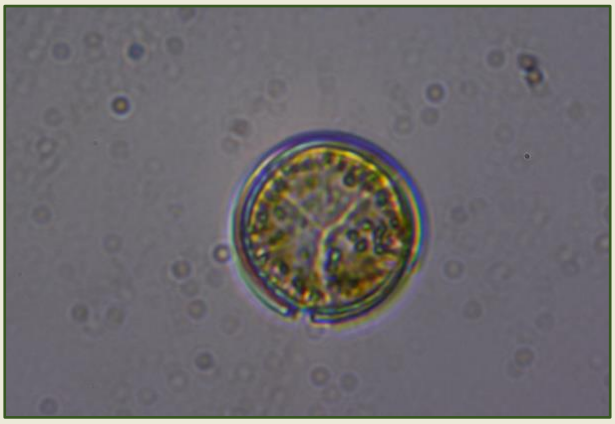
May 2021

Manchaug Pond is located in the town of Sutton, which is south of Worcester. The pond is about 350 acres in surface area and at its deepest point is 37 feet. The pond hosts fishing, swimming, and other recreational use, especially in the late spring and summer. There is significant public access. Aquatic vegetation is relatively sparse, but there are some big patches along the western shoreline, around the islands, and in the coves. The 2021 sampling season will be the second year the WCMC has sampled Manchaug Pond, following 2019.

Sampling Conditions

May 22nd was a partly cloudy, spring Saturday at 80°F. There was a light breeze coming from the east direction. Manchaug Pond's sample was taken at the dock along the shore where there had been no rain in the past 48 hours. The temperature at the surface of the water was 71°F and the water was calm with little wave activity. The water was clear with no odor, though it had pollen observed along on the surface. Two fishing boats were spotted in the pond.

Microscopic Findings



Peridinium (400x)

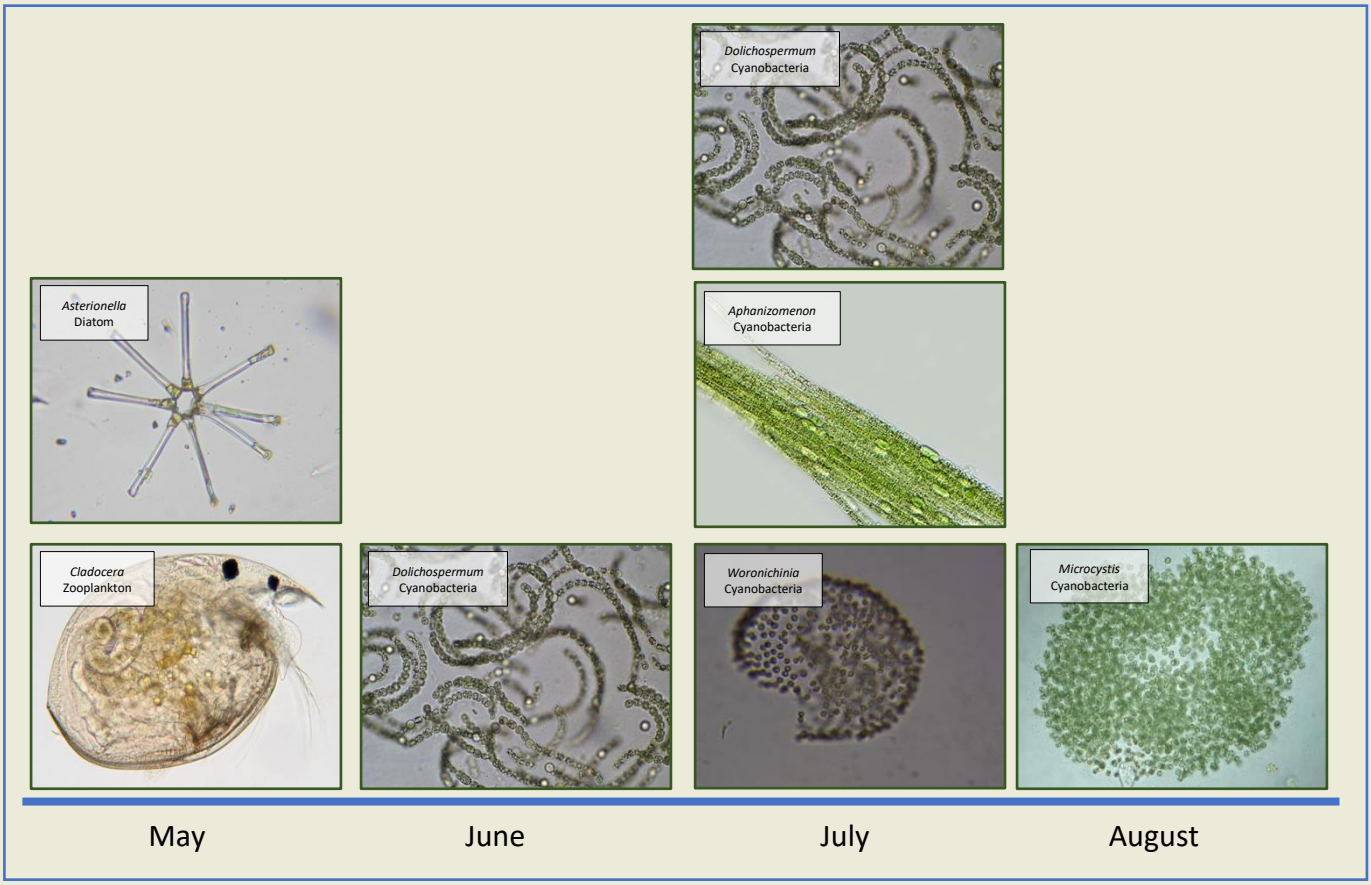
Peridinium is a genus of freshwater dinoflagellates. Although it is hard to see under the magnification pictured, this genus is spherical and heavily armored. Peridinium are mobile, using a flagellum to get around.

Monthly Overview

Underneath the microscopes, volunteers observed a Peridinium, a dinoflagellate but no colonies of cyanobacteria. These observations line up with previous observations, where cyanobacteria were not found until later in the season in June, July, and August. We look forward to complementing this data with fluorometry and FlowCam data next month!

Past Year's Findings

The timeline below shows the organisms that have been found in Manchaug Pond in past years.



Thank you to Phyllis and all other volunteers!