

WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

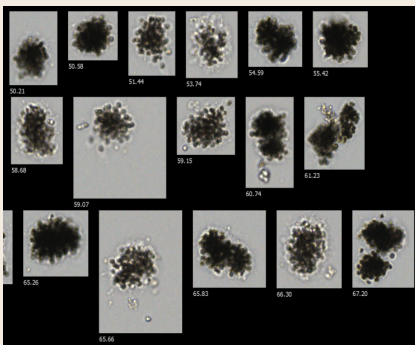
Little Indian Lake - October 2021

Sampling Conditions

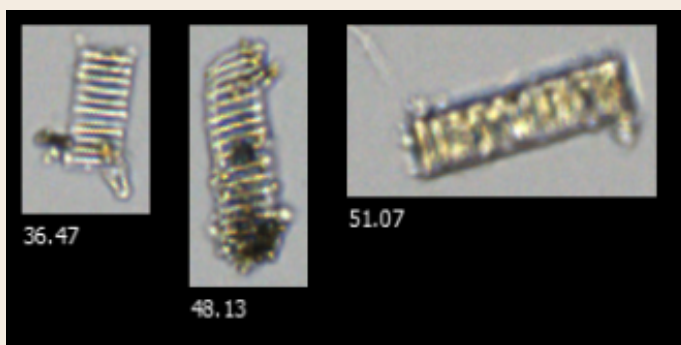
October 16th was a windy Saturday at 66.2°F. The water was 65.8°F and turbid. There was no rainfall the day before the sample was taken.

FlowCam Findings from the GRAB Sample

The particle density at Little Indian Lake was 1,737 particles/ml in October, down from 6,872 particles/ml in September, according to the FlowCam. While there were fewer cyanobacteria present than the previous month, of those that were, most were of the genus *Microcystis*, with several *Aphanizomenon*. Additionally, there were several *Fragillaria* diatoms and *Pediastrum* green algae.



Microcystis Cyanobacteria



Fragillaria Diatoms



Aphanizomenon Cyanobacteria

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, Little Indian Lake had 46 Aus of phycocyanin pigment, up from 22 Aus in September. A pond becomes at risk for a bloom when it is at levels above 50 Au.

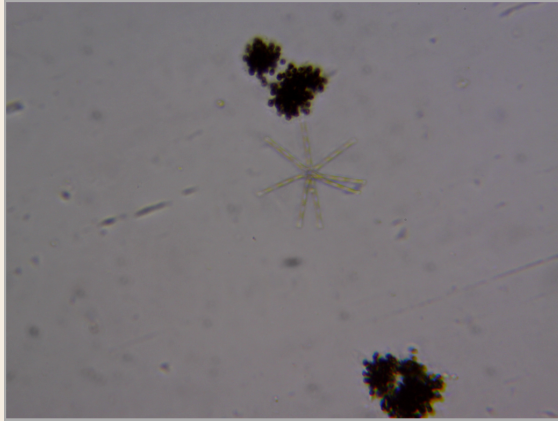
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Little Indian Lake - September 2021

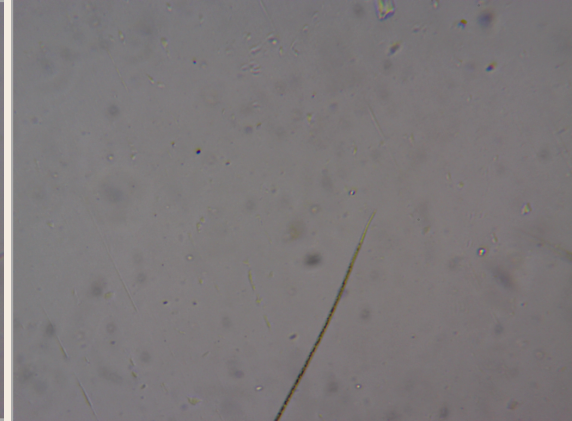
Sampling Conditions

September 25th was a calm Saturday at 61°F. The water was 68°F and opaque with green scum on the surface.. There were 2 inches of rainfall the day before the sample was taken.

Microscopic Findings from the Plankton NET



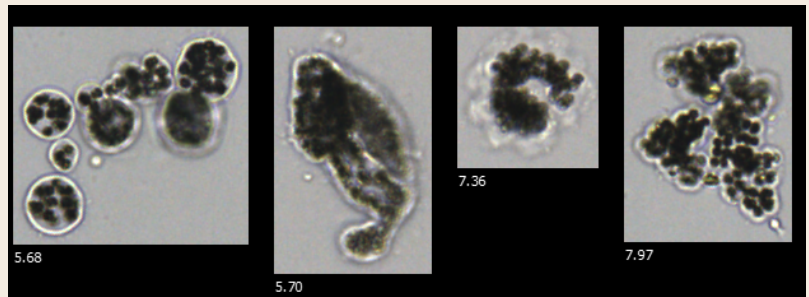
Microcystis Cyanobacteria and Asterionella Diatoms



Aphanizomenon Cyanobacteria

FlowCam Findings from the GRAB Sample.

The particle density at Little Indian Lake was 6872 particles/ml in September, according to the FlowCam, which was high than it was in August. The sample was dominated by cyanobacteria of the genera *Microcystis*, with less *Aphanizomenon* than the previous month. There were also more diatoms than there were in August, specifically from the genus *Tabellaria*. This suggest that the lake may be in better shape this month than last month.



Microcystis Cyanobacteria

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, Little Indian Lake had 22 Au of phycocyanin pigment. A pond becomes at risk for a bloom when it is at levels above 50 Au.

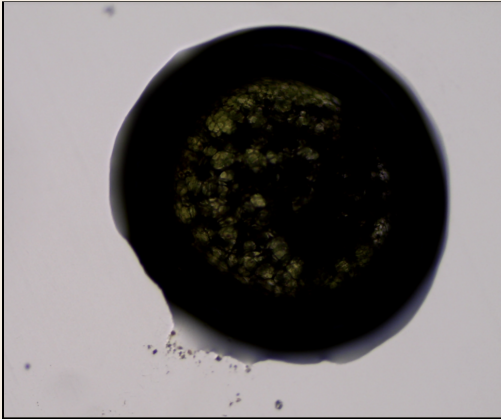
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Little Indian Lake - August 2021

Sampling Conditions

August 21st was a calm Saturday at 76°F. There was 1 inch of rainfall the day before the sample was taken and 3.2 inches of rainfall two days prior to the meeting .

Microscopic Findings from the Plankton NET



Circular Diatom



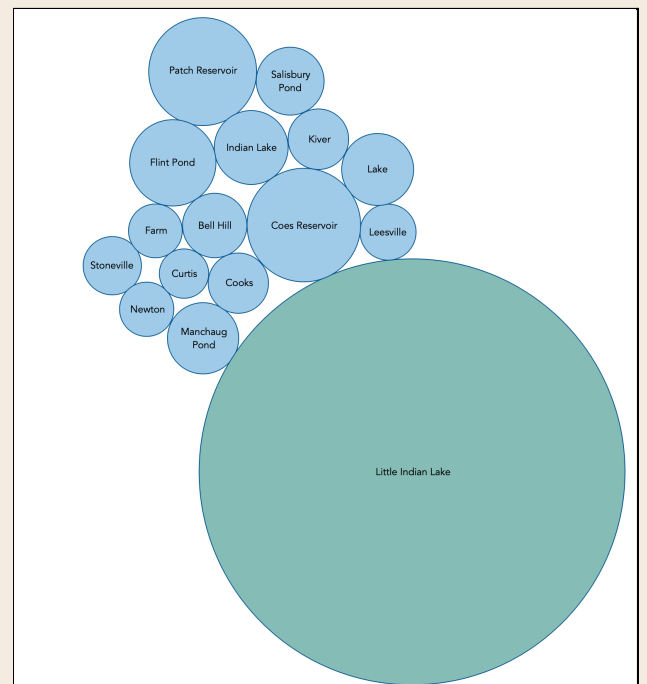
FlowCam images of *Microcystis* and *Aphanizomenon*

FlowCam Findings from the GRAB Sample

The particle density at Little Indian Lake was 2,387 particles/ml in August, according to the FlowCam, which was much lower than it was in July. The sample was dominated by cyanobacteria of the genera *Microcystis* and *Aphanizomenon*, and our fluorometry data suggests that there may be a bloom occurring there.

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. Little Indian Lake rose from 25 Au in the month of July to 658 Au in the month of August. A pond becomes at risk for a bloom when it is at levels above 50 Au.



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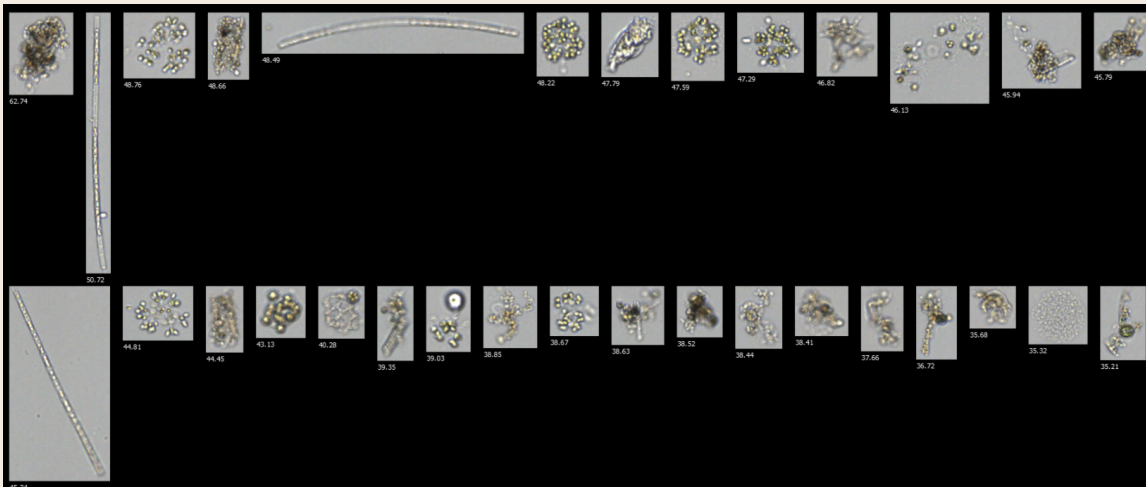
Little Indian Lake - July 2021

Sampling Conditions

July 17th was a partly cloudy Saturday at 73°F with a light breeze. There were .4 inches of rainfall the day before the sample was taken. The water's surface temperature was 73°F and the water was still with no waves. The water was turbid with some green scum observed along the surface in the middle of the water.

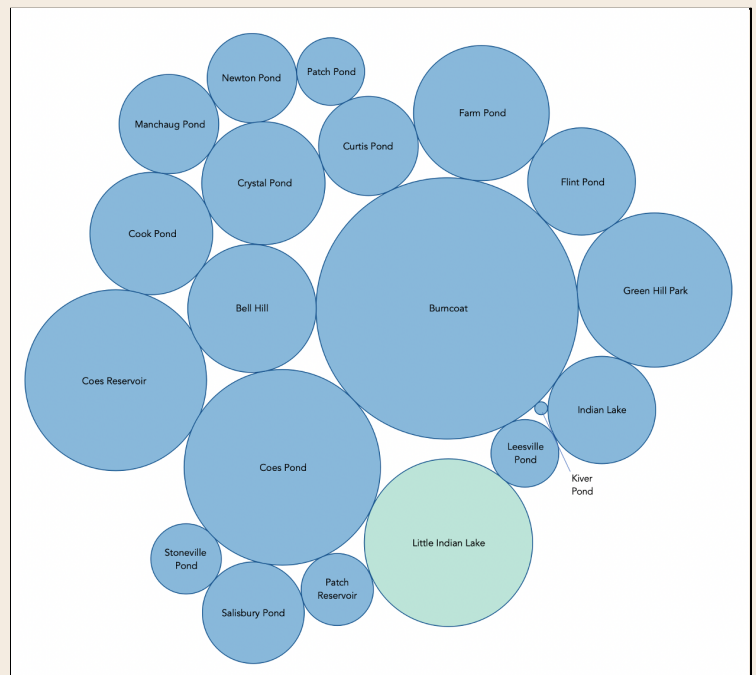
FlowCam Findings from the GRAB Sample

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 Little Indian Lake was 12,355 particles/ml in July, which is a decrease from 21,897 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. Little Indian Lake decreased from 214 Absorbance Units (Au) in the month of June to about 25 Au in the month of July. A pond becomes at risk for a bloom when levels rise above 50 Au.



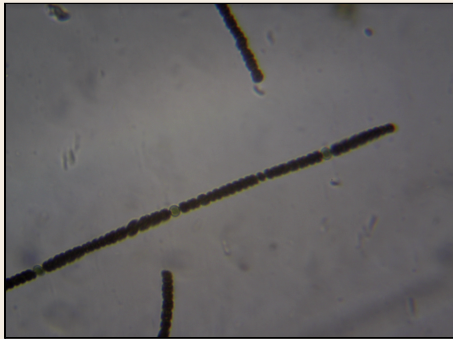
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Little Indian Lake - June 2021

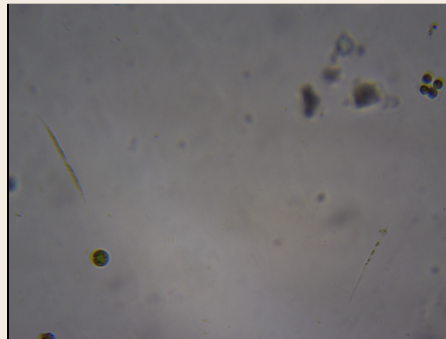
Sampling Conditions

June 19th was a partly cloudy Saturday at 73°F with a light breeze coming from the southeast direction. There was .25 inches of rain the morning of the sample being taken. Surface temperature was 73°F and the water was still with no waves. The water was turbid with a moderate fishy smell and some pollen observed along the top.

Microscopic Findings from Plankton Net on June 19th



Dolichospermum - 100x



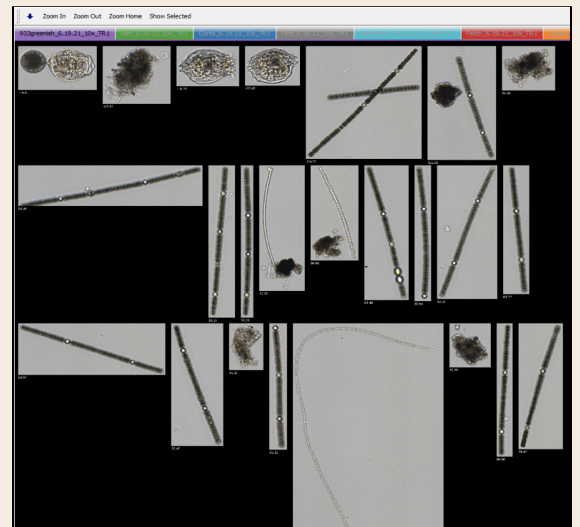
Gloeocapsa, Peridinium, Synedra - 100x



FlowCam Findings from GRAB Sample

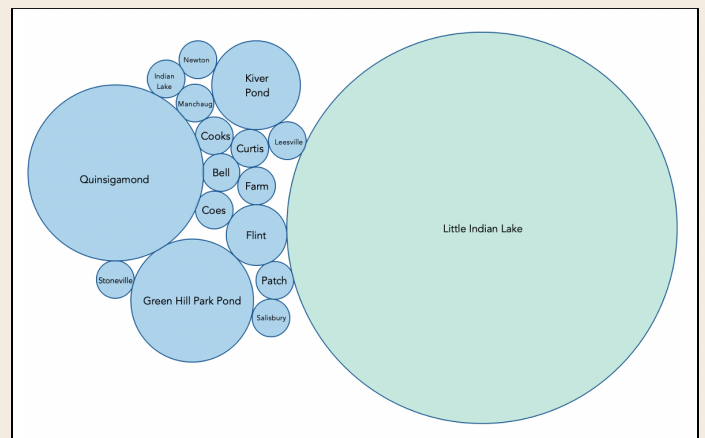
The FlowCam is advanced microscopy technology that uses a high speed camera to photograph individual cells as they pass through a thin flow cell. The computer's image recognition technology will then sort the cells based on parameters used to distinguish cyanobacteria from other organisms, and eventually 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 Little Indian was 21,897 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. It is important to note that there is some uncertainty in the Little Indian Lake FlowCam results, since there were some bottles improperly labeled. Based on previous results, we have matched these results to Little Indian 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.



Little Indian Lake

May 2021

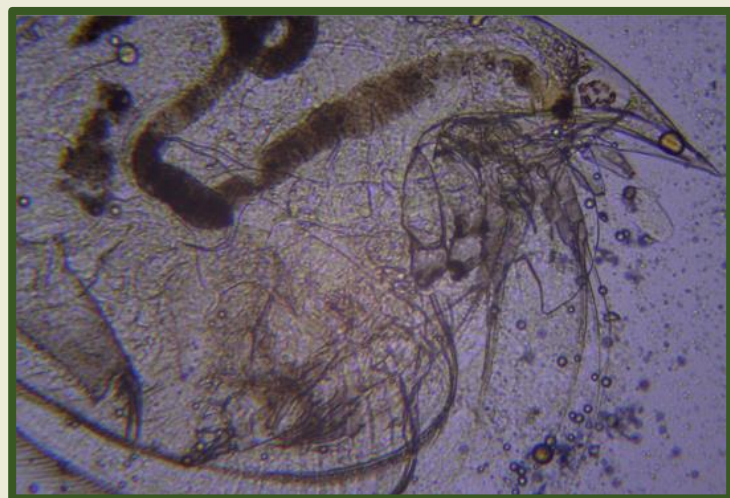
Little Indian Lake is located at one of the outlets to the south of Indian Lake, and is located at the corner of Grove and Forest St, and adjacent to Forest Grove middle school. There is not significant public access and the lake is surrounded mostly by private residences. Little Indian Lake is a man-made body of water created in the construction of Massachusetts state highway 122A. The lake is small and shallow at 5 acres in area and 12 feet at its deepest point. The size, depth, and lack of water flow into the lake make the waterbody susceptible to cyanobacteria blooms. This sampling season will be Little Indian Lake's third year of sampling, following 2017 and 2018.



Sampling Conditions

May 22nd was a spring Saturday at 77°F. There was a light breeze coming from the east direction, and no rain in the 48 hours prior to taking the sample. The temperature at the surface of the water was 74°F and the water was still with no waves. The water was slightly turbid with a moderate fishy smell and some leaves observed along the top. Wildlife was spotted along the shore, including mollusks, a muskrat, and possibly a beaver.

Microscopic Findings



Cladocera zooplankton(100x)

Also known as water fleas, Cladocera are an order of zooplankton commonly observed in local lakes and ponds.

Monthly Overview

Underneath the microscopes, volunteers found a type of zooplankton, but no cyanobacteria colonies. While fluorometry data suggests that there are slightly elevated concentrations of cyanobacteria pigments at Little Indian Lake, more data is needed to determine the risk of harmful algal bloom. We look forward to collecting and analyzing more data next month!

Thank you to Dana, Preston, Karen and all other volunteers!