

## WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

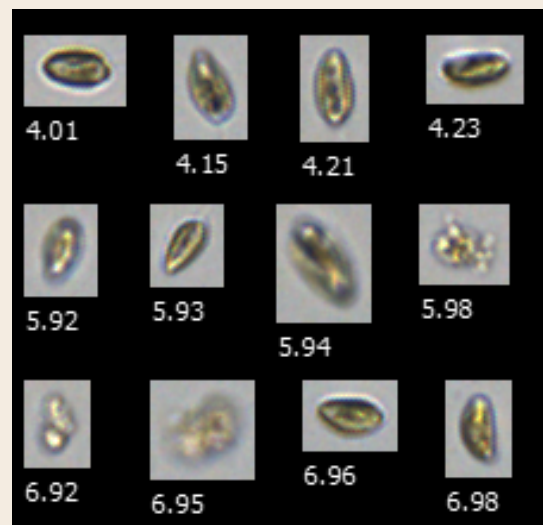
# Patch Reservoir - September 2021

### Sampling Conditions

September 25th was a calm, sunny Saturday at 66°F. There were 0.34 inches of rainfall the day before the sample was taken. A light scum was observed on the surface of the water.

### FlowCam Findings from the GRAB Sample

The particle density at Patch Reservoir was 1902 particles/ml in September, according to the FlowCam, which was higher than it was in August. Contrary to the previous month, however, there were few to no cyanobacteria cells present. Instead, the sample was dominated by Cryptomonads, which are not known to cause toxin blooms in our lakes.



Flowcam Image of *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 September, Patch Reservoir had undetectable levels of phycocyanin pigment. This is down from 42 Au in August. A pond becomes at risk for a bloom when it is at levels above 50 Au.

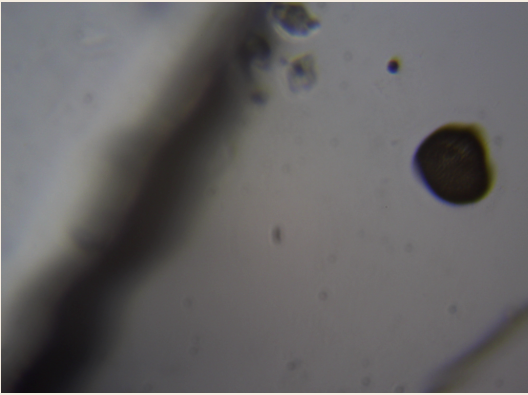
WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

# Patch Reservoir - August 2021

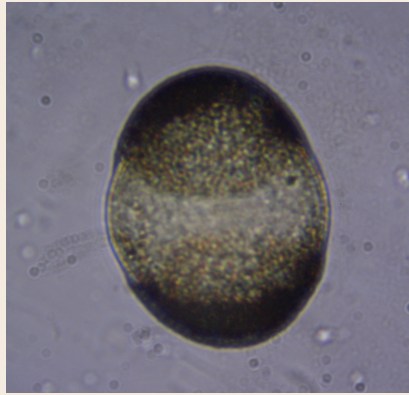
Sampling Conditions

August 21st was a calm, sunny Saturday at 78°F. There were 3.2 inches of rainfall two days prior to the meeting.

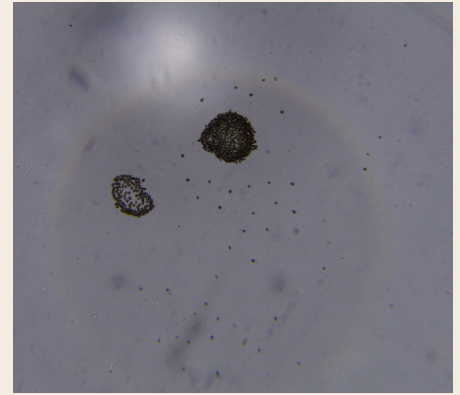
Microscopic Findings from the Plankton NET



Unidentified Debris



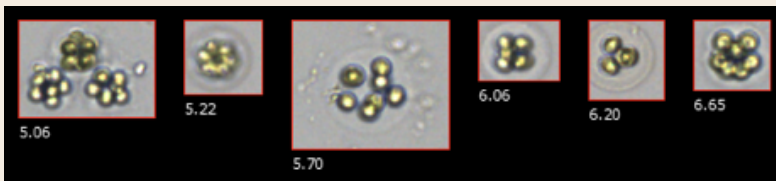
Pollen



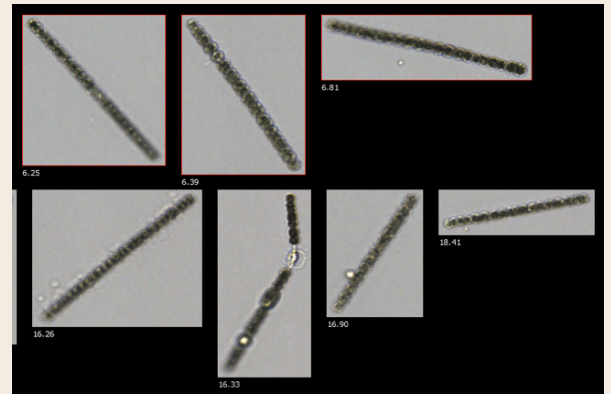
*Woronichinia* Cyanobacteria

FlowCam Findings from the GRAB Sample

The particle density at Patch Reservoir was 621 particles/ml in August, according to the FlowCam, which was much lower than it was in July. The sample was dominated by the cyanobacteria *Dolichospermum*, and our fluorimetry data suggest that there may be conditions for a bloom there.



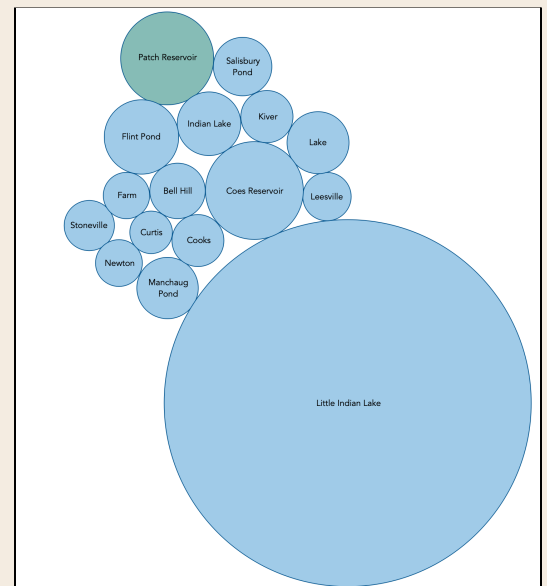
Green Algae



*Dolichospermum* Cyanobacteria

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. Patch Reservoir rose from undetectable levels in the month of July to 42 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

## Patch Reservoir - July 2021

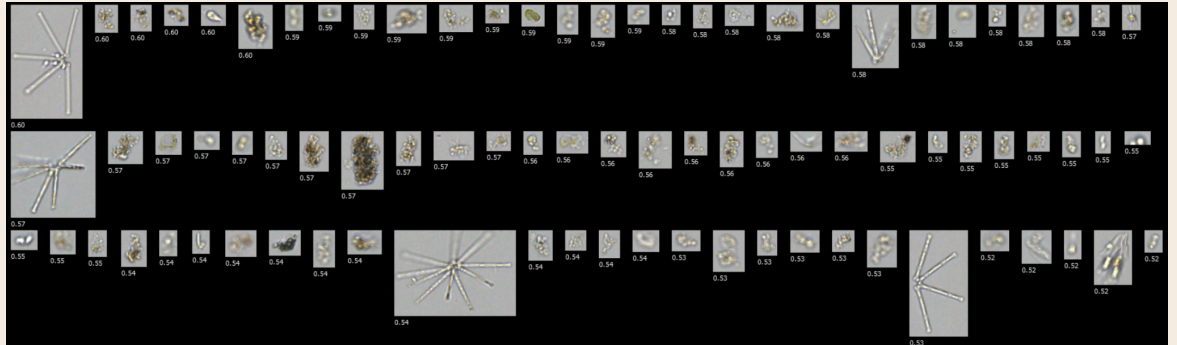
### Sampling Conditions

July 17th was a partly cloudy Saturday at 73°F with a light breeze coming from the southwest. There were .4 inches of rainfall the day before the sample was taken. The water had average wave activity and was slightly turbid. The water had no smell and there were light particles observed along the surface of the water. Invasive water chestnut was observed along the shoreline.

### Microscopic Findings from the Plankton NET on July 17th



Euglena - 400x

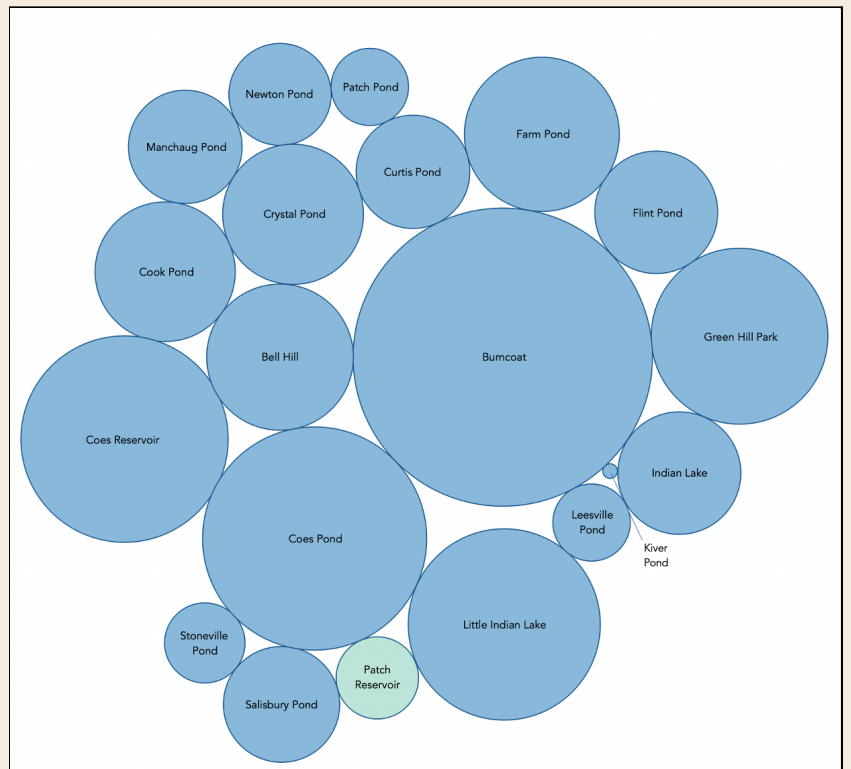


### FlowCam Findings from the GRAB Sample

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 Patch Reservoir was 1,443 particles/ml in July, which is a decrease from 2,885 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. Patch Reservoir 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.





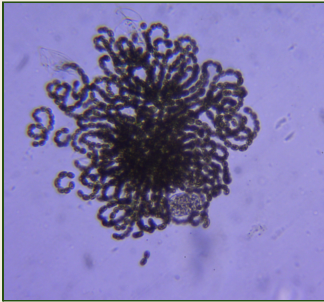
# WORCESTER CYANOBACTERIA MONITORING COLLABORATIVE

## Patch Reservoir - June 2021

### Sampling Conditions

June 19th was a cloudy Saturday at 78°F. There was a light breeze coming from the southwest direction. There were .25 inches of overnight sprinkles of rain from the night before the sample was taken. Surface temperature was 71°F and the water had average wave activity. The water had no smell or evidence of scums. Swans were observed along the shoreline.

### Microscopic Findings from Plankton NET on June 19th



Dolichospermum - 100x



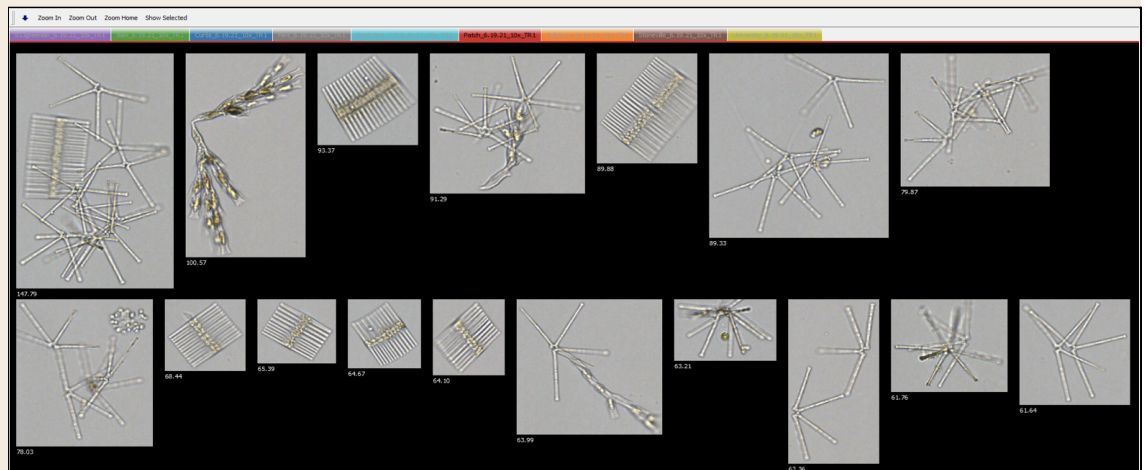
Asterionella, Pollen, Trichome - 100x



Asterionella - 100x

### FlowCam Findings from GRAB Sample

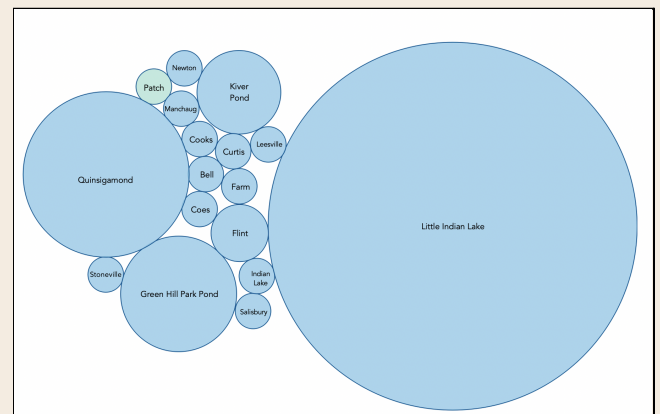
The FlowCam is advanced microscopy technology that uses a high speed camera to photograph individual cells as they pass through a thin flow cell. The computer's image recognition technology will then sort the cells based on parameters used to distinguish cyanobacteria from other organisms, and eventually 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 Patch Reservoir was 2885 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 Patch Reservoir, showed no distinguishable levels of phycocyanin.





## Patch Reservoir

May 2021

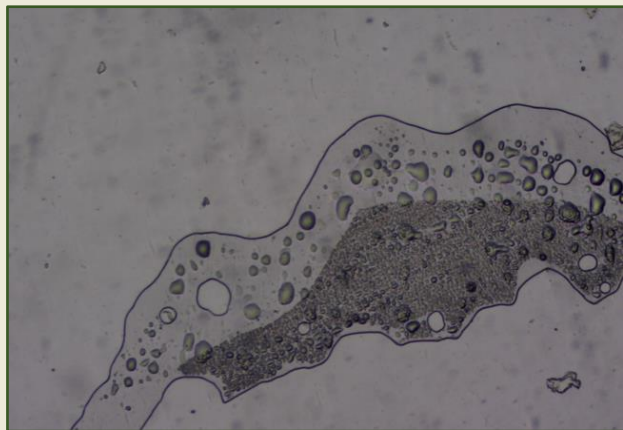
Patch Reservoir is a 31-acre body of water located in West Worcester near Worcester State University. In the late 1930s Patch Reservoir was a supplier of ice to the city of Worcester before modern refrigeration was common. There are walking trails around the southern shore of Patch Reservoir, including a wide, flat gravel road that leads there from Mill Street out to a newly renovated dam. The small size and shallow waters make Patch Reservoir susceptible to cyanobacteria blooms. The 2021 sampling season will be the fourth year of sampling for Patch Reservoir, following 2017, 2018, and 2019.



### Sampling Conditions

May 22nd was a sunny, spring Saturday. There was a light breeze coming from the west direction. Patch Reservoir's sample was taken at a private residence along Hunthurst Circle where there was no rain in the 48 hours prior to sampling. The water was still with no waves. The water was slightly turbid with no smell, and there was pollen observed along the surface.

### Microscopic Findings



Bubbles on Slip Cover (100x)



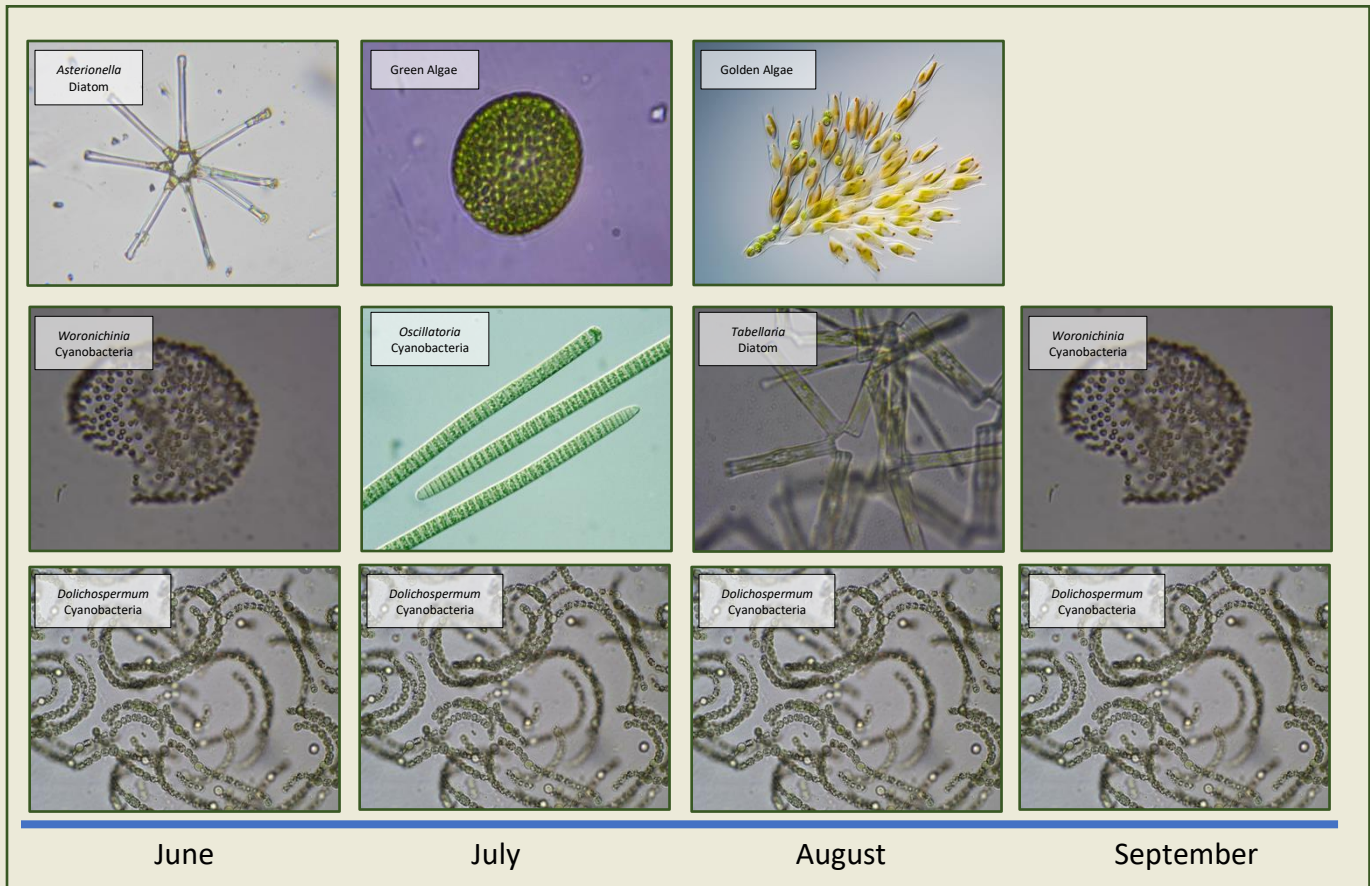
Trichome (100x)

### Monthly Overview

Underneath the microscope, no cyanobacteria colonies were found. Previous years have suggested that there will be more cyanobacteria observed in June, and we look forward to complementing our microscopy data with our fluorometry and FlowCam data in the coming sampling session.

# Past Year's Findings

The timeline below shows the organisms that have been found in Patch Reservoir in past years.



Thank you to Peg, Zoe, and all other volunteers!