

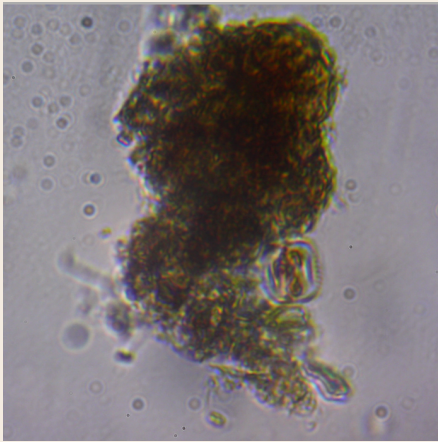
WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Kiver Pond - October 2021

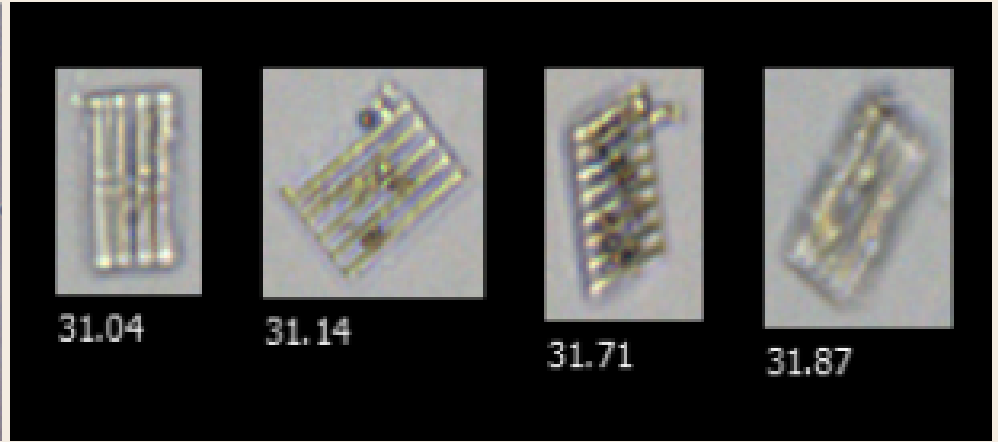
Sampling Conditions

October 16th was a breezy, partly cloudy Saturday at 64.5°F. There was no rainfall the day before the sample was taken. The water was slightly turbid with a temperature of 64.6°F.

Microscopic Findings from the Plankton NET



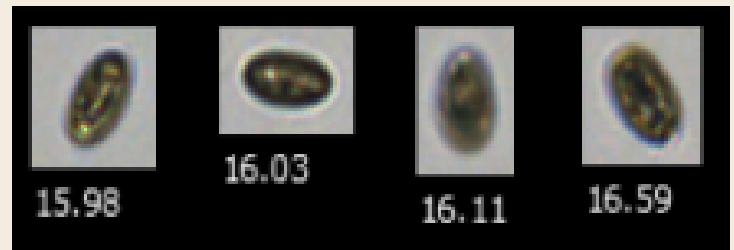
Detritus



Flowcam images of *Fragilaria* Diatoms

FlowCam Findings from the GRAB Sample

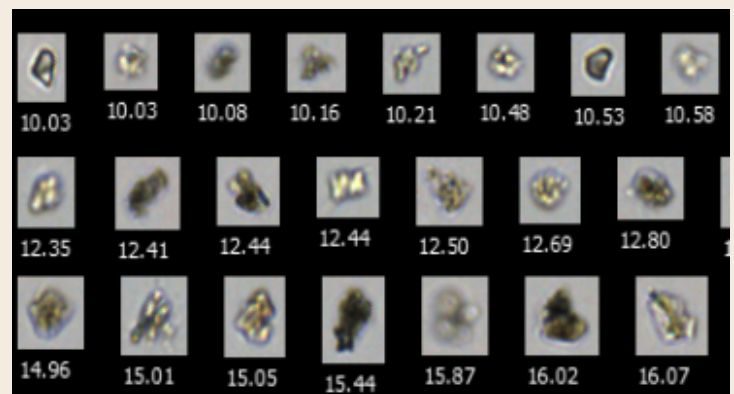
The particle density at Kiver Pond was 6,376 particles/ml in October, down from 14,069 particles/ml in September, according to the FlowCam. Much like in the previous month, the sample contained many small particles, including cryptomonads and diatoms, especially from the genera *Fragilaria* and *Tabellaria*. There was also a lot of debris.



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, Kiver Pond had 47 Aus of phycocyanin pigment, down from 190 Aus in September. A pond becomes at risk for a bloom when it is at levels above 50 Au.



Detritus

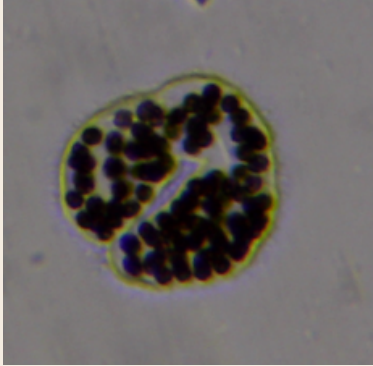
WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Kiver Pond - September 2021

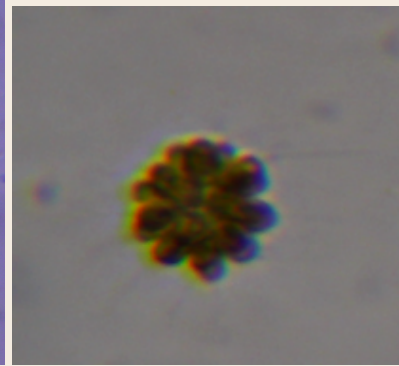
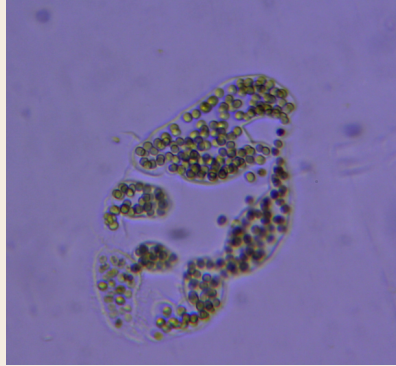
Sampling Conditions

September 25th was a calm, sunny Saturday at 59°F. There were 2 inches of rainfall the day before the sample was taken. The water was opaque and smelled strongly of sulfur with a temperature of 64°F.

Microscopic Findings from the Plankton NET



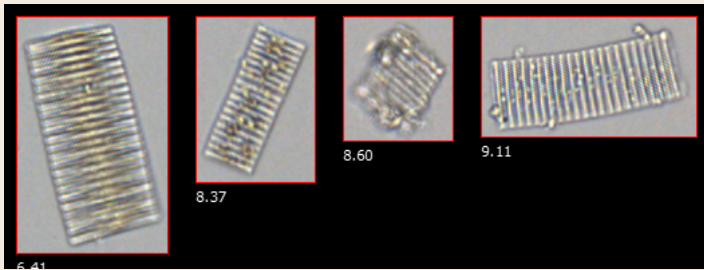
Microcystis cyanobacteria



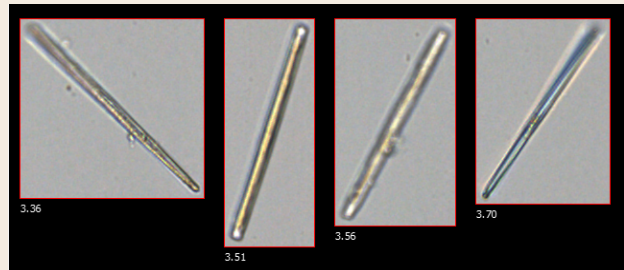
Synura Golden Algae

FlowCam Findings from the GRAB Sample

The particle density at Kiver Pond was 14069 particles/ml in September, according to the FlowCam, which was higher than it was in August. The sample contained a combination of Cryptomonads and diatoms, especially from the genera *Fragilaria* and *Synedra*. There was also a lot of debris.



Fragilaria diatom



Synedra diatom

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, Kiver Pond had 199 Aus of phycocyanin pigment, which is relatively high compared to other lakes in the program. A pond becomes at risk for a bloom when it is at levels above 50 Au.

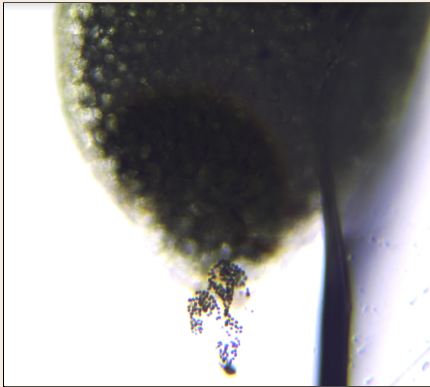
WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Kiver Pond - August 2021

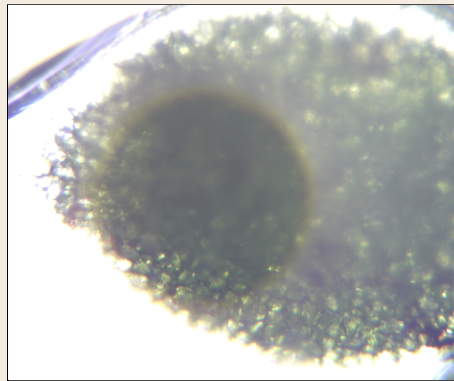
Sampling Conditions

August 21st was a mostly cloudy Saturday at 75°F with a light breeze. 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



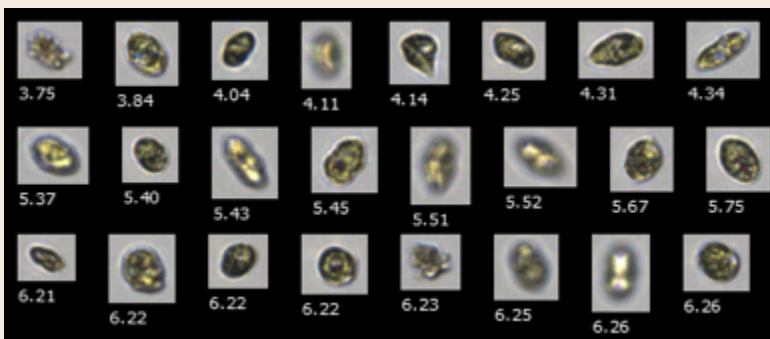
Microcystis cyanobacteria



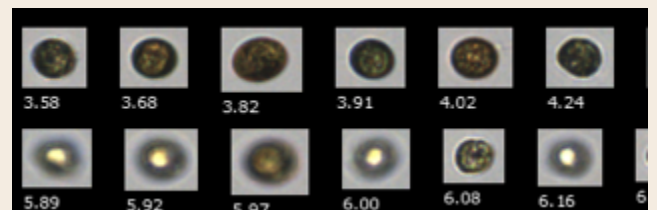
Unidentified particle

FlowCam Findings from the GRAB Sample

The particle density at Kiver Pond was 4,034 particles/ml in August, according to the FlowCam, which was lower than it was in July. The sample contained mostly small particles, dominated by circular diatoms and *Cryptomonas*, a cryophyte. There was also a lot of debris in the sample. No cyanobacteria were identified.



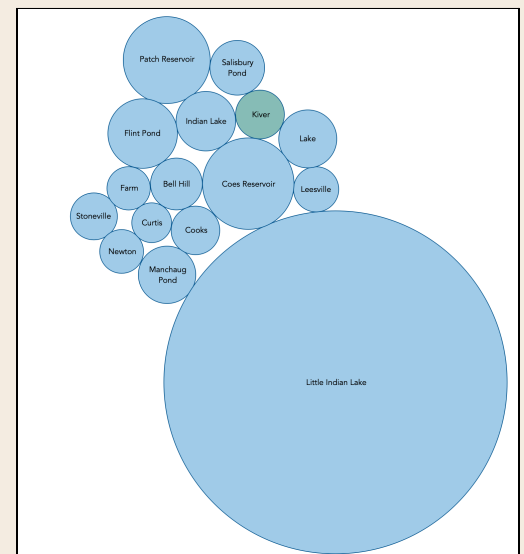
Cryptomonas



Circular Diatoms

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. Kiver Pond rose from undetectable levels in the month of July to 13 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

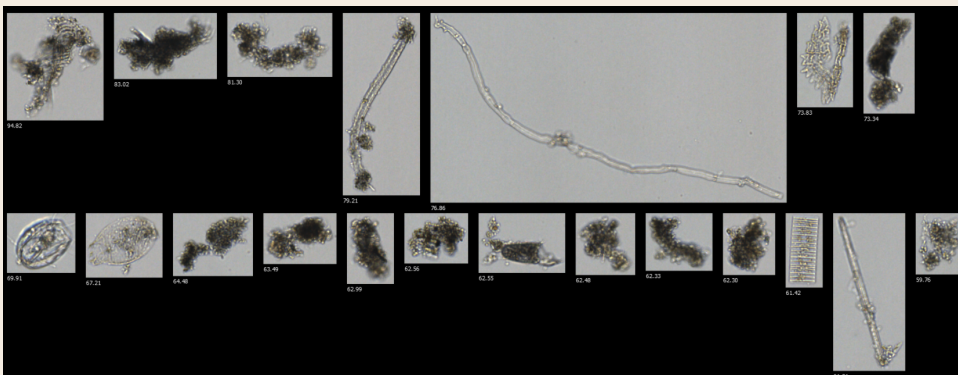
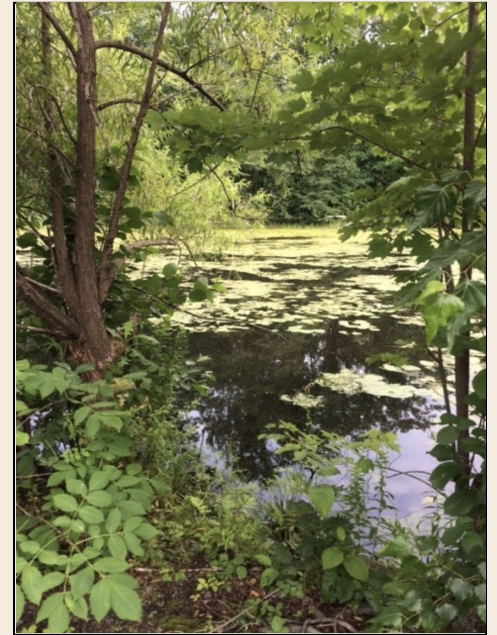
Kiver Pond - July 2021

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 surface temperature of the water was 71°F and the water was still with no waves. The water was opaque with a strong smell of phosphorus and sulfur, and green algae scum observed along the surface. A blue heron was spotted among the lily pads along the shore.

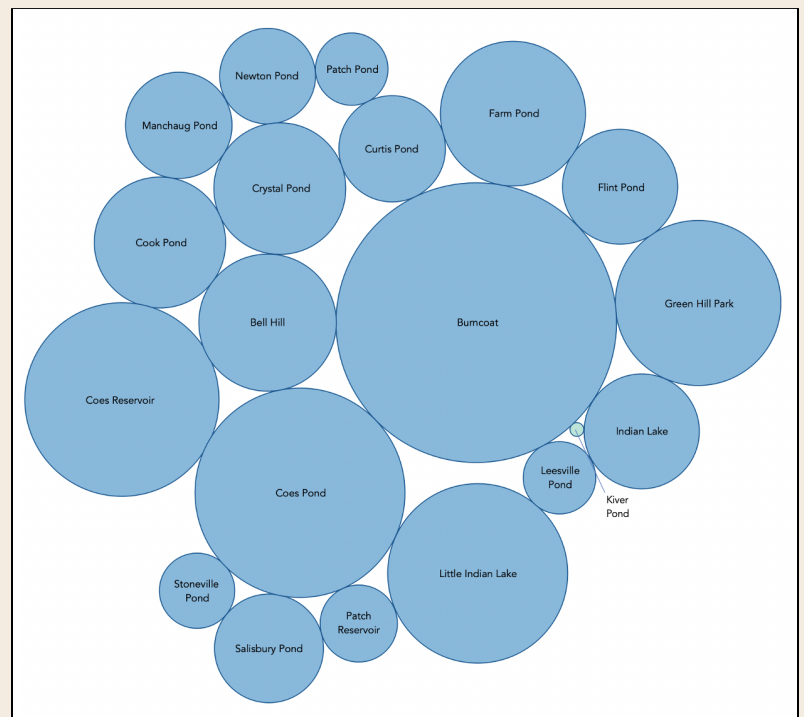
FlowCam Findings from the GRAB Sample

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 Kiver Pond was 5,844 particles/ml in July, which is a decrease from 10,594 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. Kiver Pond decreased from 11 Absorbance Units (Au) in the month of June to undetectable levels in the month of July. A pond becomes at risk for a bloom when levels rise above 50 Au.



WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

Kiver Pond - June 2021

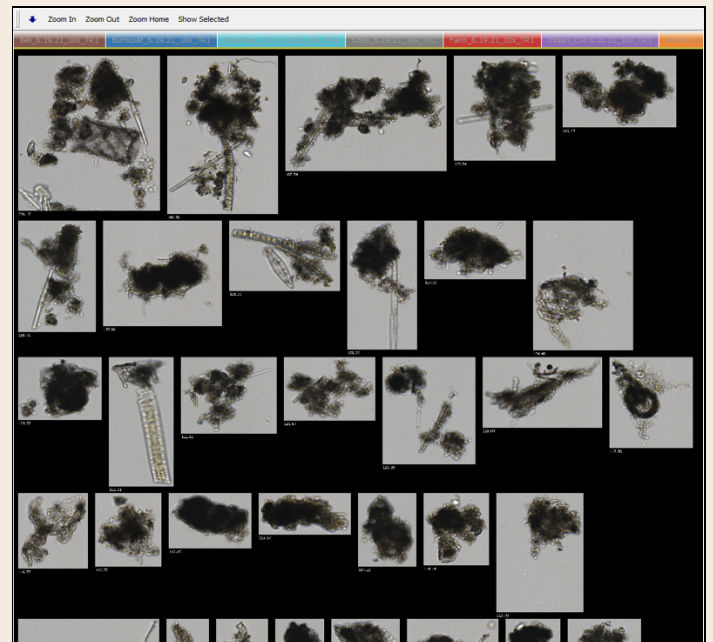
Sampling Conditions

June 19th was a mostly cloudy Saturday at 68°F with no wind. There was .25 inches of rain the morning of the sample being taken. Surface temperature was 71°F and the water was still with no waves. The water was opaque with a strong smell of phosphorus and sulfur, and green algae scum observed along the top. Blue heron and lily pads were spotted along the shore.



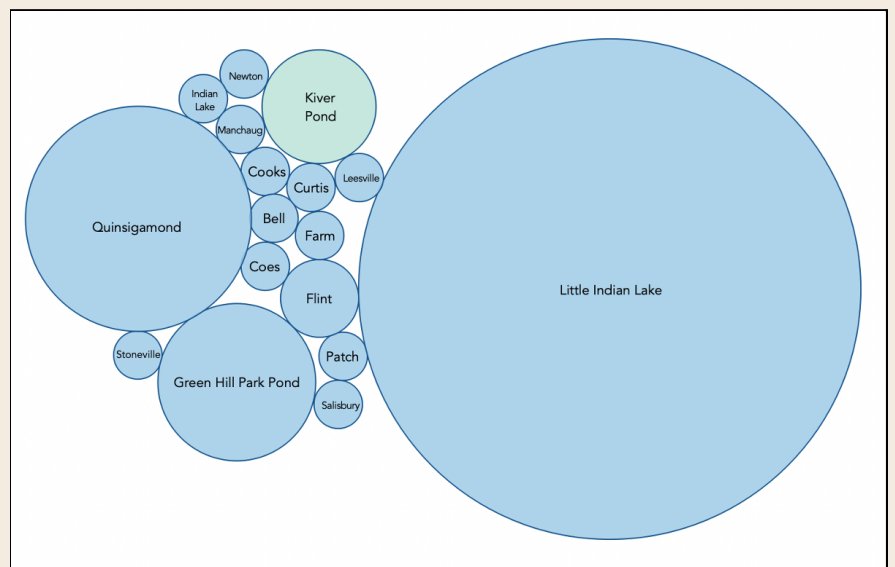
FlowCam Findings from GRAB Sample

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 Kiver Pond was 10,594 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 Kiver Pond FlowCam results, since there were some bottles improperly labeled. Based on previous results, we have matched these results to Kiver Pond.



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.



Kiver Pond

May 2021

Kiver Pond is a tributary of Indian Lake, a small 2-acre body of water about 400 feet long. It is located .2 miles to the east of Indian Lake, along the parking lot of the Holy Trinity Armenian Apostolic Church at 635 Grove Street. Kiver Pond does not have significant public access and is not used for recreation purposes. The pond is not monitored by the City and does not receive any treatment. Due to its small size and shallow depth, Kiver Pond is considered high risk for cyanobacteria blooms. Kiver Pond has been sporadically sampled by WCMC samplers in the past, but this is its first year with a dedicated sampling team.



Sampling Conditions

May 22nd was a partly cloudy, spring Saturday at 72°F with no wind. There was no rain in the 48 hours prior to taking the sample. The water surface temperature was 72°F and the water was still with no waves. The water was opaque with an unpleasant swamp and algae smell, and much green scum observed along the top. Sparrows and nesting geese were spotted while samples were taken.

Microscopic Findings



Asterionella diatom (40x)

Asterionella is a genus of freshwater diatoms that often form star or chain shaped colonies. In Worcester's lakes and ponds they are commonly observed in spring and early summer months.

Monthly Overview

Underneath the microscope this month, volunteers found Asterionella, which is a diatom, but no cyanobacteria. Initial fluorometry data suggests that this lake has elevated levels of cyanobacteria pigment related to other lakes in the program, but more data is needed to determine the extent of the risk of the pond to blooms.

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