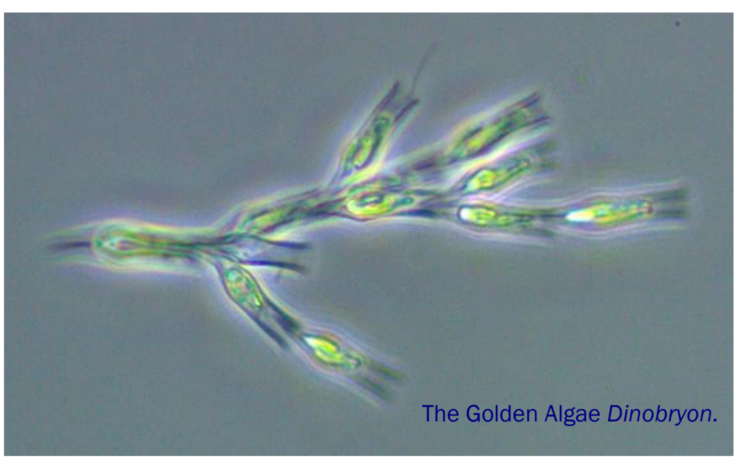
Lakes Environmental Association
2018 Water Testing Report

Chapter 5—Algae and Fluorometric Monitoring



The Golden Algae *Dinobryon.*

LEA's Algae & Fluorometeric Chlorophyll Monitoring Programs

Sample Sites
Back Pond
Hancock Pond
Keoka Lake
Keyes Pond (fluorometer only)
McWain Pond
Middle Pond
Moose Pond (Main Basin)
Moose Pond (North Basin)
Moose Pond (South Basin)
Peabody Pond
Sand Pond
Trickey Pond
Woods Pond

Studies of algae populations are a good way for lake managers to glean information about lakes: their nutrient levels, stratification, and a host of complex details are all made more clear through the study of phytoplankton (the technical term for free-floating algae). Algae are the foundation of lake food webs, meaning that they are the food source that directly or indirectly supports much of the animal life existing in a lake. Of course, algae are also the source of algal blooms, which usually result from an over-abundance of nutrients and can cause a host of problems within a lake system. Algal blooms are often a sign of a water quality issue, and are generally bad for people (impacting recreation, fishing, and aesthetics) and for the lakes themselves.

LEA measures algae both directly and indirectly. Our direct method involves collecting a sample and analyzing the actual algae present using a microscope. The indirect method measures the amount of algal pigment present in the water. This can be done in the field using an instrument called a fluorometer, or it can be measured by filtering and analyzing lake water in a lab.

Direct Measurement: Algae Analysis

The goal of LEA's algae testing program is to identify the kinds of algae present in our lakes, quantify them, and study how they change over time. The focus is on planktonic algae, which are free-floating in the water, rather than attached to rocks or other material. In 2018, algae samples were collected from twelve lakes once per month for five months (May—September). Samples were collected from the top layer (ranging from 3-10 meters deep) of each lake's water column. The depth of the sample differed depending on the location of the thermocline (transition zone between top and bottom lake layers) in each lake. Collection and analysis of algae samples was made possible by support from local lake associations.

Samples were preserved using Lugol's Iodine at the time of collection. Samples were settled within 3 weeks of collection using an Utermöhl chamber, which consists of a 100 mL tube set over a modified microscope slide. Slides were examined with an inverted microscope at 600x total magnification. Algae were identified to genus level (the level above species) where possible. Random fields were counted until a total of 400 natural algae units was reached. The number of cells per milliliter (cells/mL) was calculated for each sample.

Algae are incredibly diverse, but in general 5-6 species will make up about 90% of the biomass in a lake at any given time. The dominant algae change over the course of the summer due to several factors including temperature, nutrient levels, and predation by zooplankton. Samples are taken on a monthly basis to monitor how populations shift throughout the summer.

One important water quality indicator that we can determine through collecting algae samples is the amount of cyanobacteria in a lake. Cyanobacteria are not technically algae, but rather photosynthetic bacteria. Nevertheless, they are treated as a type of algae because they have many of the same characteristics. High levels of cyanobacteria are often correlated with high phosphorus levels, and cyanobacteria such as *Aphanizomenon*, *Dolichospermum* (formerly *Anabaena*), and *Microcystis* are the most common causes of harmful cyanobacterial blooms, which can be toxic to both people and animals. Cyanobacteria tend to be most common in the later part of the summer, when temperatures are warmest. Colonial cyanobacterial genera such as *Aphanocapsa*, *Aphanothece,* and *Merismopedia* are common in low-nutrient lakes such as those in the Lakes Region and do not contribute to toxic blooms, although they do contribute to relatively high cell counts in some lakes.

Intern Olivia Mills uses the fluorometer to collect a profile of chlorophyll concentrations on Hancock Pond.

Indirect Measurement: Fluorometry

Chlorophyll, the green pigment in algae, is a fluorescent compound. This means that, when triggered by certain wavelengths of light, it will respond by emitting light at a different wavelength. The fluorometer is an instrument that emits a blue light and measures the magnitude of the corresponding fluorescence from chlorophyll pigments present in algae cells. The level of fluorescence is converted to a concentration based on the calibration of the instrument. Unlike the lab chlorophyll samples LEA collects, which are composite samples from the upper layer of each lake, the fluorometer measures chlorophyll at specific depths from the top of the water column to the bottom. From this data, we can graph relative chlorophyll concentrations to see where algae are concentrated within the lake.

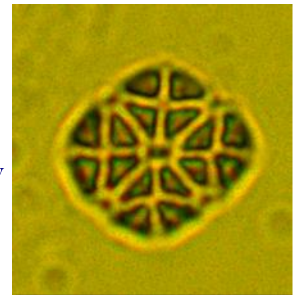
Monthly fluorometer profiles were collected from each lake and pond in this chapter for five months. Each summary contains a graph of the lake's results. Many lakes contain a chlorophyll maximum near the thermocline. There are a few reasons why this tends to happen. One is that there is a large density difference between the warm upper-layer water and cold bottom-layer water, so algae that sink down from the upper layer tend to be slowed down here and accumulate. Another reason is that this area is actually preferred by some types of algae. In many of our clearer lakes, the thermocline is still within the sunlit zone, so the algae can still photosynthesize. Additionally, there are often more nutrient resources in the deeper layer of the lake, which can diffuse into the thermocline and make this area advantageous for algae growth.

Note on comparing chlorophyll measurements

It is important to note that although LEA continues to measure chlorophyll-a concentrations in water as a proxy for algae abundance (reported in chapter 1), lab-based chlorophyll-a measurements are not comparable to cells/mL concentrations found in these summaries because the amount of chlorophyll-a in algae cells varies based on type and condition. Chlorophyll concentrations measured by the fluorometer are similarly to be treated as approximate; the instrument provides only a relative chlorophyll concentration which is not as accurate as lab-based testing.

Note on the difference between natural units and cell counts

The summaries on the following pages discuss results in terms of both natural units and cell counts. One natural unit can be one cell or one colony. Cell counts are simply a count of all cells. A single-celled algae would be counted as one natural unit and one cell, whereas a colony of cells will be counted as one natural unit and, say, 16 cells (or however many cells are present within the colony). There are several cyanobacterial genera that are large colonies made up of many tiny cells, or long, filamentous chains of cells. Because of this, cyanobacteria dominate cell counts in many algae samples. Colonial cyanobacteria such as *Aphanocapsa* and *Aphanothece* are common in our lakes and can lead to high cell counts, but because they are colonies of picoplankton (tiny cells around 1 µm wide), they contribute little biomass to the algae assemblage and do not often cause water quality issues.



This *Crucigenia* would be counted as one natural unit made up of 16 cells.

Cell counts allow for a better understanding of colonial algae presence and are necessary to calculate cells/mL accurately, which allows for better comparisons of results between lakes and over time. Colonies, even of the same algae type, often vary greatly in the number of cells they contain – one natural unit of *Dinobryon* could be two cells or one hundred, and knowing this information is important in lake assessment.

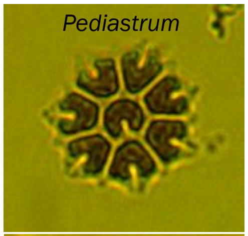
Why we Monitor Algae

One reason for the algae testing program is to collect baseline data. Baseline sampling is important because it provides a record of conditions to which future data can be compared. This data will help in assessing changes over time and determining what a typical algae population looks like in each lake. Because these lakes currently have good water quality, knowing which algae are present, and in what concentrations, is especially important. Any water quality changes in the future will be easier to assess if current water quality conditions are understood.

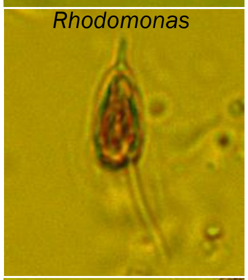
The other reason for algae sampling is to gain mor'e information about water quality. Certain types of algae are only present when specific water quality conditions exist, which makes them good environmental indicators. For example, algae such as *Dolichospermum* and *Aphanizomenon*, two cyanobacterial genera that form blooms, are good indicators of eutrophication when found in abundance. Additionally, the dominant algae in a sample can be very informative, since different algae will dominate under different water quality conditions. Collecting samples throughout the summer enables us to record how algae populations shift over time, and allows for a more complete account of each lake's algae population.

The 6 Main Types of Algae

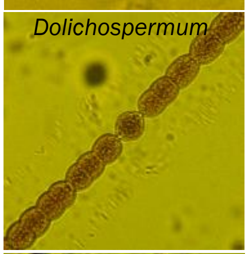
Note: Algae appear brown with a yellow background in photos because they are preserved with iodine.



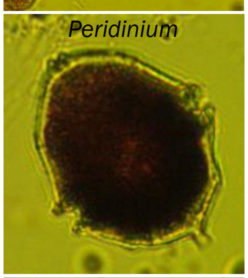
Green algae (Chlorophyta) are the most diverse group of algae present in freshwater habitats. They come in a variety of sizes and shapes: round or filamentous, single-celled or colonial, and flagellated or unflagellated. Green algae can be identified by their deep green grassy color and rigid cell walls.



Cryptomonads (Cryptophyta) are one-celled algae with two flagella (tails) that allow them to move through water. In this report, Haptophytes (of which only the genus *Chrysochromulina* was identified) and Euglenoids (rare in samples) are counted among the cryptomonads.

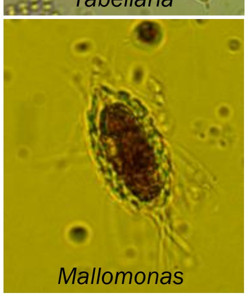


Cyanobacteria (Cyanophyta/blue-green algae) are not algae but prokaryotic bacteria that can photosynthesize. Most forms are colonial, and are usually either round or filamentous. While Cyanobacteria are present in all waters and many of them are harmless, there are several species that can produce toxins and will form blooms when nutrient levels are high.



Dinoflagellates (Dinophyta) are a group made up of large, motile algae. Large numbers of Dinoflagellates indicate high nitrate and phosphate levels. Most Dinoflagellates are covered in armor-like plates that serve as a protective shell.

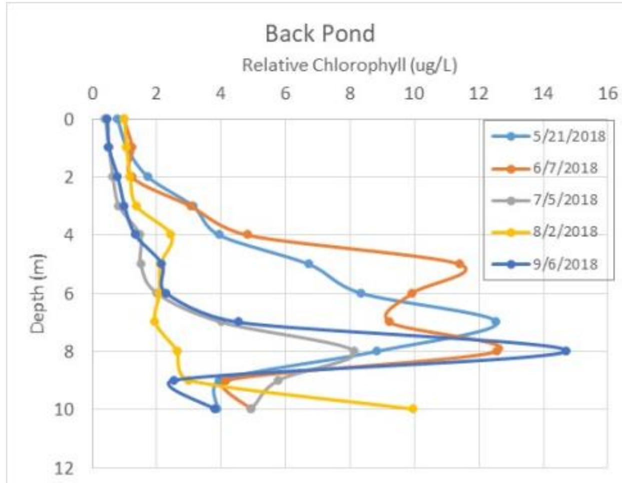
Diatoms (Bacillariophyta) are easily identified by their hard silica-based outer shells. Diatoms are either centric (round) or pennate (long, thin rectangles or canoe-like shapes). Because their shells make them heavy, diatoms often settle out of the water column during the calm summer months. Most diatoms are single-celled, but a few of the common genera are colonial.



Golden algae (Chrysophyta) are common in lakes with low to moderate nutrient levels, low conductivity and alkalinity, moderate color and slightly acidic pH. Golden algae can be identified by their brown to yellow color and the delicate nature of their cells. They are often colonial and a few of the common genera are relatively large in size.

Images are not to scale

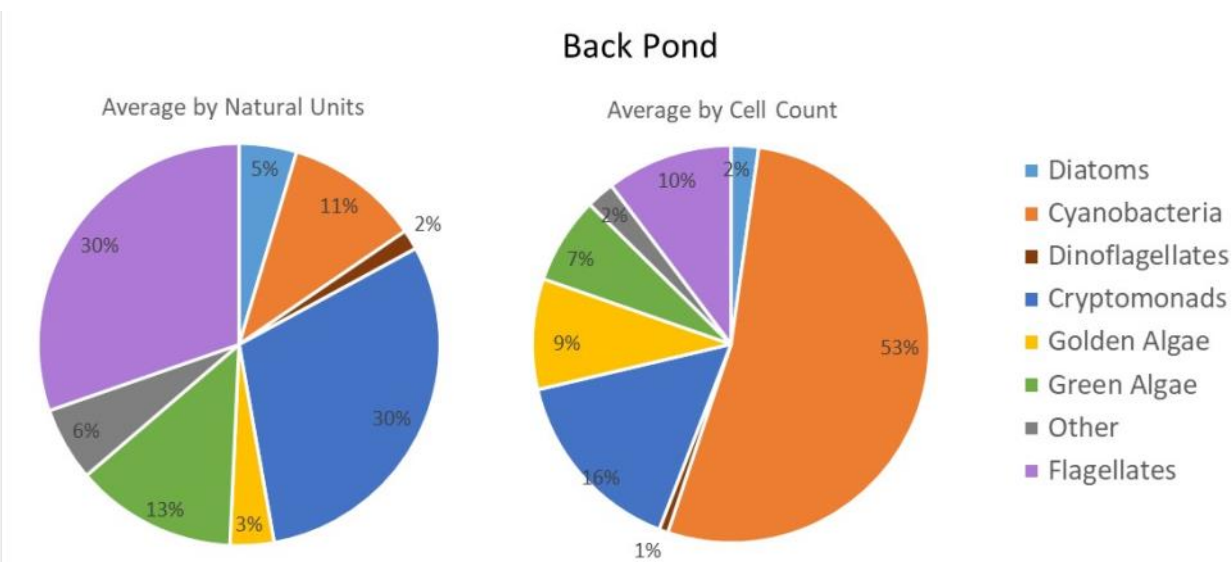
Back Pond



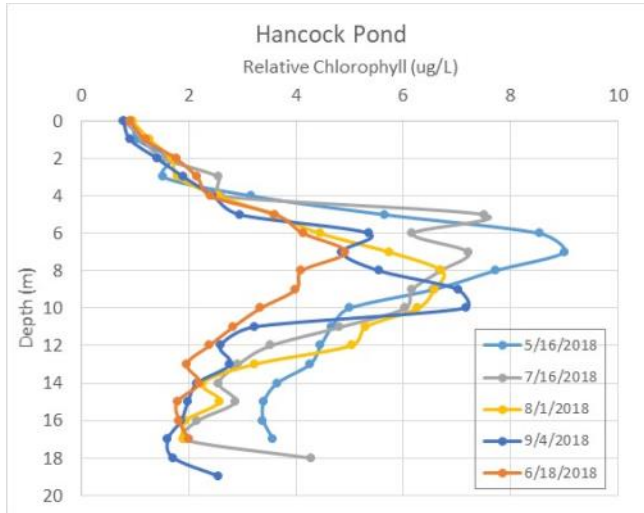
Fluorometer profiles taken throughout the testing season revealed peaks in algae fluorescence just below the thermocline (transition zone between top and bottom lake layers). There were large increases in dissolved oxygen at the thermocline (likely due to algae growth), but interestingly, these did not line up with the depths of maximum chlorophyll concentration.

Algae samples were collected from Back Pond once per month from May through September, 2018. Algae concentrations started off low in May and peaked in August. The pie charts below show percentages of algae of the 6 main types, plus an "other" category for other types of algae and a "flagellates" category that lumps together tiny flagellated algae of various types. Flagellates, which are single-celled algae with "tails" (flagella) that help them swim, made up about 60% of the algae (by natural units) recorded in Back Pond, because the algae in the Cryptomonads category are all flagellates also.

The algae present in Back Pond are broadly characteristic of a mesotrophic system, indicating a moderate level of productivity. While the level of cyanobacteria was relatively high, especially in the cell counts, there were no nuisance species recorded beyond a small amount of *Dolichospemum.* The majority of the cyanobacteria were colonies of tiny cells known as *Aphanocapsa* and *Merismopedia.* The large number of cells in these colonies adds a lot to the cell count calculation, but they do not contribute much to the biomass of algae in the pond because their cells are so small.



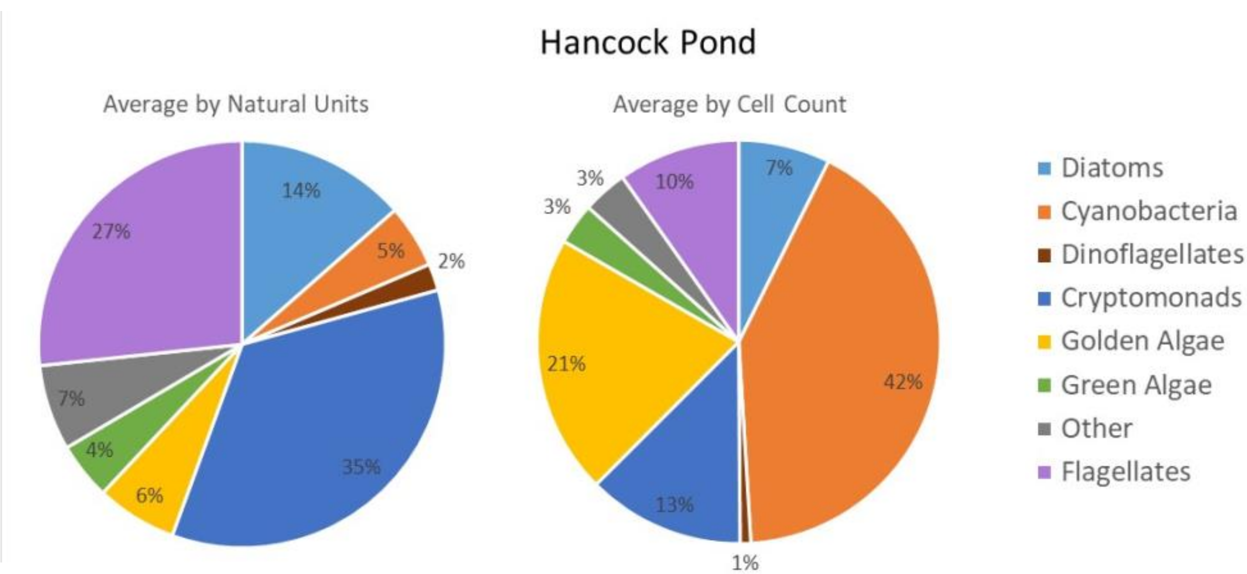
Hancock Pond



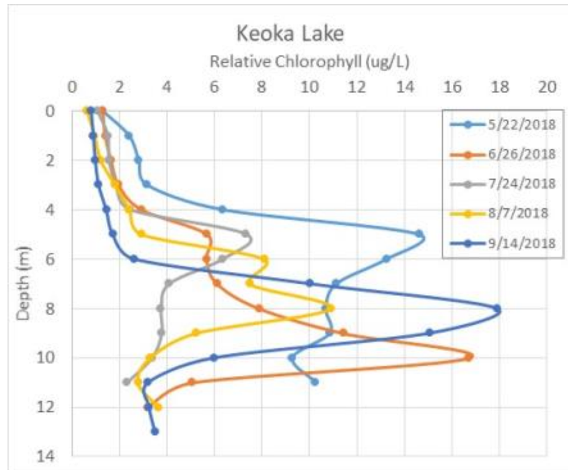
Each of the fluorometer profiles collected on Hancock Pond were similar in shape and magnitude. Maximum fluorescence readings corresponded with peaks in dissolved oxygen at the thermocline (boundary layer between top and bottom layers of pond). Relative to other lakes sampled, estimated chlorophyll levels were low.

Algae samples were collected from Hancock Pond once per month between May and September, 2018. Concentrations remained low throughout the testing season and were highest in May, similar to fluorometer results. Hancock Pond contained the largest average percentage (by cell count) of diatoms and golden algae of all the lakes tested, and the lowest amount of cyanobacteria based on cell counts. The Pond also had the lowest average number of cells/mL of all lakes sampled. Small flagellated algae (which often belong to different algal groups) were also common in the samples collected, and make up the "flagellates" category in the pie charts below. This type of algae make an excellent basis for the pond's food web.

Hancock Pond was the only pond tested that had none of the common cyanobacteria *Merismopedia* both in 2016, 2017 or 2018. The only cyanobacteria of concern noted were three natural units of *Dolichospermum*. The most common cyanobacteria found in Hancock Pond was *Aphanocapsa*. The algae assemblage found at Hancock Pond was indicative of a deep, clear lake with low to moderate productivity. Relatively large amounts of golden algae and flagellates, as well as genera like *Aphanocapsa*, are typical of northern latitude, temperate lakes.



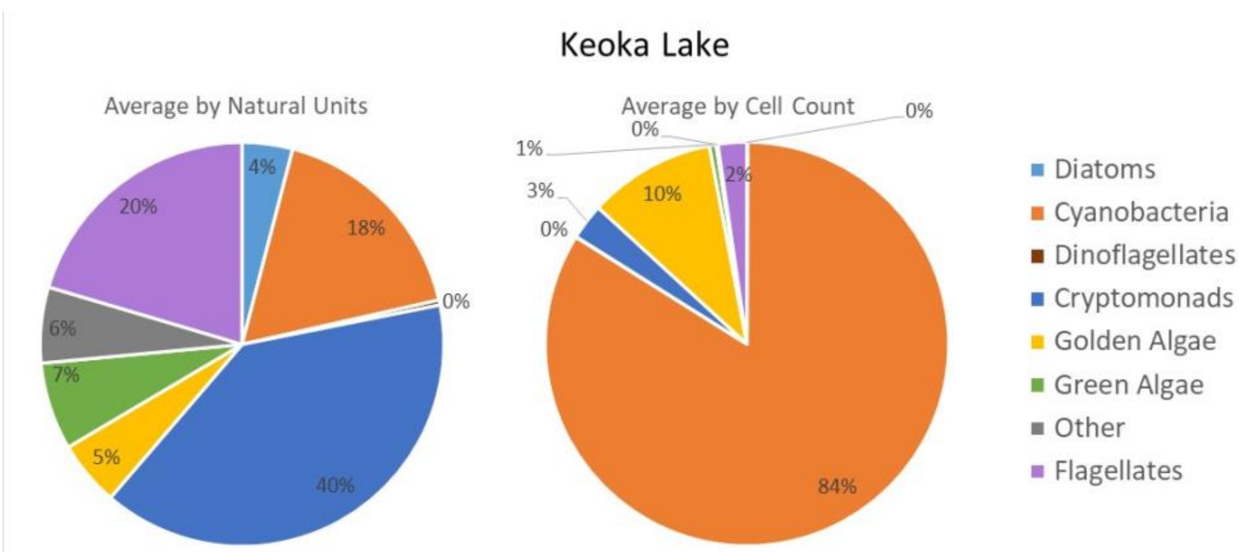
Keoka Lake



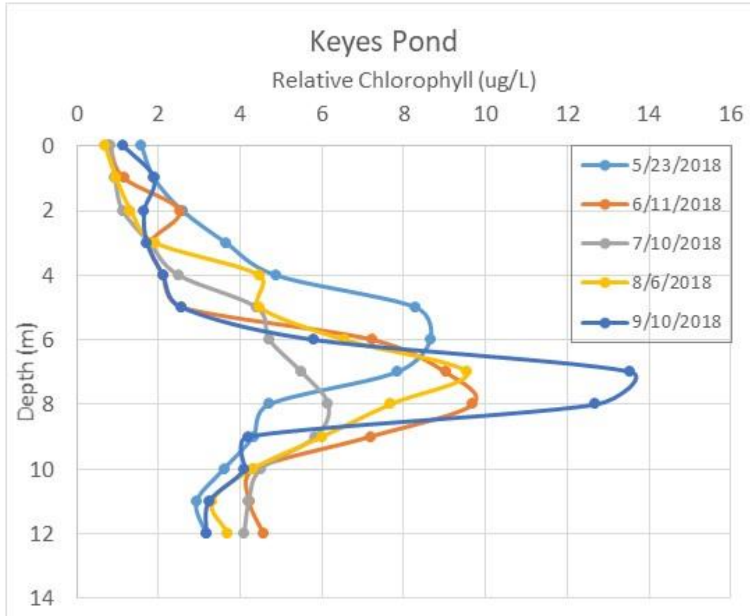
Fluorometer profiles showed variation in chlorophyll peaks over the course of the summer, some matching the depth of the thermocline (middle layer of the lake), others being deeper. Slight increases in dissolved oxygen at the thermocline were present when each profile was taken. In May, June, and September, maximum relative chlorophyll levels were in the very high range. These depths were not included in water samples collected and analyzed for chlorophyll at the same time that the fluorometer profiles were collected because they occurred beneath the thermocline.

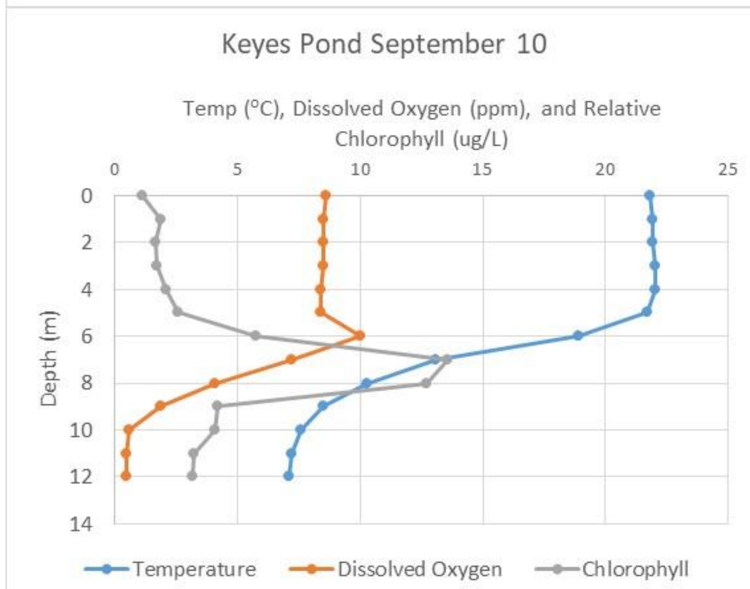
Keoka Lake was sampled for algae once per month between May and September, 2018. Algae concentrations were highest in August, and overall algae levels were higher than the other lakes sampled. Cryptomonads, which are flagellated algae (single-celled algae with tail-like flagella), were the most common algae based on natural units. The pie charts below show percentages of algae of the 6 main types, plus an “other” category and a “flagellates” category that lumps together flagellated algae of various types. Together, flagellates (including the flagellated cryptomonads) made up about 60% of the algae present in Keoka Lake. These algae make an excellent basis for the lake food web that supports all of the larger creatures that live in and on the lake.

The cyanobacteria present in Keoka Lake were mainly *Aphanocapsa* and *Merismopedia*, two colonial genera made up of many tiny cells. This means that cyanobacterial cell counts were high, but the overall biomass remained low because these cells are very small. Two nuisance cyanobacteria were noted in Keoka Lake: *Gloeotrichia* (see chapter 3) and *Dolichospermum*.



Keyes Pond



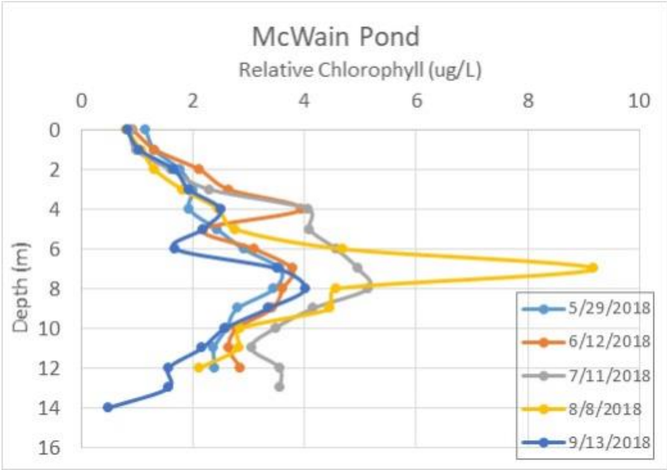


No algae samples were collected from Keyes Pond in 2018. Fluorometer profiles were collected once per month from May through September (top graph). Comparison with temperature and dissolved oxygen data taken concurrently with the fluorometer profiles show that there was a slight increase in dissolved oxygen near the thermocline (boundary layer between the top and bottom layers of the pond) on all sampling dates (bottom graph shows an example from September). This increase in dissolved oxygen is common and usually attributable to algae growth.

The fluorometer profile data show increases in chlorophyll fluorescence just below the thermocline on all sampling dates. Maximum relative chlorophyll levels were in the high range on all dates with the exception of September, when the maximum was very high. Build-up of algae cells at the thermocline following the height of the summer growing period may account for the very high levels in September.

During regular water testing, water samples are collected from the top layer of the lake to be analyzed for chlorophyll in the lab. While these samples incorporate high-oxygen areas at the thermocline, they may miss areas of high chlorophyll concentration if these zones lie below the thermocline, as seen in Keyes Pond. In these cases, it is likely that the current methodology for chlorophyll sampling underestimates water column chlorophyll concentrations.

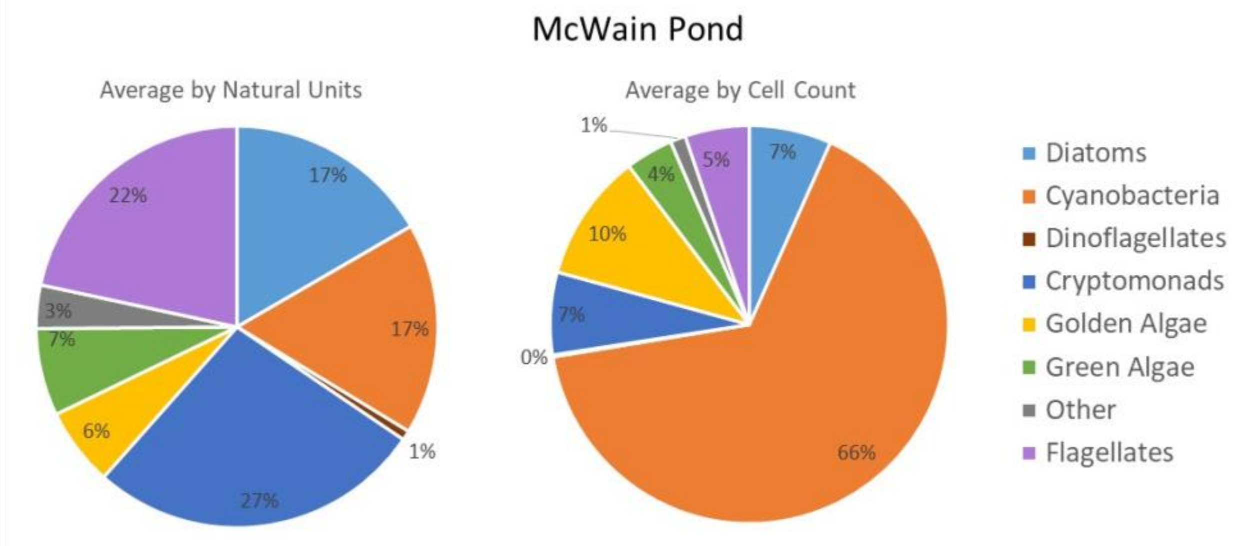
McWain Pond



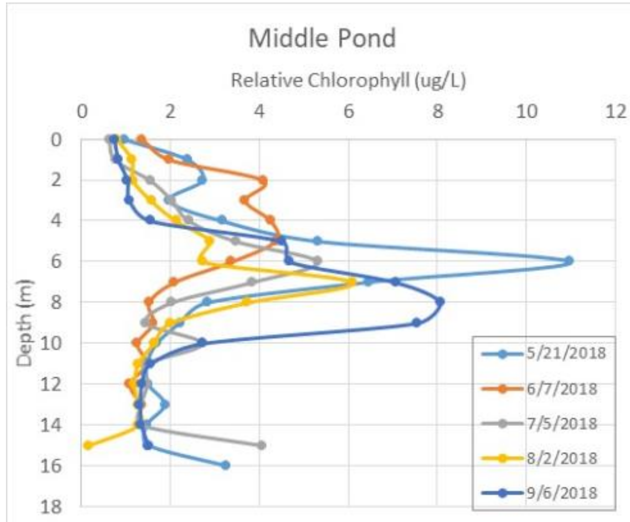
Fluorometer profiles show that chlorophyll values were highest near the thermocline (the boundary layer between the top and bottom layers of the pond). However, chlorophyll levels were relatively low, with the exception of the profile taken in August. That profile shows high levels of chlorophyll within the thermocline. Often, high chlorophyll levels near the thermocline correspond with elevated dissolved oxygen levels (due to algae photosynthesis), but dissolved oxygen profiles showed little or no increase in oxygen levels around the thermocline on any of the dates when profiles were taken.

Algae samples were collected from McWain Pond once per month between May and September. Algae abundance was moderate in these samples compared to other lakes sampled. Concentrations were highest in August. Flagellated algae (one-celled algae with flagella, or "tails") were common in each sample, especially the cryptomonad *Rhodomonas*. Including cryptomonads, flagellates of various types made up about half of the algae in the samples. Flagellates constitute a solid basis for the lake food web.

Cell counts of cyanobacteria were high because the most common genera, *Aphanocapsa* and *Merismopedia,* are colonies made up of many very tiny cells. Neither of these cyanobacteria cause harmful blooms. There were few nuisance or problem cyanobacteria noted in samples beyond a small amount of *Dolichospermum*, although McWain Pond does have elevated levels of *Gloeotrichia* in most years (see chapter 3).



Middle Pond

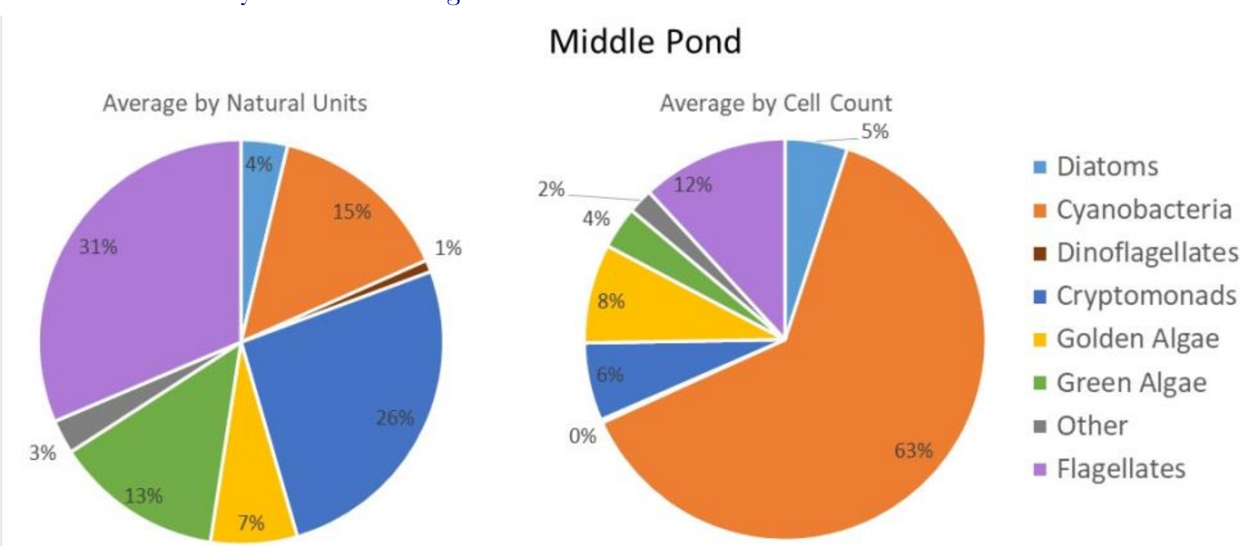


Fluorometer profiles show varied relative chlorophyll levels on Middle Pond throughout the summer of 2018. The maximum chlorophyll levels in May and September were in the high range, but otherwise levels were moderate. The highest chlorophyll levels were found below the thermocline (boundary between top and bottom layers of the pond).

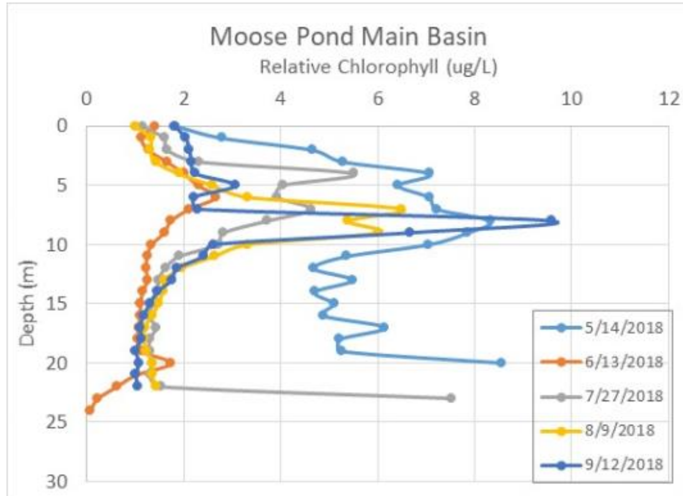
Algae samples were collected on Middle Pond once per month between May and September, 2018. Algae concentrations were low in May and June, and were highest in July and September. The average number of cells/mL was low compared to the other lakes sampled.

The most common algae based on natural units were flagellates. The second most common algae were cryptomonads. Although categorized separately, cryptomonads are also flagellated and fill the same ecological role that flagellates do. Between these two categories, flagellates made up the majority of algae based on natural units. Flagellates are good quality food and provide a solid basis for lake food webs.

Cyanobacteria colonies made up 15% of the algae within the samples based on natural units, but they constituted 63% of all of the algae by cell count. Although cyanobacteria made up a majority of the algae assemblage based on cell counts, there was very little evidence of nuisance or problem cyanobacteria in Middle Pond. The most common cyanobacteria in the pond were *Aphanocapsa* and *Merismopedia*, both of which are colonial forms that can contain hundreds of cells in each colony. Both of these genera are often seen in abundance in lower-nutrient lakes.



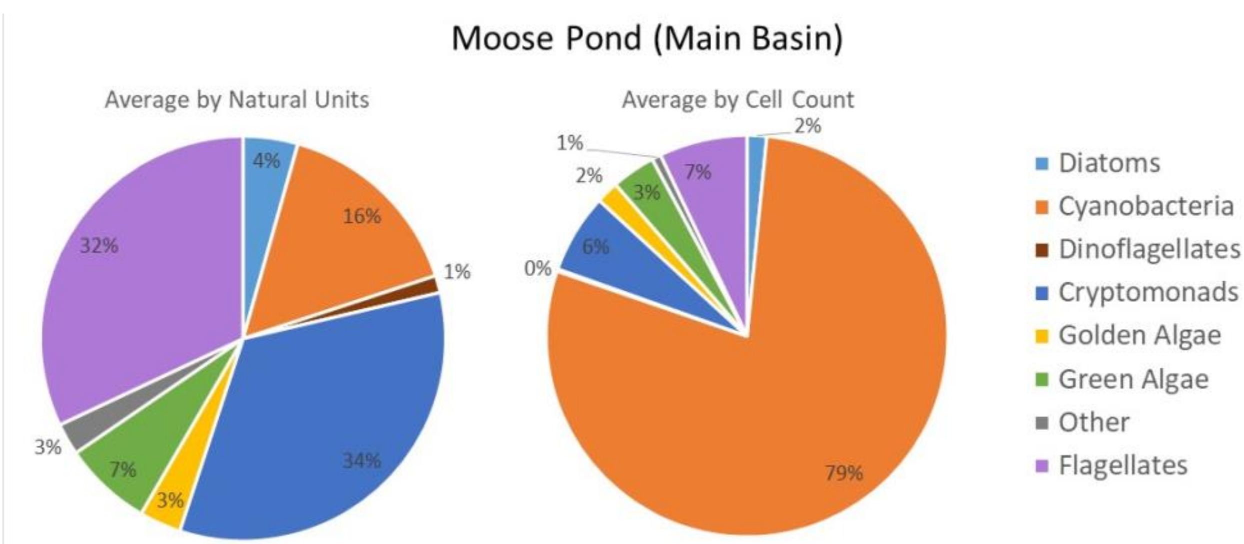
Moose Pond (Main Basin)



Fluorometer profiles show a relationship between stratification strength and the concentration of chlorophyll present near the thermocline (boundary between the top and bottom layers of the pond). The May profile shows a great deal of variation, which is indicative of weak or no stratification. The peak in chlorophyll gets more pronounced in each of the following months. The high reading near the bottom in the July profile may have been due to interference from bottom sediments.

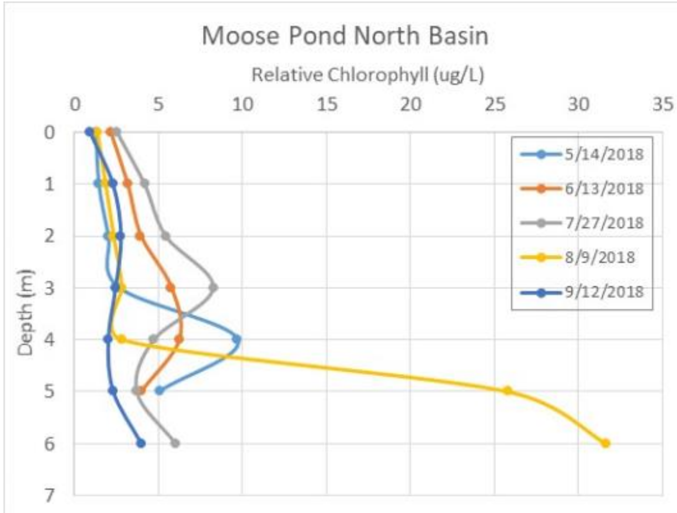
Five algae samples from the main basin of Moose Pond were collected between May and September. Algae concentrations were lowest in May and highest in August. The most common algae based on natural units were flagellates (single celled algae with flagella or "tails" that allow them to swim) of different algae types. The second most common algae were Cryptomonads, which are a type of flagellated algae. Between these two categories, flagellates made up the majority of algae based on natural units. Flagellates are a good source of nutrients for larger organisms in the lake food web.

Although cyanobacteria made up a majority of the algae assemblage based on cell counts, many of the common genera were not the kinds that cause blooms or produce toxins. The most common cyanobacteria in the pond were *Aphanocapsa, Cyanodictyon,* and *Merismopedia.* The cyanobacteria of concern seen in samples from Moose Pond's main basin were *Gloeotrichia* (see chapter 3), *Dolichospermum,* and *Aphanizomenon,* but concentrations were very low.



Moose Pond (North Basin)

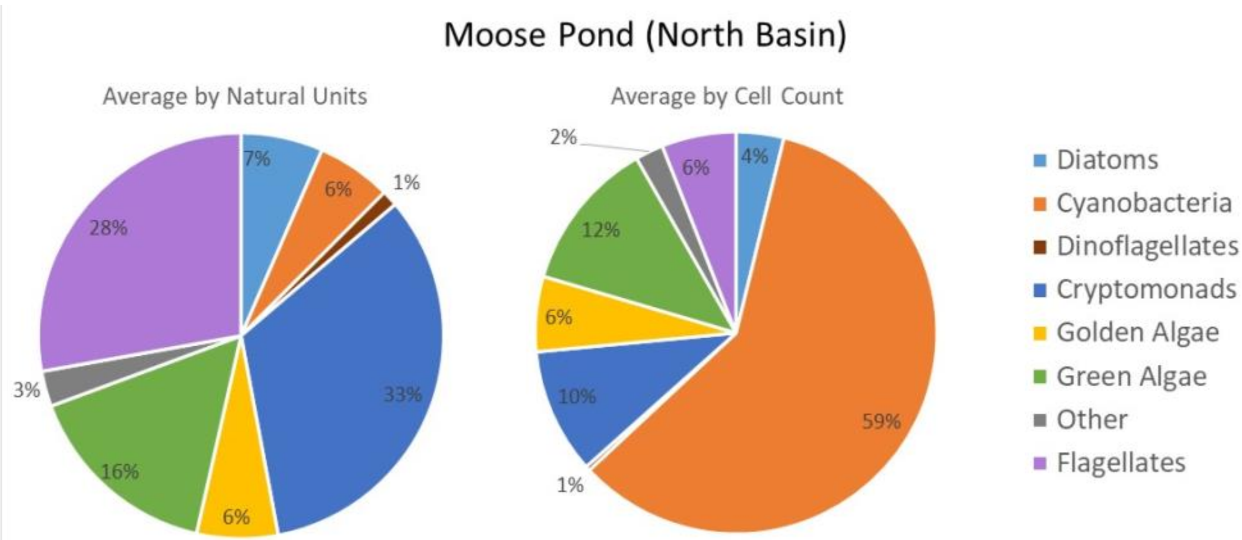
Fluorometer profiles collected from Moose Pond's north basin show increases in chlorophyll concentrations around the thermocline (boundary layer between top and bottom layers of the pond) in June and July. August sampling showed very high concentrations in the bottom two meters of the basin. This could be a buildup of algae cells, but more likely it is interference from sediments that had been kicked up at the bottom of the pond. No increases in dissolved oxygen were associated with the elevated chlorophyll levels.



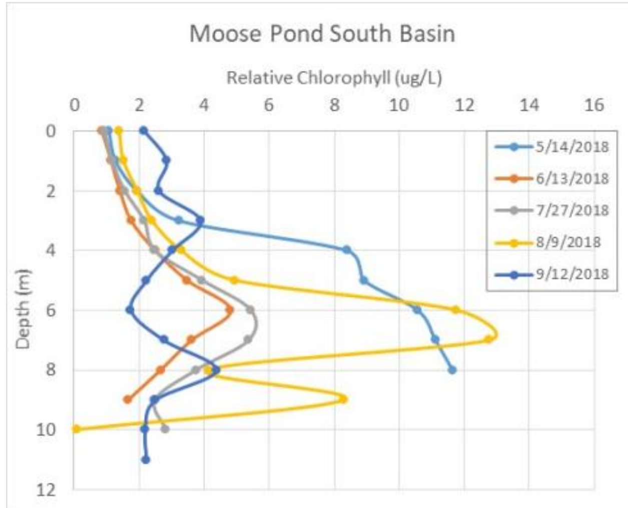
Algae samples were collected from the north basin of Moose Pond once per month between May and September. The highest concentration of algae was seen in the August sample. Moose Pond's north basin had the highest average percentage of green algae of all the lakes sampled based on natural units and cell counts. *Crucigenia, Monomastix, Oocystis,* and *Sphaerocystis* were common green algae seen in samples.

Most of the cyanobacteria noted were *Aphanocapsa* and *Merismopedia,* both of which contribute to high cell counts but do not have much biomass. A small amount of *Dolichospermum,* a cyanobacterium that can cause harmful blooms in high nutrient systems, was noted.

The most common algae based on natural units were cryptomonads and flagellates. Both these groups are made up of algae with flagella (tail-like appendages), which constitute a strong basis for the pond's food web because they are a good quality food source.



Moose Pond (South Basin)

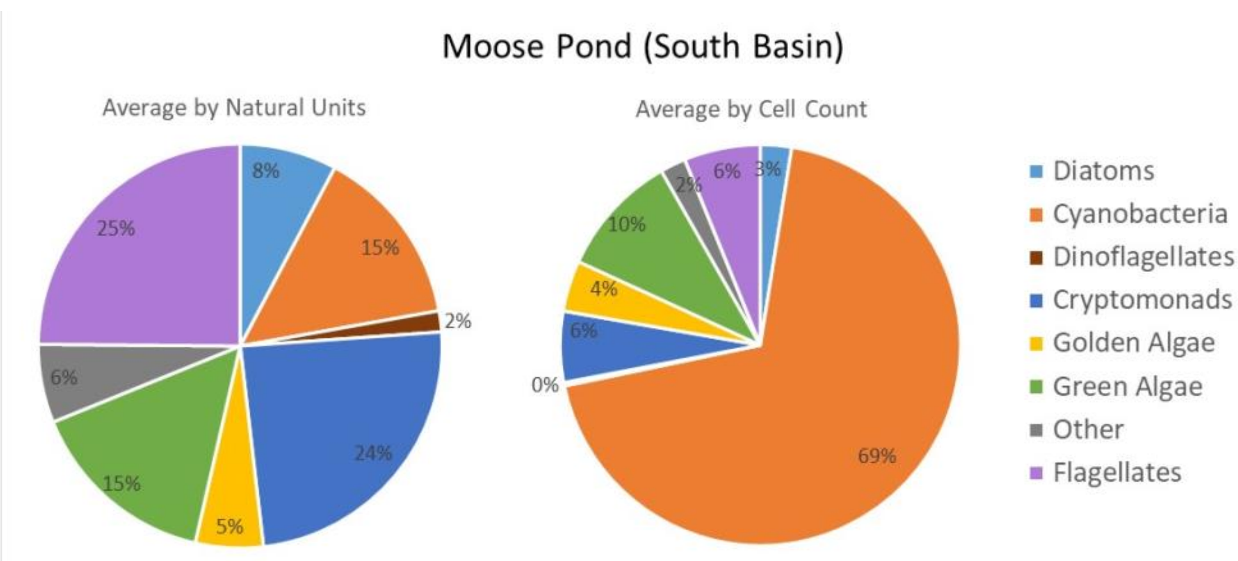


Fluorometer profiles show chlorophyll is highest in most months right at or slightly below the thermocline (boundary layer between the top and bottom layers of the pond). The May profile was taken before the pond was fully stratified and does not follow this pattern. The September profile showed a high amount of variation with depth and relative chlorophyll concentrations were actually lower at the thermocline than above and below it.

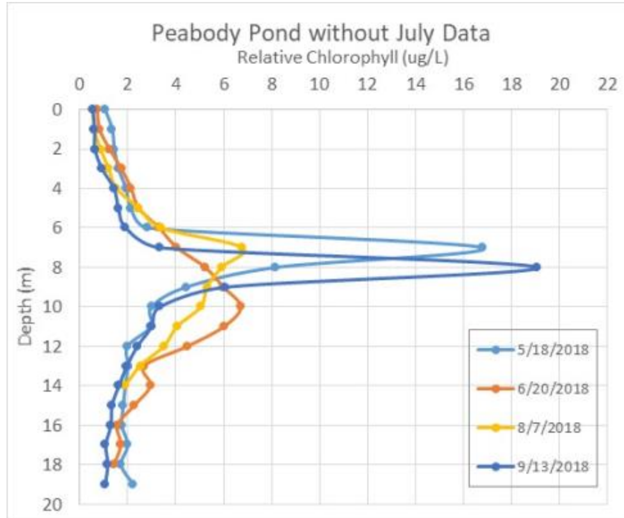
Algae samples were collected once per month between May and September. Algae abundance was highest in July and the average concentration was high compared to other sampling sites.

The pie charts below show the most common types of algae seen on average in the five samples, both by natural units and by number of cells. In natural units, "flagellates" and "cryptomonads" were the most common categories. The "flagellates" category consists of small algae with tail-like flagella of various algae types. Crytomonads are also a type of flagellate, so the majority of algae present in the samples were flagellated algae. These kinds of algae are good quality food for the larger organisms that eat them.

By cell count, cyanobacteria were the most abundant algae in the samples from Moose Pond's south basin. This is because the pond had a lot of small colonial cyanobacteria such as *Aphanocapsa* and *Merismopedia.* These cyanobacteria do not add much to the biomass of lakes; however, they can add a lot to cell counts because they are often made up of hundreds of cells.



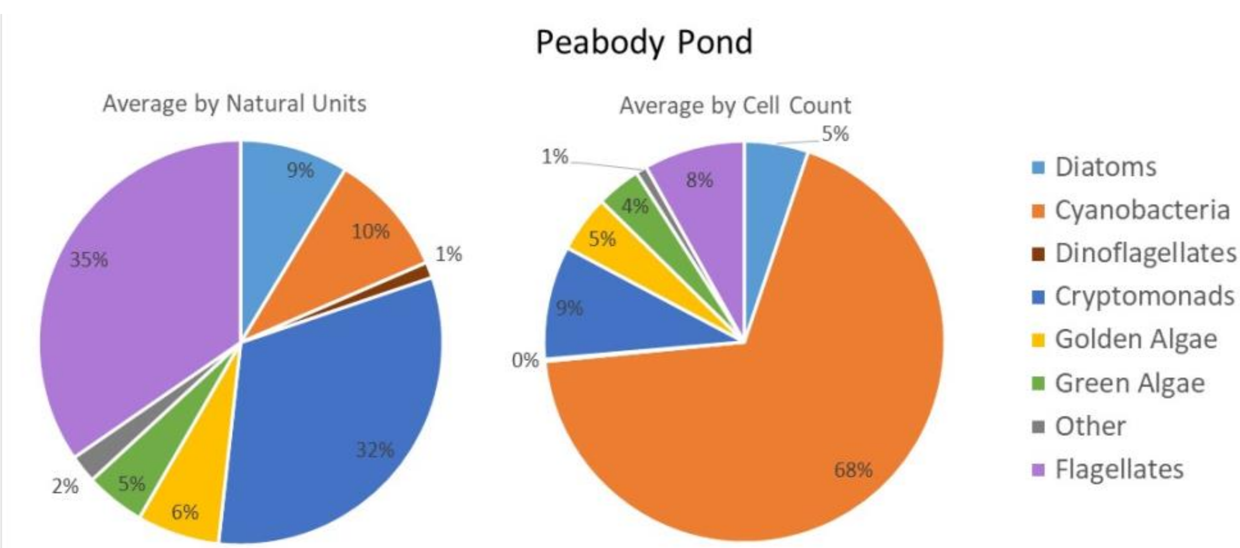
Peabody Pond



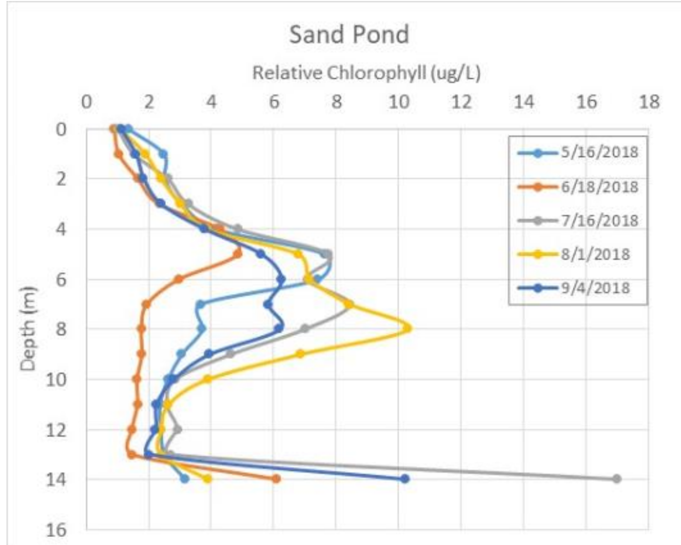
Fluorometer profiles showed large increases in chlorophyll fluorescence at the thermocline (boundary layer between top and bottom layers of the Pond) in May and September. In June, the peak in chlorophyll was just below the thermocline. June and July peaks were less extreme but lined up with thermocline depth. The July profile is not shown in the graph because of high fluorescence readings near the bottom of the pond that skew the graph and are likely due to interference from sediment.

Algae samples were collected from Peabody Pond once per month from May to September. Algae concentrations peaked in September and were moderate compared to the other lakes sampled.

The pie charts below show the proportion of common types of algae seen in the five samples, both by natural units and by number of cells. In terms of natural units, "flagellates" and "cryptomonads" were the most common categories. Flagellated algae are those with "tails" called flagella that they use to move around and are of various algal types. Crytomonads are flagellates as well, so the majority of algae present in the samples were flagellated algae. These algae are good quality food for larger organisms such as zooplankton, and provide a solid basis for the lake's food web. By cell count, the most common type of algae were cyanobacteria. Most were not nuisance genera, but the Pond did contain some *Dolichospermum* (formerly called *Anabaena*) and *Gloeotrichia*. Many of the cyanobacteria seen in Peabody Pond are actually indicative of low nutrient systems and are not usually bloom-forming.



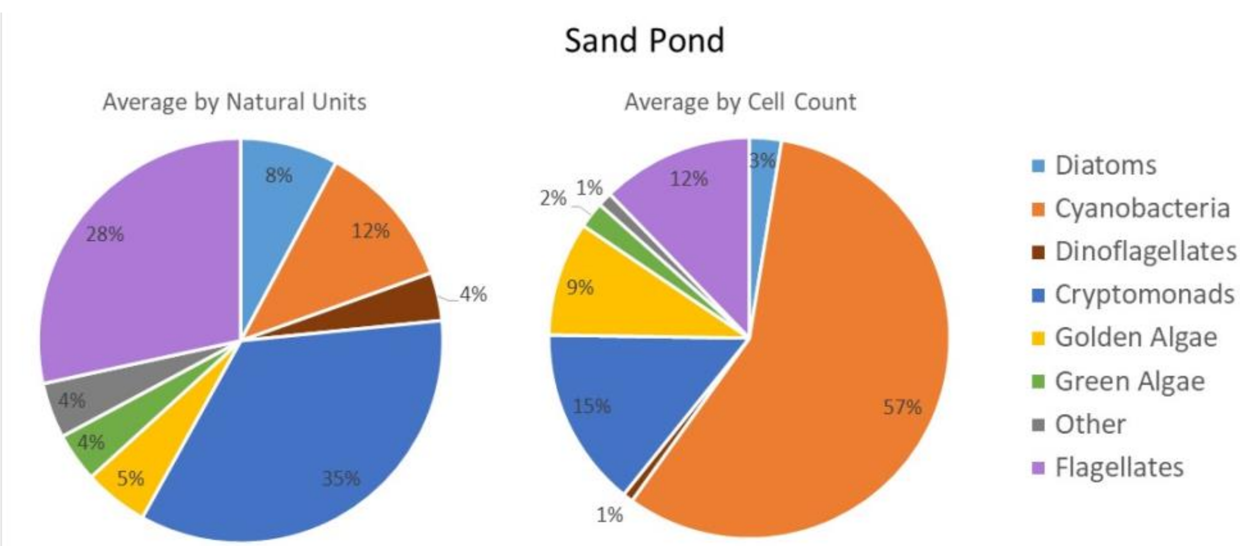
Sand Pond



Fluorometer profiles on Sand Pond show chlorophyll increasing at or just below the thermocline (boundary layer between the top and bottom layers of the Pond). Relative chlorophyll levels were moderate to high, and July, August, and September profiles showed slightly lower chlorophyll concentrations right at the thermocline. High readings at the bottom of the pond are likely due to interference from fluorescent sediment particles.

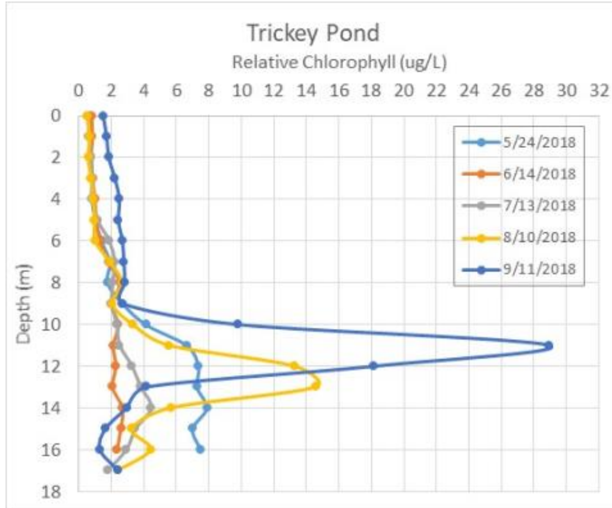
Algae samples were collected once per month on Sand Pond between May and September, 2018. Algae concentrations peaked in July, with overall average concentrations being moderate compared to other lakes. In terms of natural units, cryptomonads and flagellates made up 63% of the algae present. The term "flagellate" refers to an organism that has flagella— tail-like appendages that facilitate movement. Cryptomonads are a specific type of flagellate, so overall, the most abundant type of algae in Sand Pond in terms of natural units are flagellates. These algae make excellent quality food for other organisms, providing a solid basis for the lake's food web.

Sand Pond had a relatively small amount of cyanobacteria compared to the other lakes tested. Cyanobacteria made up roughly half of the cells counted in Sand Pond. The most common cyanobacteria in Sand Pond were of the genus *Aphanocapsa.* This genus consists of a colony of numerous tiny cells, so they add a lot to cell counts but do not add much to the total algal biomass present in the pond.



Trickey Pond

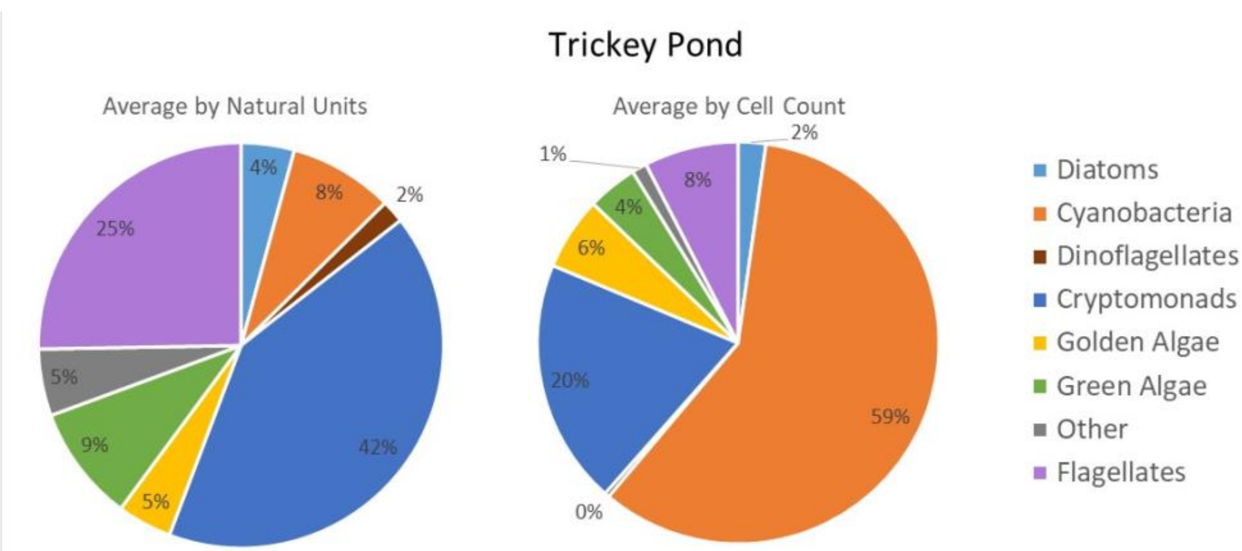
Fluorometer profiles show slight increases in chlorophyll fluorescence in May, June, and July beneath the thermocline (boundary zone between the top and bottom layers of the stratified pond). In August and September, these increases are much larger in magnitude, with relative concentrations in the very high range.



Algae samples were collected once per month between May and September. The highest cell concentration occurred in the month of June. Overall, cell counts were low compared to the other lakes and ponds sampled.

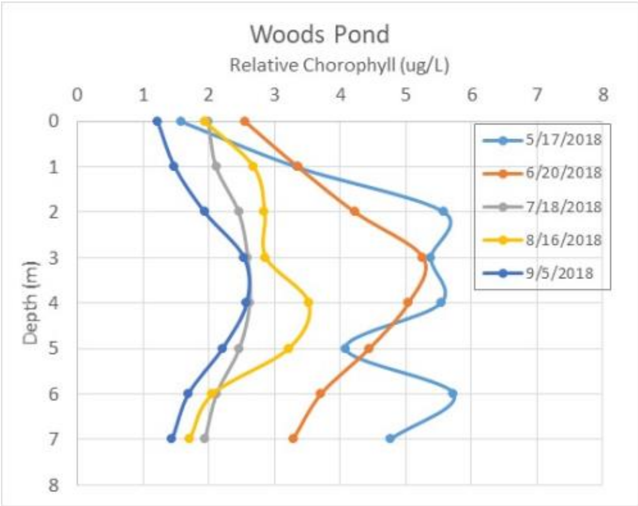
The pie charts below show the most common types of algae seen on average in the five samples, both by natural units and by number of cells. In terms of natural units, "flagellates" and "cryptomonads" were the most common categories. Flagellates are algae with tail-like appendages that help them swim, and represent several different types of algae. Crytomonads are flagellates as well, so the majority of algae present were flagellates. These algae are good quality food and provide a solid base for the food web.

By cell count, cyanobacteria were the most abundant algae in the samples from Trickey Pond. This is because the pond had a lot of small colonial cyanobacteria such as *Aphanocapsa* and *Cyanodictyon.* These genera are not harmful and do not add much to the biomass of lakes; however, they add a lot to cell counts because they are made up of hundreds of cells. This is clear when you compare the percentage of the algae in Trickey Pond that were colonies of cyanobacteria, at 8%, to the percentage of cells, at 59% of the total share.



Woods Pond

Fluorometer profiles show moderate levels of relative chlorophyll that tend to be slightly higher in the middle of the water column. Woods Pond does not stratify (separate into layers) strongly, which is probably why there are no big spikes in chlorophyll fluorescence.



Algae samples were collected from Woods Pond once per month from May to September. The highest cell concentration was reached in July. Overall algae abundance was moderately high compared to other lakes sampled.

The pie charts below show the most common types of algae seen on average in the five samples, both by natural units and by number of cells. In terms of natural units, “flagellates” and “cryptomonads” were the most common categories. Flagellates are a kind of algae with tail-like appendages (flagella) that help them swim. They are a functional group that is made up of various types of algae. Crytomonads are also flagellates. These algae are good quality food and provide a solid base for the food web.

In terms of cell counts, cyanobacteria were the most common type of algae in Woods Pond. The genera *Aphanocapsa* and *Merismopedia* were the most common. These genera are not indicative of poor water quality, but they tend to dominate cell counts because they are small colonies made up of many cells. Counted as natural units (colonies), cyanobacteria made up only 12% of the algae counted in an average sample. However, counting all the individual cells within the colonies brings the percentage to 63% of the total cells counted.