Three Lakes Algal Monitoring
2022 Report

Lake Rippowam, Lake Oscaleta, & Lake Waccabuc

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Three Lakes Algal Report

Lake Rippowam, Lake Oscaleta, & Lake Waccabuc

Introduction

The Three Lakes Council maintains an outstanding water quality monitoring program to properly manage its three lakes: Lake Waccabuc, Lake Oscaleta and Lake Rippowam. This includes conducting the CSLAP Water Quality Monitoring Program with assistance from the New York State Department of Environmental Conservation (NYSDEC) and the New York State Federation of Lake Associations (NYSFOLA), as well as further water quality testing beyond these programs. This data is reviewed and used to maintain the lakes as a natural resource for the community for recreation and aesthetic value. SŌLitude Lake Management was pleased to provide services to the Three Lakes Council again in 2022. Phytoplankton and zooplankton samples for each of the three lakes were collected by the client on July 21st, 2022. A separate report will outline and discuss the zooplankton results of 2022. This is the 13th season SŌLitude Lake Management has partnered with the Three Lakes Council.

Algae Monitoring

Methodology

Three Lakes Council (3LC) volunteers collected a single algal sample from each basin on July 21st, 2022 and delivered them to SŌLitude Lake Management (SLM) staff for laboratory analysis. In an effort to compare historical data, sampling dates were selected based on previous sampling events. Subsequently, the same historical sample sites, established by the CSLAP monitoring stations on all three lakes, were re-selected.

Algal samples were collected at a depth of 1.5 meters at each station using clean 1,000 mL HDPE or Nalgene plastic bottles. To preserve the integrity of the sample, bottles were immediately placed in a dark cooler with ice. The samples were returned to SŌLitude Lake Management's laboratory for analysis within 24 hours. If the sample could not be examined within 24 hours, it was preserved using 0.5 mL of Lugol's solution of iodine. A sub-sample was sand filtered and microscopically examined at 100X magnification using a compound microscope. Using regionally appropriate taxonomic keys, algae were identified to genus level and enumerated. The results for each lake are discussed below and associated examination data is included in the appendix of this report. Further descriptions of the functional groups observed can also be found in the appendix. Also included in the appendix are full-sized versions of the abundance and distribution graphs and pie charts.

2022 Algal Results

Cyanobacteria were present in all three lakes and dominated Rippowam and Waccabuc. Algal abundance decreased in all three lakes when compared to last year. The dominance of green algae in Oscaleta is encouraging, as it implies these benign algae are outcompeting the cyanobacteria.

Because algae are excellent indicators of water quality and system health, it is recommended that stakeholders invest in a robust monitoring plan that extends parameters and sample frequency. The additional data would support improved conclusions and recommendations.

Table 1: 2022 Algal Totals and Percent Distribution

Functional Group	Lake Rippowam		Lake Oscaleta		Lake Waccabuc	
	Org./mL	%	Org./mL	%	Org./mL	%
Diatoms	20	2.6%	20	5.1%	10	0.6%
Golden Algae	40	5.3%	0	0.0%	70	4.3%
Green Algae	80	10.5%	200	51.3%	500	31.1%
Cyanobacteria (Blue-Green Algae)	590	77.6%	170	43.6%	930	57.8%
Euglenoids	0	0.0%	0	0.0%	0	0.0%
Protozoa	0	0.0%	0	0.0%	0	0.0%
Dinoflagellates	30	3.9%	0	0.0%	100	6.2%
Total Organisms	**760**	**100%**	**390**	**100%**	**1,610**	**100%**

Lake Rippowam

In 2022, the algal distribution at Lake Rippowam was the most diverse out of the three lakes (Table 1). There were nine (9) different genera observed at Rippowam including: *Fragilaria, Mallomonas, Ceratium, Closterium, Coelastrum, Pediastrum, Staurastrum, Anabaena, and Aphanizomenon*. The genera were spread out over five functional groups: diatoms, golden algae, dinoflagellates, green algae, and cyanobacteria. Algal density was considered moderate at 760 organisms per milliliter and was the second highest overall abundance of the three lakes. This is typical for Lake Rippowam, according to historical data. The only functional groups that were not represented in this year's assemblages were euglenoids and protozoa. The most abundant functional group of algae observed was nuisance cyanobacteria (77.6%), which was dominated by *Aphanizomenon* at 480 organisms/mL. Although cyanobacteria were the dominant group represented, green algae accounted for 10.5% of the total organisms. Low amounts of diatoms, golden algae, and dinoflagellates rounded out the assemblage at this site in late July.

Water clarity at Lake Rippowam measured 2.0 meters which is a slight decrease from secchi readings in 2021. It was the second highest of the three sites sampled on this date, which correlates with the moderate algal abundance. It should be stated, however, that a water clarity approaching 2.0 meter is suitable for this site in late July.

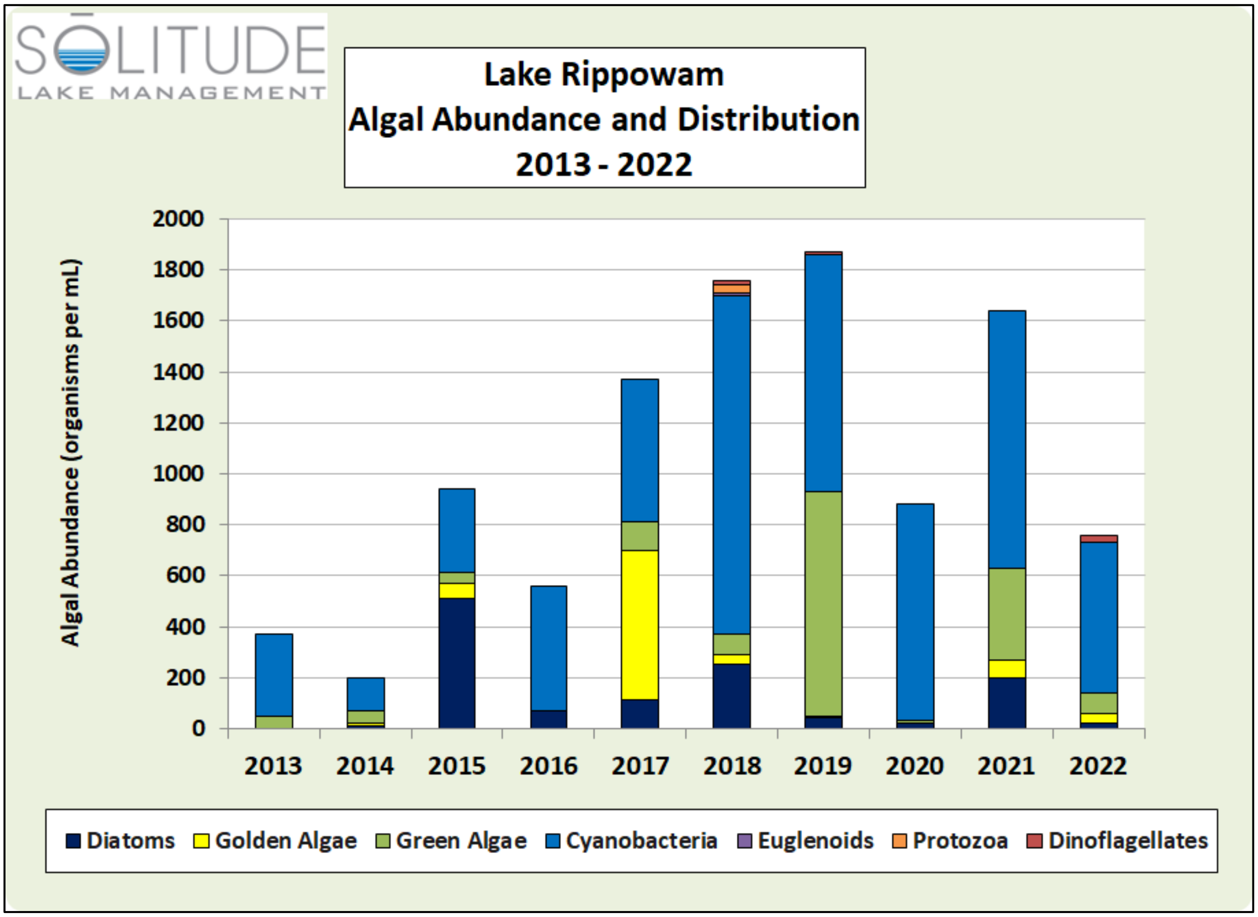


Figure 1. Lake Rippowam Algal Abundance and Distribution, 2013 - 2022

At Lake Rippowam, algal abundance and distribution has varied greatly over the years but remains high on average (Figure 1). In 2021, overall abundance increased significantly (2020: 880 organisms/mL, 2021: 1,640 organisms/mL) but decreased in 2022. This could be attributed to a variety of factors, including decreased rainfall from the mid-season drought. Less rainwater runoff prevents extra nutrients from being introduced into the system that could cause prolific algal growth. However, less rainfall can cause other stressors to affect the lake ecosystem and surrounding area.

It is important to note that throughout the years, assemblages have been dominated by cyanobacteria. This is the case for many different aquatic systems throughout this service territory of SŌLitude Lake Management. Cyanobacteria are often associated with malodors, unusable waters, and potential toxin production. Large populations of cyanobacteria that produce toxins are referred to as Harmful Algal Blooms (HABs). Monitoring nutrient loads and algal densities throughout the growing season can assist in the prediction of HABs. Acting before these parameters exceed acceptable limits is key to preventing Harmful Algal Blooms.

Lake Oscaleta

In 2022, the overall algal abundance at Lake Oscaleta was considered low with a total of 390 organisms/mL (Figure 2). Algal diversity was moderate as seven (7) different genera were recorded from three different functional groups. All functional groups were represented except for protozoa and euglenoids. The functional group with the highest abundance was green algae, consisting of 51.3% of the assemblage. Most green algae were represented by *Coelastrum* at 80 organisms/mL. Although the assemblage was dominated by nuisance cyanobacteria, overall abundance was lower than Lake Rippowam at the time of sampling. Cyanobacteria genera accounted for 170 organisms/mL of the assemblage. Diatoms were the only other functional group observed, present at low abundance. Water clarity at Lake Oscaleta was measured at 2.56 meters, which is considered good for late July. Typically, in mid-summer, algal densities are the highest of the growing season, which can negatively impact water clarity.

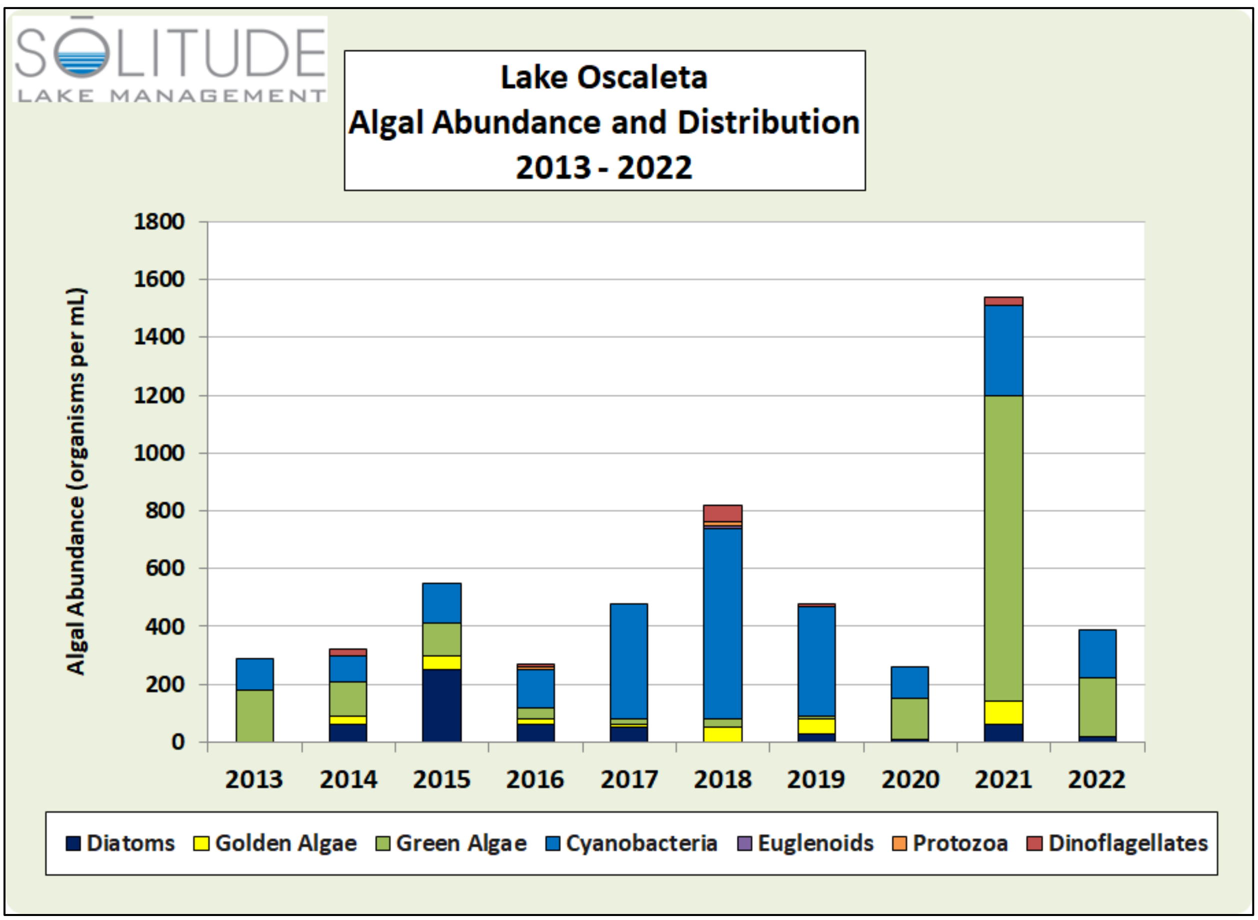


Figure 2. Lake Oscaleta Algal Abundance and Distribution, 2013-2022

At Lake Oscaleta, overall algal abundance fluctuated from 2013 to 2022 (Figure 2) but remained low on average. However, the 2021 abundance increased dramatically and was dominated by green algae. The results from 2021 are unique to Lake Oscaleta as this is the highest level of algae we have seen in the lake. It is possible that the 2021 season was a naturally high production year at the Three lakes because of the record rainfall. This data is supported at the other two sites.

The trend in cyanobacteria dominance at Lake Oscaleta needs to be closely monitored as it could indicate a shift in the algal community. However, we are examining a very limited dataset. More data is needed to accurately understand the ecosystem at Lake Oscaleta during the growing season. Increasing sampling sites, frequency of sampling events, and additional water quality parameters are all tools that would help to better comprehend the algal community in the lake.

Lake Waccabuc

Out of the Three Lakes sampled, Lake Waccabuc supported the highest algal density in 2022 at 1,610 organisms/mL. Five different functional groups were observed including: diatoms, golden algae, green algae, cyanobacteria, and dinoflagellates. Overall, sample diversity was moderate at seven (7) genera, with two genera as green algae and two genera as cyanobacteria. The most abundant functional group was cyanobacteria which accounted for 57.8% of the assemblage (at 930 organisms/mL). Lake Waccabuc had the highest abundance of cyanobacteria out of the Three Lakes. Specifically, the genus *Anabaena* accounted for 800 organisms/mL of the assemblage at Waccabuc. Moderate amounts of green algae accounted for 31.1% of the algal assemblage (at 500 organisms/mL). Trace amounts of diatoms, dinoflagellates and golden algae rounded out the observed assemblage.

Water clarity at Lake Waccabuc was measured at 1.56 meters, which is an increase from 2021 and is considered good. This is likely due to the high algal density that is common at Lake Waccabuc in July. Late July through August is typically the time of year for peak photosynthetic production.

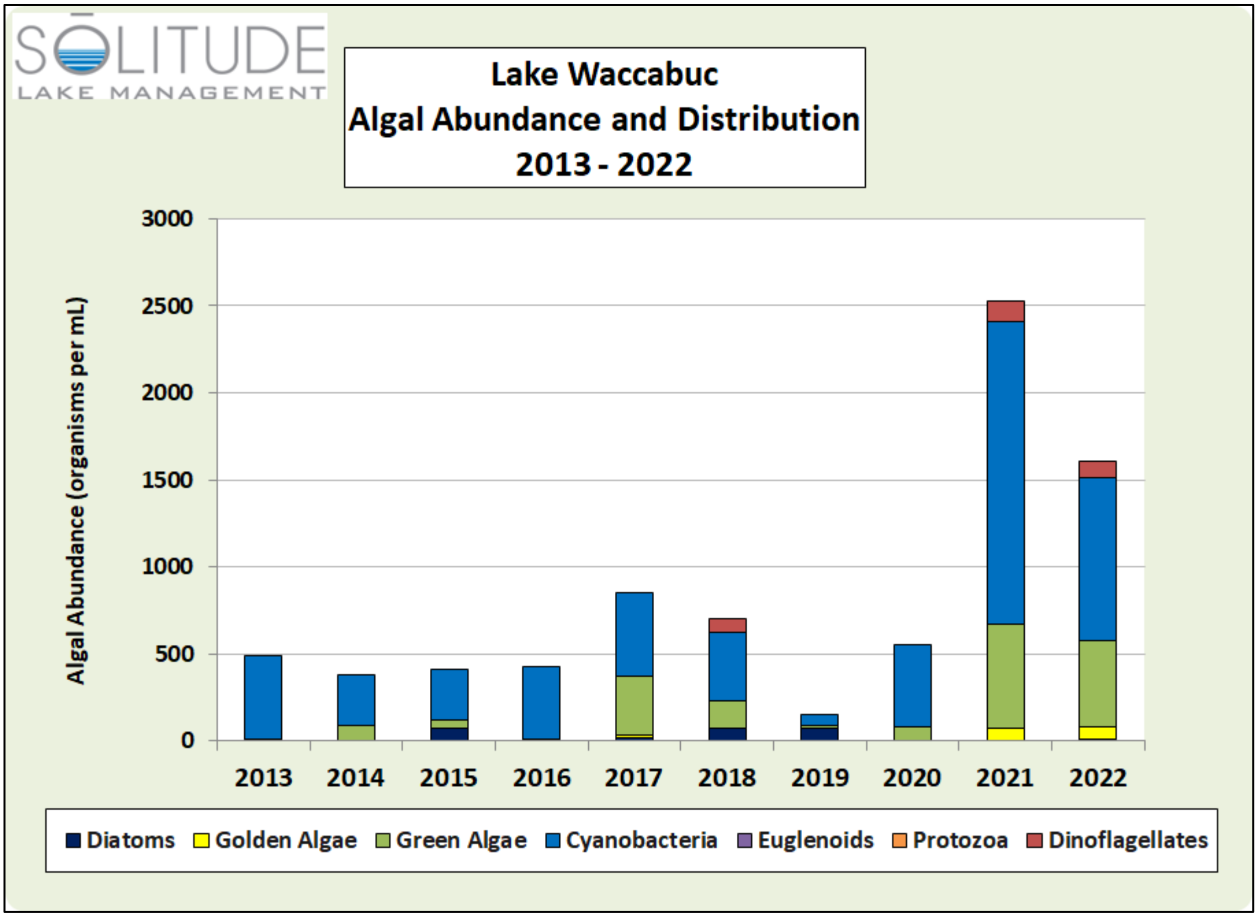


Figure 3. Lake Waccabuc Algal Abundance and Distribution, 2013-2022

Based on the data (Figure 3), Lake Waccabuc contains the most consistent cyanobacteria population over the past ten years. Over 50% of each assemblage from nine of the previous ten years consisted of various genera of cyanobacteria. In 2022, similar to the other lakes, total abundance decreased significantly. All three lakes show overall increases in algal populations over time. Lake Waccabuc, having the highest amount of cyanobacteria in 2022, has also held the most consistent and stable population compared to the other two basins. Only during the 2017 season did we observe a significant increase in green algae genera, indicating competition over cyanobacteria. This basin contains a moderately diverse algal community, though assemblages over the years are temporal and inconstant. The high abundances of cyanobacteria are currently outcompeting the other algal groups and are most likely a result of seasonal variation.

In 2021, we observed a significant increase in overall algal and cyanobacteria abundance. This was the highest overall algal density among the ten years of algae samples. This year could be the outlier of the dataset.

Lake Profiles

Table 2: 2022 Temperature and Dissolved Oxygen Profiles						
Depth (meters)	**Lake Rippowam**		**Lake Oscaleta**		**Lake Waccabuc**	
	Temp. (°C)	Dissolved Oxygen (mg/L)	Temp. (°C)	Dissolved Oxygen (mg/L)	Temp. (°C)	Dissolved Oxygen (mg/L)
0	28.40	9.42	28.7	9.24	28.1	11.54
1	28.10	9.33	28.3	9.63	28.1	11.63
1.5	27.90	9.74	28.0	9.72	27.7	12.01
2	27.3	10.38	27.7	9.51	27.2	11.51
3	25.3	12.02	26.8	8.66	25.6	5.70
4	20.5	2.84	23.2	10.26	21.3	0.21
5	15.4	0.19	18.3	8.51	18.1	0.16
5.5	14.4	0.15	---	---	---	---
6			14.0	1.43	14.6	0.13
7			11.6	0.24	12.3	0.11
8			10.4	0.17	11.4	0.10
9			9.6	0.15	10.6	0.10
10			9.3	0.14	9.8	0.10
10.5			9.1	0.13	---	---
11					9.3	0.10
12					9.1	0.10
13					8.9	0.10
14					8.6	0.10

In 2022, temperature and dissolved oxygen profiles were measured at each lake station by the client. That data was provided to SLM for a summary. Data was collected at one-meter intervals with some extra measurements at half-meter marks, most likely based on depth measurements. All three profiles have an extra measurement at the 1.5-meter depth coinciding with the depth of the algal collection. Lake Rippowam has an added measurement at the 5.5-meter depth. Lake Oscaleta has an extra measurement at the 10.5-meter depth.

At Lake Rippowam, dissolved oxygen readings were slightly elevated until reaching a depth of four meters. We observed a gradual decrease in the dissolved oxygen in the lower levels of the water column. The highest dissolved oxygen occurred at the three-meter mark (12.02 mg/L). At four meters, and the rest of the water column, the dissolved oxygen was effectively anoxic which is a concern for aquatic biota.

At Lake Oscaleta, dissolved oxygen levels were highly elevated from the surface with a slight decrease at the three-meter mark. We then observed an expected decrease in dissolved oxygen to the five-meter depth (8.51 mg/L). From the six-meter depth to the lake bottom, we observed anoxic conditions with dissolved oxygen dropping to a low of 0.13 mg/L which is also a concern for aquatic biota.

At Lake Waccabuc this year, dissolved oxygen was slightly elevated at the surface. We then observed a steeper than expected decrease in dissolved oxygen; suitable oxygen to support diverse aquatic biota was only found in the upper layer water column to a depth of two meters. By the three-meter depth, we observed 5.70 mg/L of oxygen. After the four-meter mark, these anoxic conditions continued down the water column to the lake bottom.

When systems experience anoxia, aquatic organisms may not be able to survive. However, cyanobacteria are well adapted to these conditions and thrive under anoxia, sometimes even creating anoxic zones themselves. This further supports the need for improved monitoring.

Conclusion

Summary

Algal abundance and composition varied throughout the Three Lakes in 2022. At Lake Waccabuc, we observed the highest overall algal abundance that was dominated by the highest levels of cyanobacteria. The previous few years at this site were considered bloom-like conditions and 2022 was no different. At Lake Oscaleta, we observed low overall algal abundance that was dominated by green algae and the assemblage showed the most favorable composition across all three lakes this year. At Lake Rippowam, we observed moderate algal abundance which was comparable to the previous years. Cyanobacteria continued to dominate the lake in 2022 with low abundance in green algae, golden algae, diatoms, and dinoflagellates.

Recommendations

It is recommended that the Three Lakes Councils continue at least their historical monitoring program. It is strongly recommended that stakeholders invest in a robust monitoring program including increased sampling frequency and water quality parameters, to better inform the conditions of the lakes. Algae are incredibly variable and can shift populations within a day, so single sampling events only inform what was happening at the exact time the sample was obtained. With increased sampling frequency, biologists will be able to analyze seasonal changes and offer more insight into system dynamics. Oftentimes, problems with algae are attributed to nutrients, so obtaining nutrient data would address root causes of the issue.

The Three Lakes Council has now compiled ten years of algal data for Lake Rippowam, Lake Oscaleta, and Lake Waccabuc. Monitoring the health of a lake ecosystem requires sampling a diverse array ofbiological communities such as fish, aquatic plants, algae, and zooplankton. This is essential to providing stewardship to a delicate ecosystem. The comprehensive water quality collected via the CSLAP program is suitable to be combined with available biological data, to assist with completing the picture of the overall ecological status of the three basins.

SŌLitude Lake Management recommends the 3LC to continue monitoring zooplankton and algae in the 2023 season. Although sampling throughout the growing season (May through September) would be more suitable to observe seasonal variation, continuing the same sampling format and techniques applied in 2013 through 2022 does provide value. Therefore, at least a single sample event should be collected in mid-July of 2023, to coincide with the SAV surveys and historical data. SŌLitude Lake Management will be updating their algal sampling analyses for 2023 to cells/mL as it is more in line with EPA standards of reporting.

SŌLitude Lake Management would like to take this opportunity to thank the Three Lakes Council for allowing us to provide lake management consulting services. We look forward to working with you again throughout the 2023 lake management season.

Appendix

Algae Primer
2022 Algae Examination Data and Pie Charts
2013-2022 Algae Abundance and Distribution Graphs
Three Lakes Profile Data and Graphs

Algal Sampling

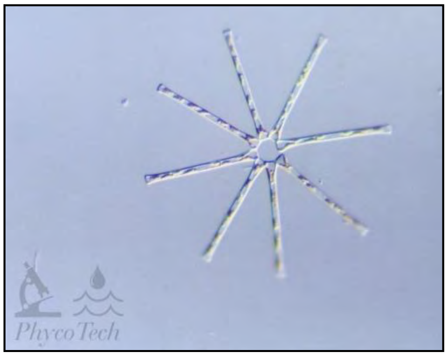
Algae: An Introduction

Lakes typically contain three broad categories of algae. These include unicellular (singular and colonial), filamentous, and macroscopic organisms.

Unicellular algae are typically microscopic and consist of individual cells or colonies of cells suspended in the water column. At high enough densities (HABs), they can impart a green or brown (and sometimes, even red) tint to the water column. Unicellular algae belong to several taxonomic groups. Density and diversity of these groups often vary due to seasonality. When unicellular algae density becomes elevated, it can reduce water clarity (giving the water a "pea soup" appearance) and impart undesirable odors. Usually, cyanobacteria are responsible for these odors, but other groups or extremely elevated densities can impart them as well. In addition to decreased aesthetics, unicellular HABs can cause degradation of water quality, increase the water temperature (turbid water warms faster than clear water), and can possibly produce a variety of toxins, depending on the type of genera present and environmental conditions. Numerous groups of unicellular algae are common in the Northeast, including diatoms, golden algae, green algae, cyanobacteria, euglenoids, and dinoflagellates. Each group shall be discussed in turn.

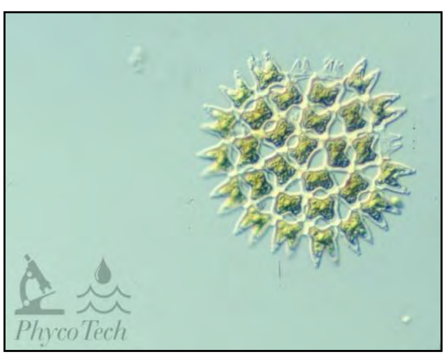
Filamentous algae are typically microscopic but can be visible to the naked eye if enough biomass accumulates. Filaments are generally composed of long chains of cells encompassed in a mucilaginous sheath or matrix that protects against cell desiccation and penetration. Growth is often associated with attachment to a substratum, typically the lake bottom or, submersed or emergent vegetation. Filamentous algae of this nature are referred to as benthic filamentous algae (BFA). However, under certain environmental conditions, rampant growth and the production of gas vesicles can cause BFA to float to the surface and form mats. Typically, genera of green algae or cyanobacteria develop into these nuisance, filamentous mats. Abundant nuisance growth of filamentous algae can cause operational and functional impairments to the water. Examples include a decline in aesthetics, recreational use, water quality, and aquatic organism survivability.

Macroscopic algae appear to be submersed plants, especially when viewed in the water column. Physical examination reveals no true roots, stems, or leaves. Although typically only reaching heights of a few inches, under ideal conditions, this type of algae can reach lengths of several feet and create a dense carpet on the bottom of a lake. Therefore, it typically does not reach nuisance levels in a lake, save for high use areas such as beaches and other popular swim areas. Since these algae occupy a similar ecological niche as submersed plants, it's often included in detailed and visual aquatic plant surveys. It provides numerous benefits to a lake system, including sediment stabilization, acting as a nutrient sink, providing invertebrate and fish shelter and habitat, and is one of the first to re-colonize a disturbed area. In the Northeast, muskgrass (*Chara* sp.) and stonewort (*Nitella* sp.) are two of the most common macroscopic algae.

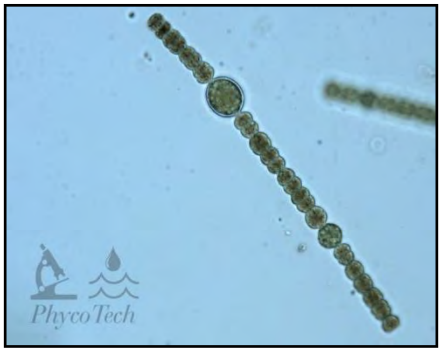


Diatoms are ubiquitous as a group of phytoplankton, and often possessing a rigid silica shell with ornate cell wall markings or etchings. Living cells often grow on or in association with benthic substrate, floating debris, or macrophytes. Under ideal conditions, cells can become stratified. When cells die, their silica shells can settle on the water-sediment interface and accumulate to significant depths. Limnologists can then study historical population characteristics of diatoms. Some are round and cylindrical (centric) in shape, while others are long and wing-shaped (pennate). They are usually brown in color, and reach maximum abundance in colder or acidic water. Therefore, they tend to dominate in winter and early spring. Common diatoms in the Northeast include *Fragilaria spp., Cyclotella spp., Navicula spp.*, and *Asterionella spp.* (pictured).

Golden Algae are typically yellow or light brown in color. Cell size is usually small oval shaped with a partially empty area, but several genera can be colonial or even filamentous. Most have two specialized flagella, and some type of scales or a rigid coating that grants it a fuzzy appearance. They typically prefer cooler water, so they dominate in the late fall, winter, or early spring. They also tend to bloom at deeper (cooler) depths. They are common in low nutrient water, and numerous forms produce taste and odor compounds. Common golden algae in the Northeast include *Dinobryon spp.* (pictured), *Mallomonas spp.*, and *Synura spp*.

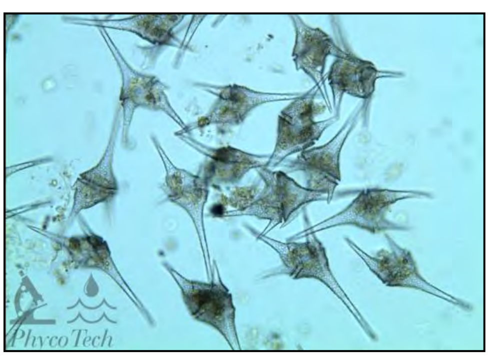


Green Algae are a very diverse group of unicellular and filamentous algae. There is tremendous variability in this group which varies from family to family and sometimes even genus to genus. There are flagellated single cells, multi-cell colonies, filamentous forms and attached forms, typically with distinct cell shapes light green in color. Some prefer acidic waters, and others highly eutrophic (sewage) conditions. A green algal bloom usually occurs in water with high nitrogen levels. Green algae typically dominate in mid to late summer in the Northeast. Common genera include *Chlorella spp.*, *Scenedesmus spp.*, *Spirogyra spp.,* and *Pediastrum spp.* (pictured).



Cyanobacteria, often referred to as blue-green algae, are ubiquitous, photosynthetic bacteria. They tend to be microscopic, but significant biomass accumulation can result in a Harmful Cyanobacterial Bloom (HCBs) that are visible to the naked eye. Cyanobacteria possess multiple mechanisms conferring a competitive advantage. Structurally, they can have nitrogen-fixing cells that allow them to grow in nutrient-limited conditions and resting cells that allow them to sustain populations. They tend to be encased in a mucilaginous matrix or sheath that protects against cell penetration and desiccation. In addition, they possess antennae-like structures for harvesting incredibly low amounts of incident light, allowing for benthic growth. The production of gas vesicles allows cyanobacteria to regulate their buoyancy to move up and down the water column to obtain nutrients. Cyanobacteria tend to be more abundant in neutral or alkaline, nitrogen-poor waters. Thus, they prefer eutrophic systems with high phosphorus loads. However, cyanobacteria are tolerant of a wide variety of water chemistries and boast many oligotrophic forms as well. Numerous cyanobacteria produce taste and odor compounds, and under certain environmental conditions can produce toxins dangerous to humans, fish, and livestock. Cyanobacteria typically dominate a lake system in late summer to early fall. Common cyanobacteria that occur in the Northeast include *Dolichospermum spp.* (pictured)*, Aphanizomenon spp., Microcystis spp.,* and *Coelosphaerium spp.*

Euglenoids are single-celled eukaryotes typically with a primitive eyespot and flagellum or flagella. They are generally green, but some species are red or colorless. Euglenoids are often associated with quiescent, eutrophic waters containing high concentrations of organic matter. Common euglenoids that occur in the Northeast include *Euglena spp.* (pictured), *Phacus spp.,* and *Trachelomonas spp*.



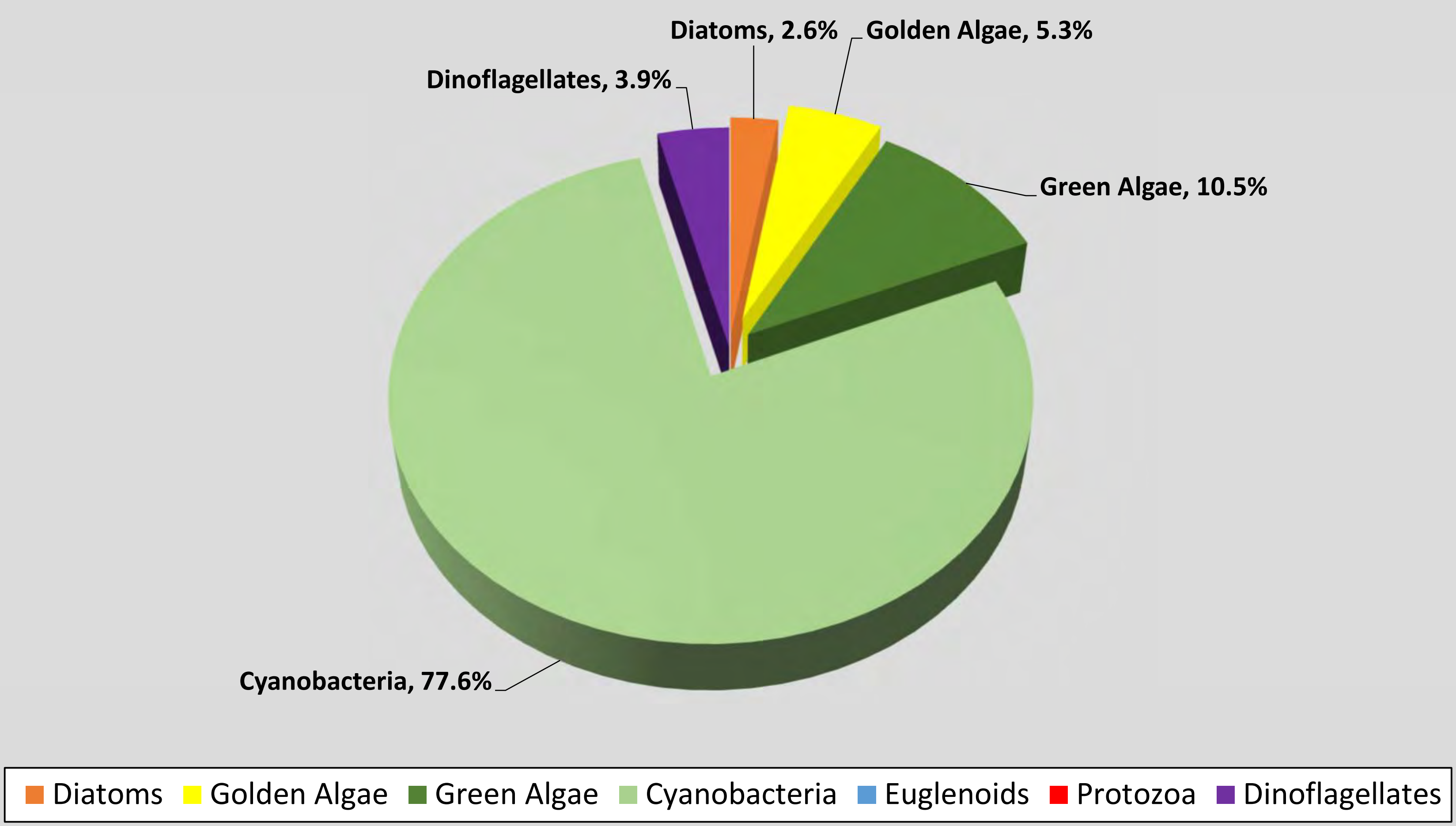
Dinoflagellates are a monophyletic group strongly associated with marine environments, in which they often cause toxic HABs known as Red Tide. However, toxin production in freshwater genera is very rare. Dinoflagellates are generally larger in size as compared to other phytoplankton. Cells typically present themselves as ovoid or spherical in shape and are encompassed in cellulose plates known as armor. They usually possess two flagella which confers propulsion and rotation through the water column. Dinoflagellates generally prefer organic-rich or acidic waters, and can impart a coffee-like brown tint to the water when enough biomass has accumulated. Common dinoflagellates in the Northeast include *Ceratium spp.* (pictured) and *Peridinium spp*.

Site A: Lake Rippowam				Site B: Lake Oscaleta				Site C: Lake Waccabuc	Amount Examined: 200mL		
Diatoms	**A**	**B**	**C**	**Green Algae**	**A**	**B**	**C**	**Cyanobacteria**	**A**	**B**	**C**
Stephanodiscus			10	*Closterium*	10	40		*Anabaena*	110	130	800
Fragilaria	20			*Coelastrum*	20	80	150	*Aphanizomenon*	480	40	
Tabellaria		20		*Gloeocystis*		40		*Microcystis*			130
				Pediastrum	10						
				Staurastrum	40	40	350				
Golden Algae	**A**	**B**	**C**								
Mallomonas	40		70					**Results**			
								Site	**A**	**B**	**C**
				Euglenoids	**A**	**B**	**C**	**Total Genera**	9	7	7
Dinoflagellates	**A**	**B**	**C**					**Secchi (m)**	2.0	2.56	1.56
Ceratium	30		100					**Organisms/mL**	760	390	1,610

Collection Date: **21 July 2022** **Examination Date:** **22 July 2022**

This is the first and only sampling event of the 2022 season. Algal diversity is considered moderate at all three lakes. Algal density is considered low at Oscaleta, moderate at Rippowam, and high at Waccabuc. The assemblage at each lake is dominated by cyanobacteria. Rippowam is dominated by *Aphanizomenon,* while Oscaleta and Waccabuc are dominated by *Anabaena*. Moderate amounts of green algae was observed at all three lakes. Trace amounts of diatoms, golden algae, and dinoflagellates were also reported. Water clarity is considered good at Rippowam and Oscaleta while Waccabuc is considered fair.

Lake Rippowam Algal Distribution July 21, 2022



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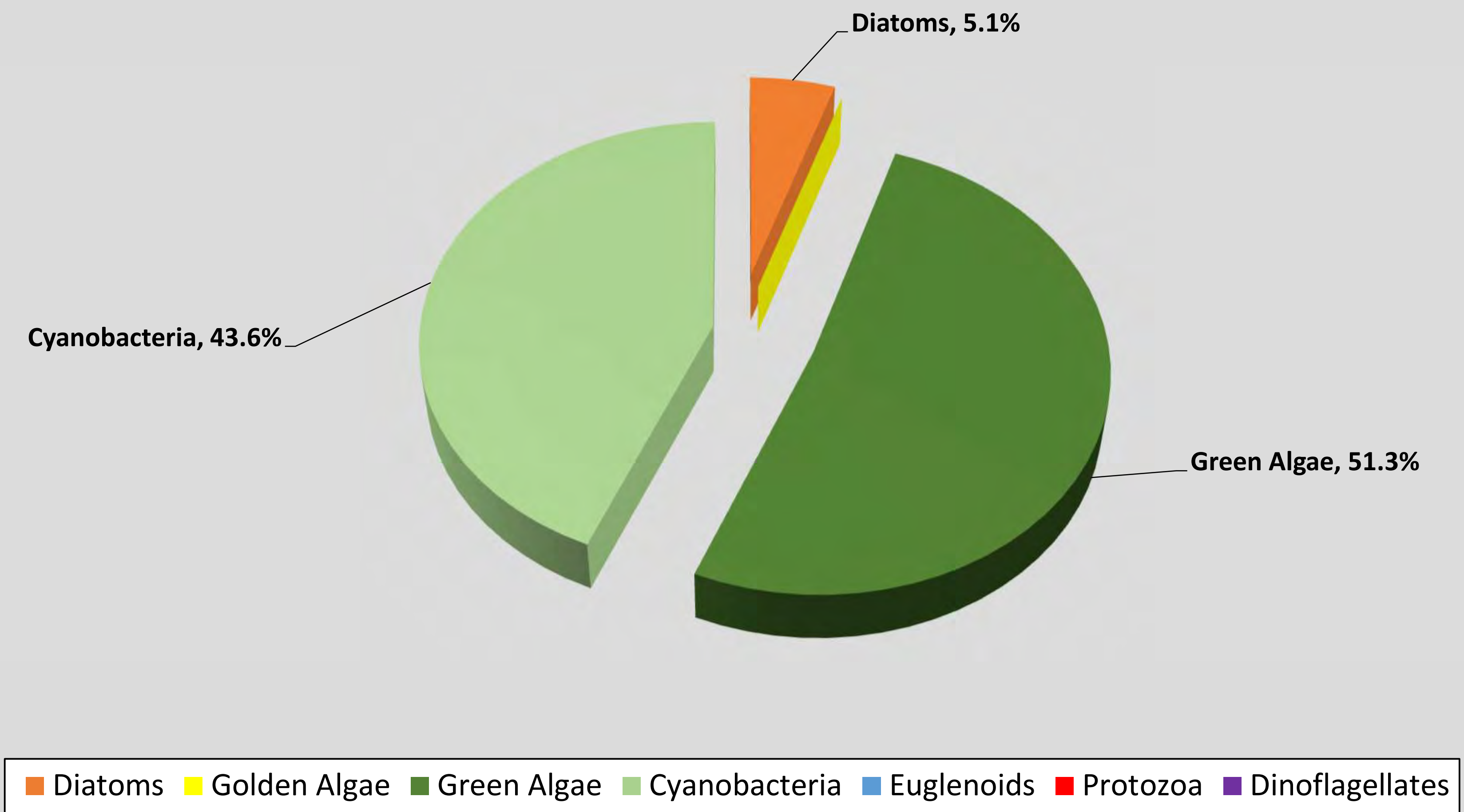
Lake Oscaleta Algal Distribution July 21, 2022



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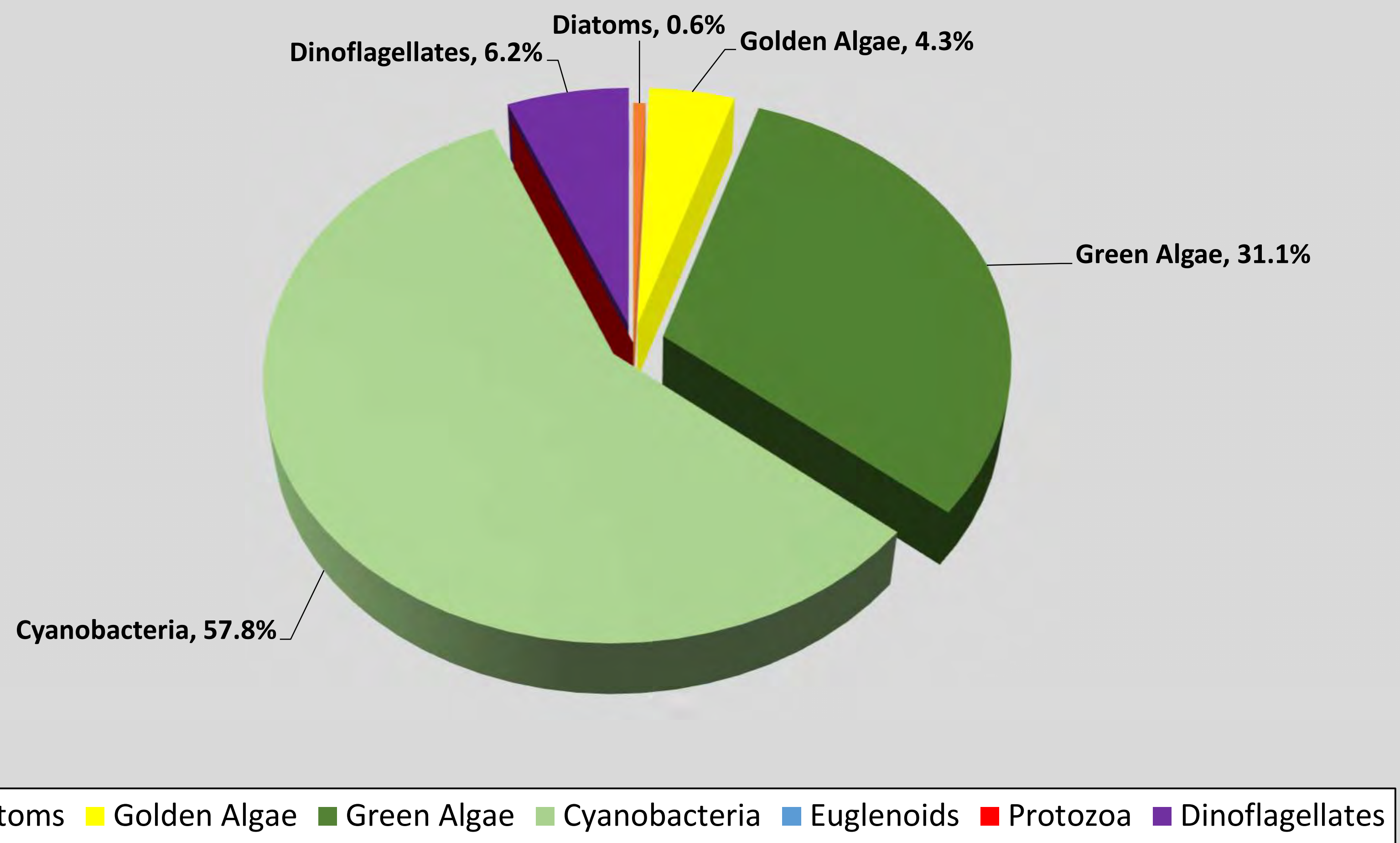
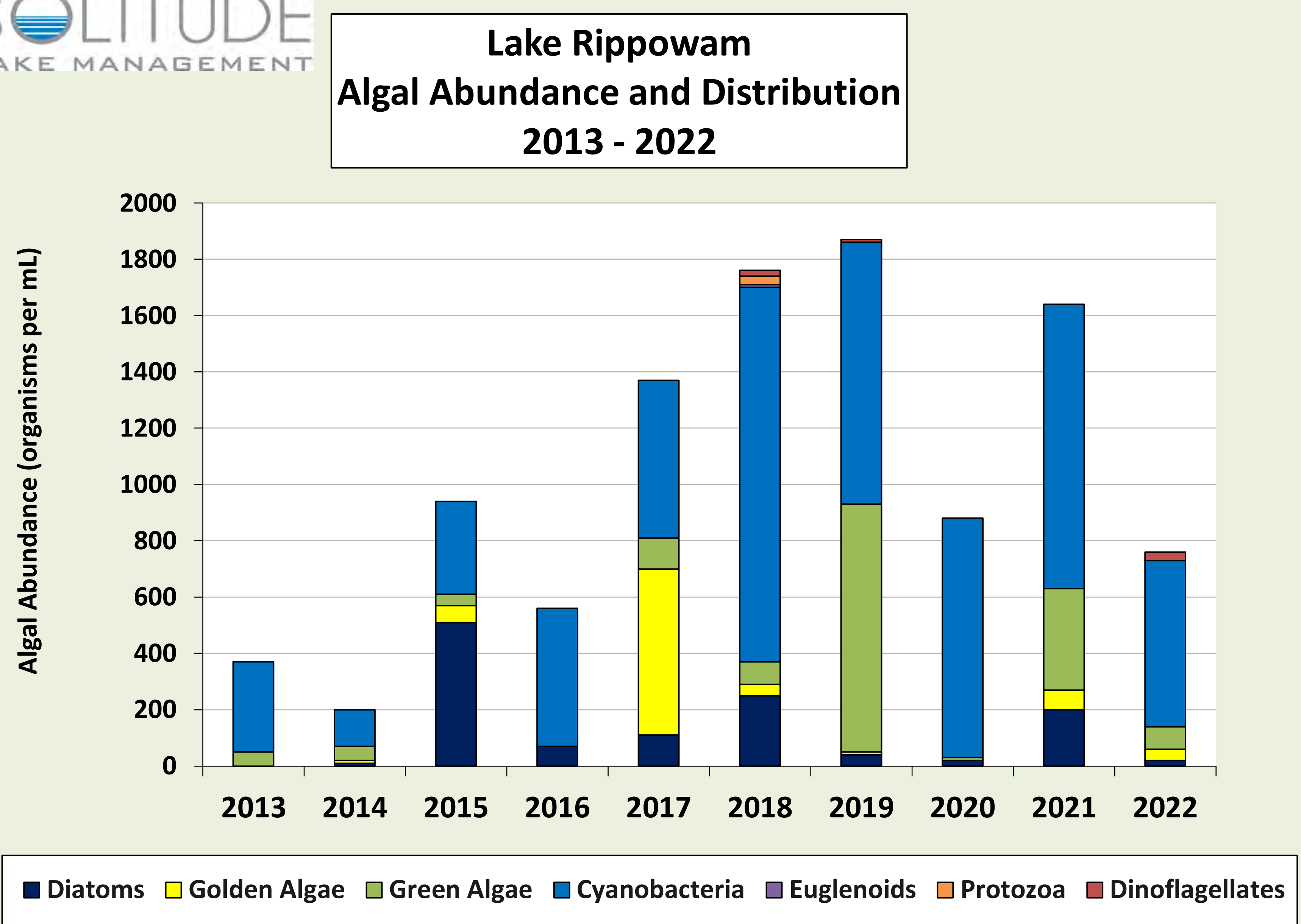
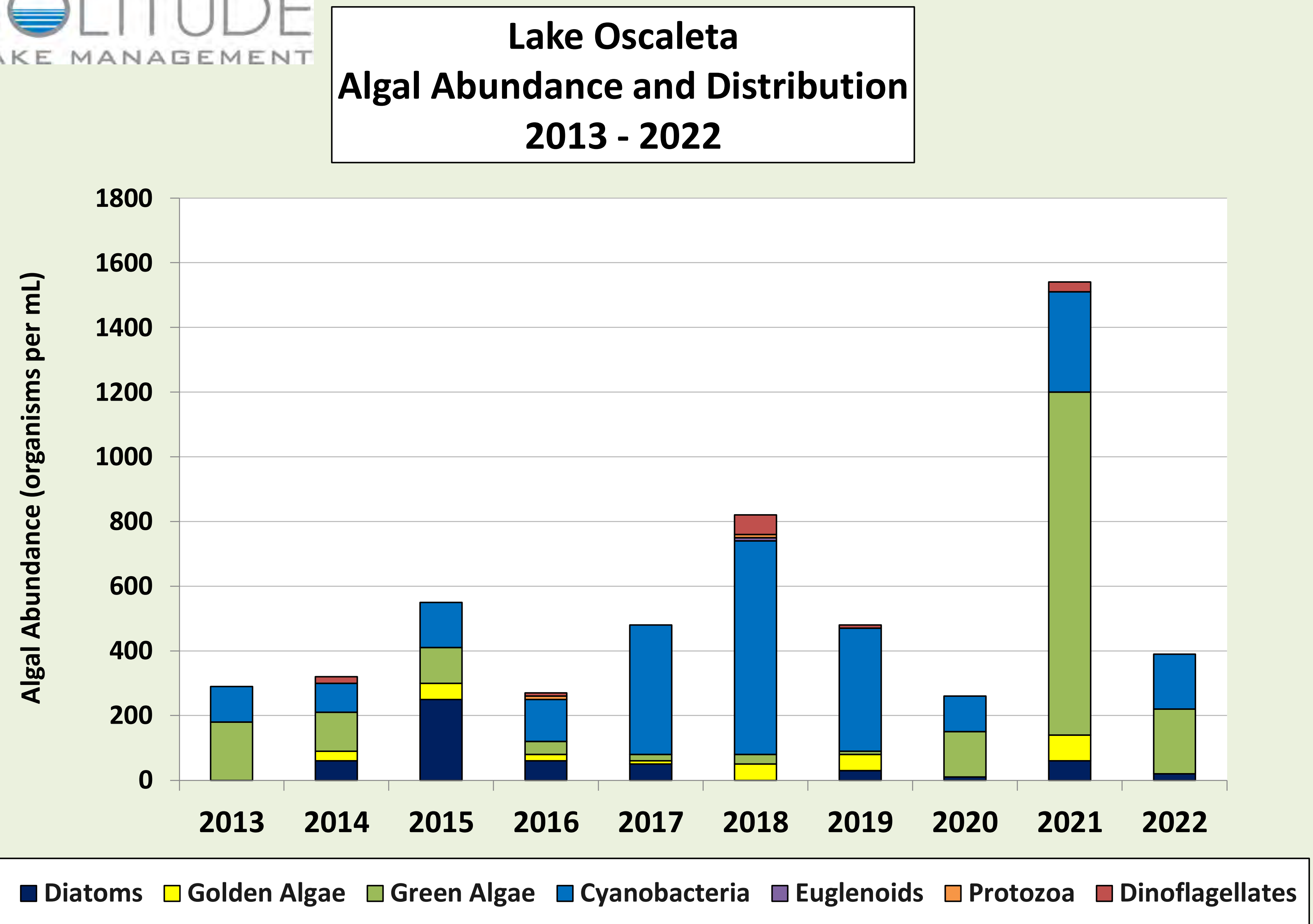
Lake Waccabuc Algal Distribution July 21, 2022





Lake Rippowam
Algal Abundance and Distribution
2013 - 2022
Algal Abundance (organisms per mL)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Protozoa
Dinoflagellates


Lake Oscaleta
Algal Abundance and Distribution
2013 - 2022
Algal Abundance (organisms per mL)
1800
1600
1400
1200
1000
800
600
400
200
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Diatoms
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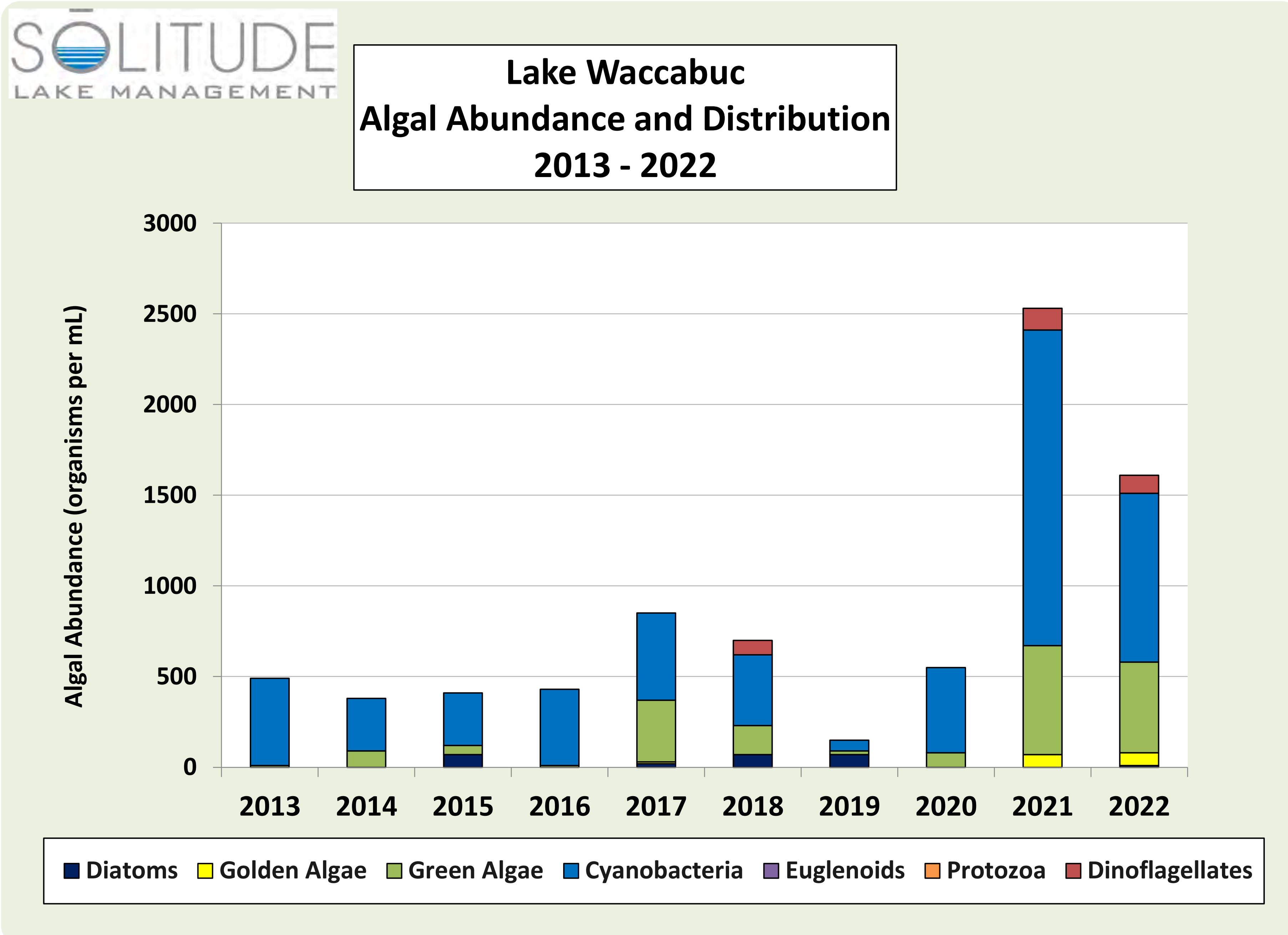
Protozoa
Dinoflagellates


SOLITUDE
LAKE MANAGEMENT
Lake Waccabuc
Algal Abundance and Distribution
2013 - 2022
Algal Abundance (organisms per mL)
3000
2500
2000
1500
1000
500
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Protozoa
Dinoflagellates

Three Lakes

SOLITUDE LAKE MANAGEMENT

Date:	7/21/2022
Sampled By:	Client (JA)

Lake Rippowam

Depth (Meters)	Temp. (ºC)	Dissolved Oxygen (mg/L)
0	28.40	9.42
1	28.10	9.33
1.5	27.90	9.74
2	27.3	10.38
3	25.3	12.02
4	20.5	2.84
5	15.4	0.19
5.5	14.4	0.15

Total Depth (m):	5.6
Secchi (m):	2.00

Lake Oscaleta

Depth (Meters)	Temp. (ºC)	Dissolved Oxygen (mg/L)
0	28.7	9.24
1	28.3	9.63
1.5	28.0	9.72
2	27.7	9.51
3	26.8	8.66
4	23.2	10.26
5	18.3	8.51
6	14.0	1.43
7	11.6	0.24
8	10.4	0.17
9	9.6	0.15
10	9.3	0.14
10.5	9.1	0.13

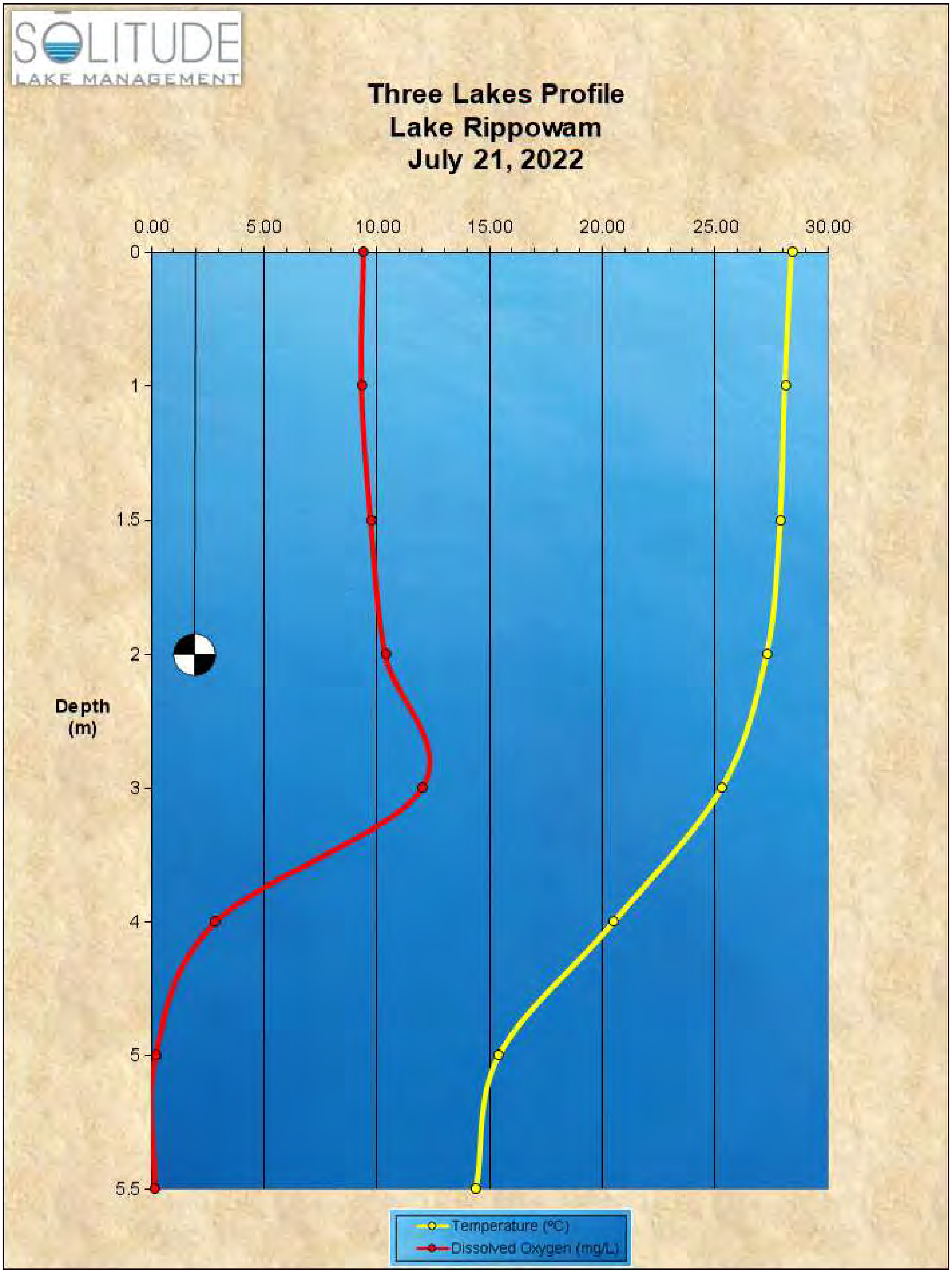
Total Depth (m):	10.8
Secchi (m):	2.56

Lake Waccabuc

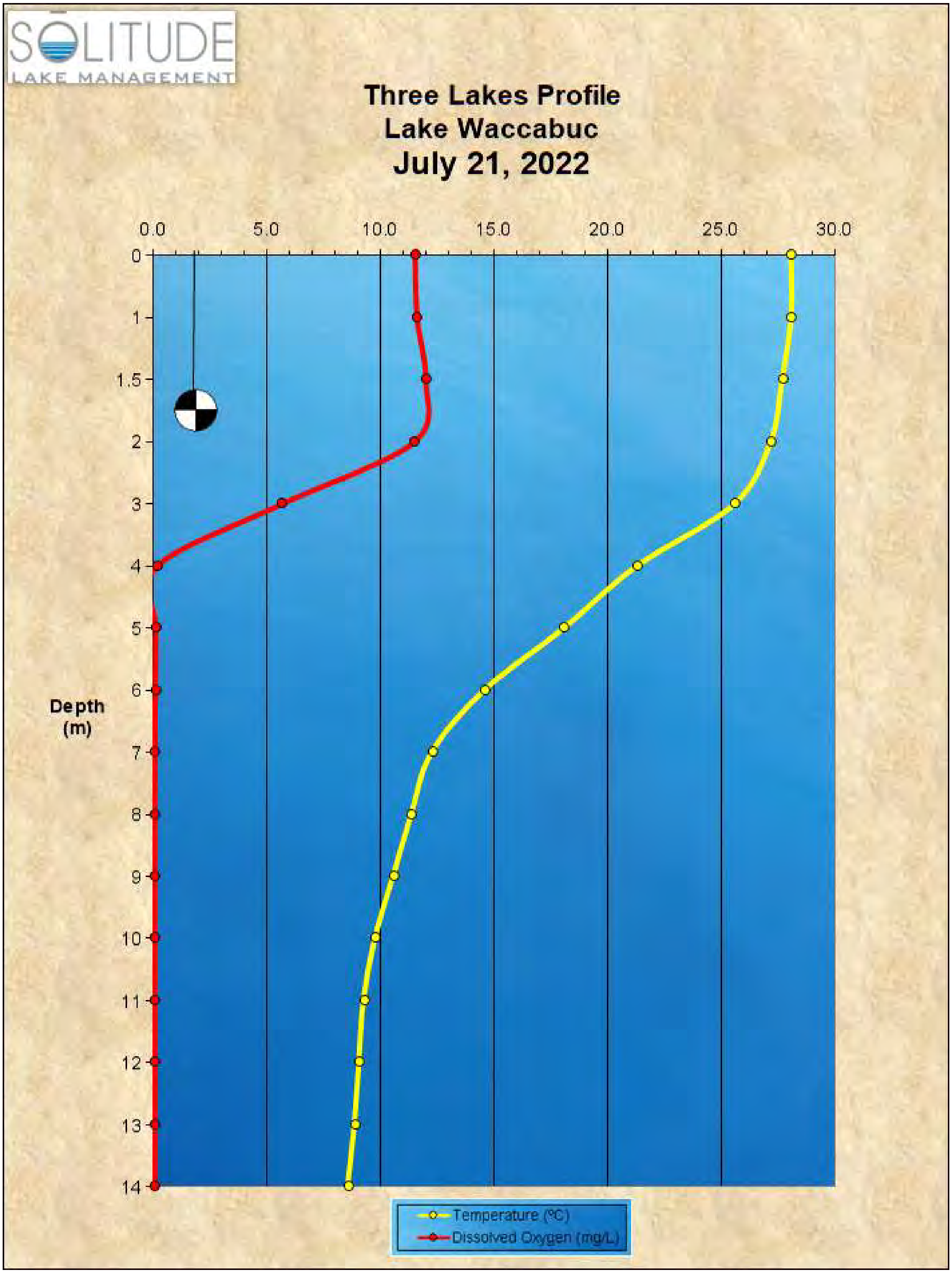
Depth (Meters)	Temp. (ºC)	Dissolved Oxygen (mg/L)
0	28.1	11.54
1	28.1	11.63
1.5	27.7	12.01
2	27.2	11.51
3	25.6	5.70
4	21.3	0.21
5	18.1	0.16
6	14.6	0.13
7	12.3	0.11
8	11.4	0.10
9	10.6	0.10
10	9.8	0.10
11	9.3	0.10
12	9.1	0.10
13	8.9	0.10
14	8.6	0.10

Total Depth (m):	14.0
Secchi (m):	1.56

Notes:


SOLITUDE
LAKE MANAGEMENT
Three Lakes Profile
Lake Rippowam
July 21, 2022
0.00
5.00
10.00
15.00
20.00
25.00
30.00
0
1
1.5
2
3
4
5
5.5
Depth
(m)
Temperature (ºC)
Dissolved Oxygen (mg/L)


SOLITUDE
LAKE MANAGEMENT
Three Lakes Profile
Lake Oscaleta
July 21, 2022
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
0
1
1.5
2
3
4
5
6
7
8
9
10
10.5
Depth (m)
Temperature (°C)
Dissolved Oxygen (mg/L)


SOLITUDE
LAKE MANAGEMENT
Three Lakes Profile
Lake Waccabuc
July 21, 2022
0.0
5.0
10.0
15.0
20.0
25.0
30.0
0
1
1.5
2
3
4
5
6
7
8
9
10
11
12
13
14
Depth
(m)
Temperature (ºC)
Dissolved Oxygen (mg/L)