Three Lakes Algal Monitoring

2024 Report

Lake Rippowam, Lake Oscaleta, & Lake Waccabuc

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Table of Contents

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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 2024. Phytoplankton and zooplankton samples for each of the three lakes were collected by the client on August 7th, 2024. A separate report will outline and discuss the zooplankton results of 2024. This is the 15th 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 August 7th, 2024, 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. To remain in compliance with the standards of the EPA and the World Health Organization, SŌLitude Lake Management has updated their algae analysis method to cells per milliliter.

Algal samples were collected at a depth of 1.5 meters at each station using clean 250 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 preparation. Before examination, 50 mL of each of the algae samples were transferred to clean conical centrifuge test tubes with five drops of Lugol's solution of iodine for preservation. The samples were then placed on a test tube rack and moved into the laboratory refrigerator at 4°C to begin the sedimentation process. Sedimentation was complete after being undisturbed for at least 24 hours. After sedimentation, a calibrated pipette was used to extract 115 µL from the bottom layer of the sample and transferred to a nanoplankton chamber slide (Palmer Maloney, or equivalent). Using a compound microscope with 100X magnification and appropriate taxonomic keys, all algal genera were identified and counted to the cell. The guidelines below, summarized by the Environmental Protection Agency, are used to determine algal density results, and advise on any potentially harmful algal blooms.

WHO's Guidelines for Safe Practice in Managing Recreational Waters*

Guidance level or situation	How guidance level derived	Health risks	Typical actions
Relatively low probability of adverse health effects 20 000 cyanobacterial cells/ml *or* 10 ug chlorophyll-a/litre with dominance of cyanobacteria	From human bathing epidemiological study	Short-term adverse health outcomes, e.g., skin irritations, gastrointestinal illness	Post on-site risk advisory signs Inform relevant authorities
Moderate probability of adverse health effects 100 000 cyanobacterial cells/ml *or* 50 ug chlorophyll-a/litre with dominance, of cyanobacteria	From provisional drinking-water guideline value for microcystin-LR and data concerning other cyanotoxins	Potential for long-term illness with some cyanobacterial species health outcomes, e.g., skin irritations, gastrointestinal illness	Watch for scums or conditions conducive to scums and further investigate hazard Post on-site risk advisory signs Inform relevant authorities
High probability of adverse health effects Cyanobacterial scum formation in areas where whole-body contact and/or risk of ingestion/aspiration occur.	Inference from oral animal lethal poisoning. Actual human illness case histories	Potential for acute poisoning Potential for long-term illness with cyanobacterial species Short-term adverse activities health outcomes, e.g., skin irritations, gastrointestinal illness	Immediate action to control contact with scums; possible prohibition of swimming and other water contact activities Public health follow-up investigation Inform public and relevant authorities

*Summarized by EPA from World Health Organization. 2003. Guidelines for safe recreational water environments. Volume 1, Coastal and fresh waters.

Figure 1. World Health Organization's Guidelines for Cyanobacteria in Recreational Waters

2024 Algal Results

Cyanobacteria were present in all three lakes; however cyanobacteria were not the most dominant algae in any of the basins. This is a positive change from last year, as cyanobacteria dominated Lake Waccabuc and Lake Rippowam. The dominance of green algae in all three lakes in 2024 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: 2024 Algal Totals and Percent Distribution						
Functional Group	**Lake Rippowam**		**Lake Oscaleta**		**Lake Waccabuc**	
	Cells/mL	%	Cells/mL	%	Cells/mL	%
Diatoms	351	1.0%	701	4.9%	-	-
Golden Algae	-	-	438	3.0%	-	-
Green Algae	20,421	61.8%	12,008	84.5%	3,506	90.8%
Cyanobacteria (Blue-Green Algae)	12,182	36.8%	526	3.7%	88	2.2%
Euglenoids	88	0.2%	263	1.8%	263	6.8%
Dinoflagellates	-	-	263	1.8%	-	-
Total Cells/mL	**33,042**	**100%**	**14,199**	**100%**	**3,857**	**100%**

Lake Rippowam

In 2024, the algal distribution at Lake Rippowam was the second most diverse out of the three lakes (Table 1). There were eight (8) different genera observed at Lake Rippowam including: *Stephanodiscus, Cosmarium, Coelastrum, Closterium, Gloeocystis, Scenedesmus, Microcystis,* and *Trachelomonas*. The genera were spread out over four functional groups: diatoms, euglenoids, green algae, and cyanobacteria. Algal density was considered moderate at 33,042 cells per milliliter and was the highest overall abundance of the three lakes. The two functional groups that were not represented in this year's assemblages were golden algae and dinoflagellates. The most abundant functional group of algae observed was green algae (61.8%), which was dominated by *Gloeocystis* at 11,130 cells/mL (Figure 2). Although green algae were the dominant group represented, nuisance cyanobacteria accounted for 36.8% (or 12,182 cells/mL) of the total assemblage in 2024. The third most abundant group was diatoms at 1.0% (or 351 cells/mL). Low amounts of euglenoids rounded out the assemblage at this site in early August.

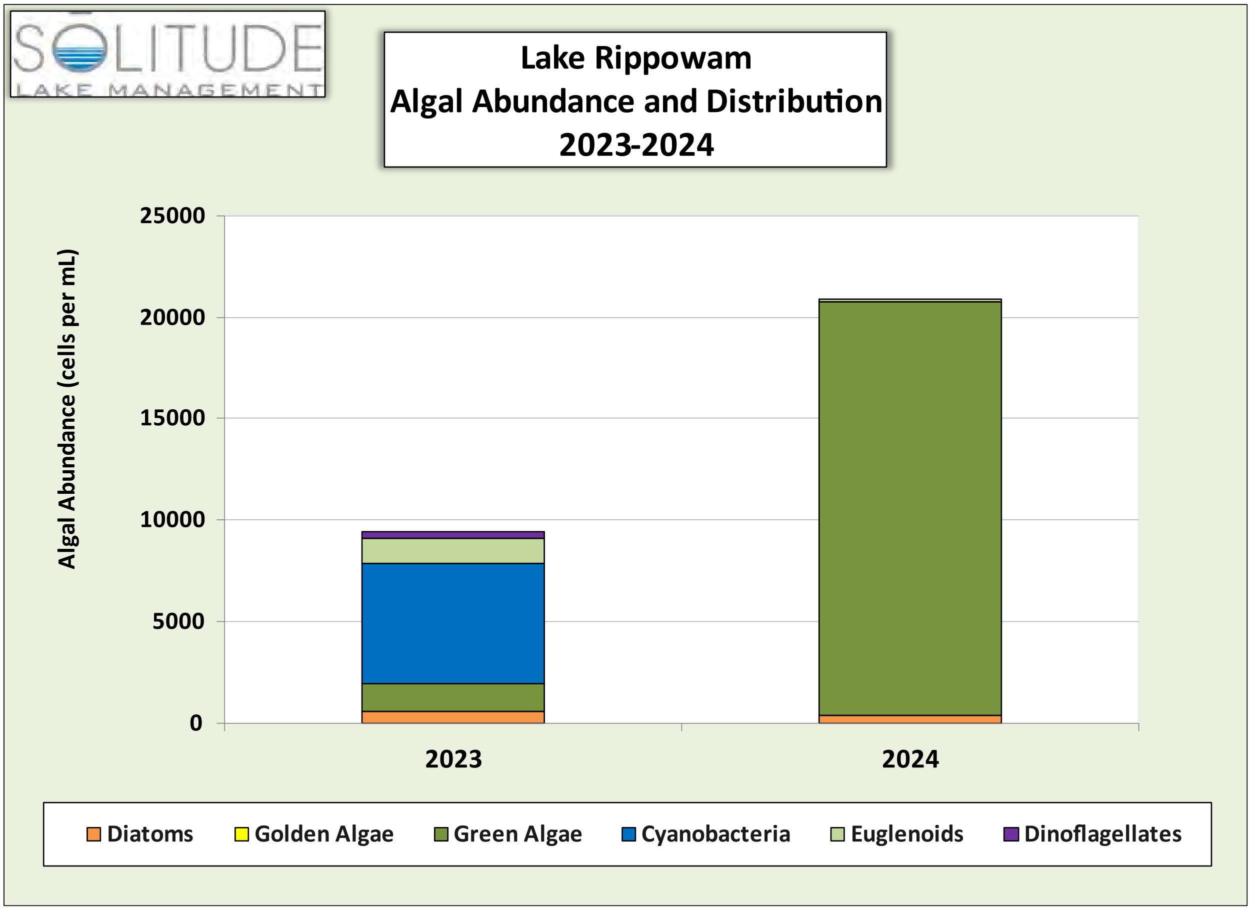

Figure 2. Lake Rippowam Algal Abundance and Distribution (cells/mL), 2023-2024

At Lake Rippowam, algal abundance and distribution has varied greatly over the years but remains moderate to high on average (Figure 3). 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.

From 2023 to 2024, algal abundance increased significantly (+251.77%) at Lake Rippowam. The population changed dramatically as well. The samples from 2023 reported cyanobacteria as the dominant functional group while 2024 reported green algae. Population dynamics can change due to a variety of reasons, such as rainfall amount or temperature fluctuations. However, mid-August through September is typically when cyanobacteria grow the most in the Mid-Atlantic.

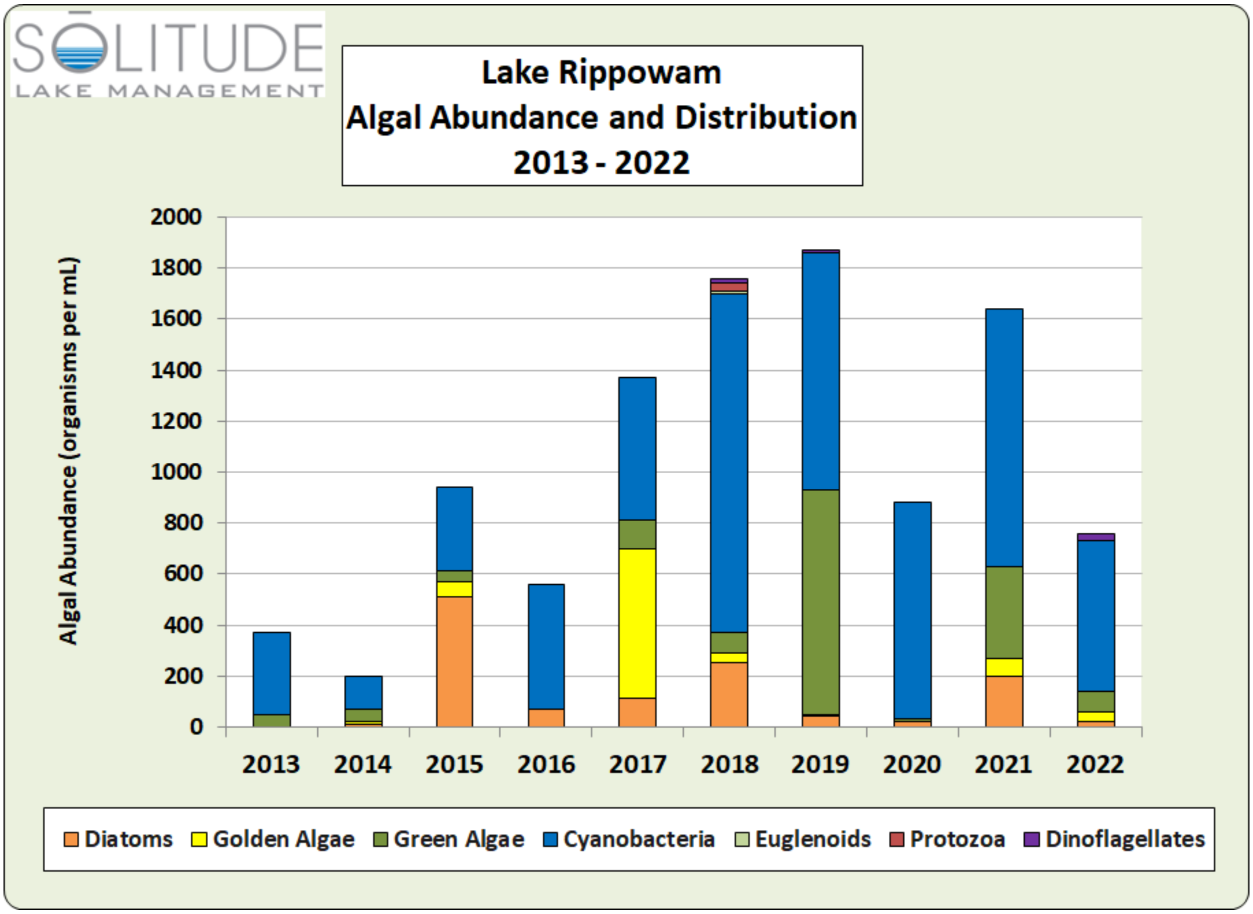

Figure 3. Lake Rippowam Algal Abundance and Distribution (orgs./mL), 2013 - 2022

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.

The average water clarity measured at Lake Rippowam in 2024 was 2.8 meters which is a slight increase from secchi readings in 2023. The water clarity at Lake Rippowam was the highest of the three lakes sampled on this date. At the time of sampling, water clarity at Lake Rippowam was considered to be fair and suitable for early August water quality.

Lake Oscaleta

In 2024, the overall algal abundance at Lake Oscaleta was considered low with a total of 14,199 cells/mL (Figure 4). Algal diversity was high as 11 different genera were recorded from six different functional groups. All the functional groups were documented in the sample. The functional group with the highest abundance was green algae, consisting of 84.5% of the assemblage. Most green algae were represented by *Gloeocystis* at 9,816 cells/mL. Diatoms were the second most abundant functional group observed, present at 701 cells/mL (or 4.9%). At the time of sampling, cyanobacteria only accounted for 3.7% (or 526 cells/mL) of the assemblage. Euglenoids and golden algae are both the least observed functional group at Lake Oscaleta, which was only documented at 263 cells/mL (or 1.8%).

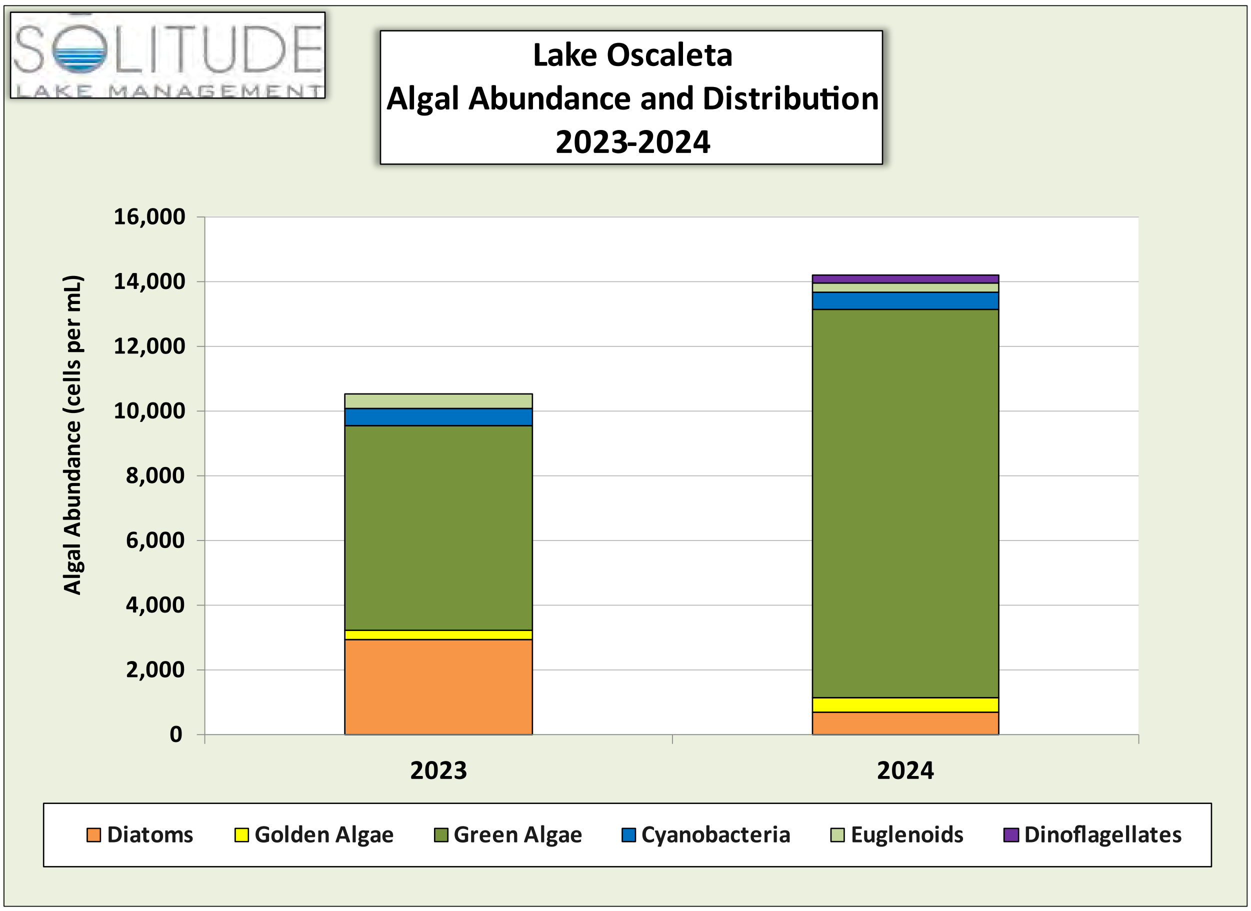

Figure 4. Lake Oscaleta Algal Abundance and Distribution (cells/mL), 2023-2024

Between 2023 and 2024, algal abundance increased by 35.02% at Lake Oscaleta. The population dynamics changed only slightly with green algae remaining as the most dominant functional group and diatoms as the second. This is a positive trend that was first reported in 2021. Diatoms and green algae are beneficial functional groups that support zooplankton populations that feed spawning fish.

Water clarity at Lake Oscaleta was measured at 2.85 meters, which is considered fair for early

August. Typically, in mid-summer, algal densities are the highest of the growing season, which can negatively impact water clarity.

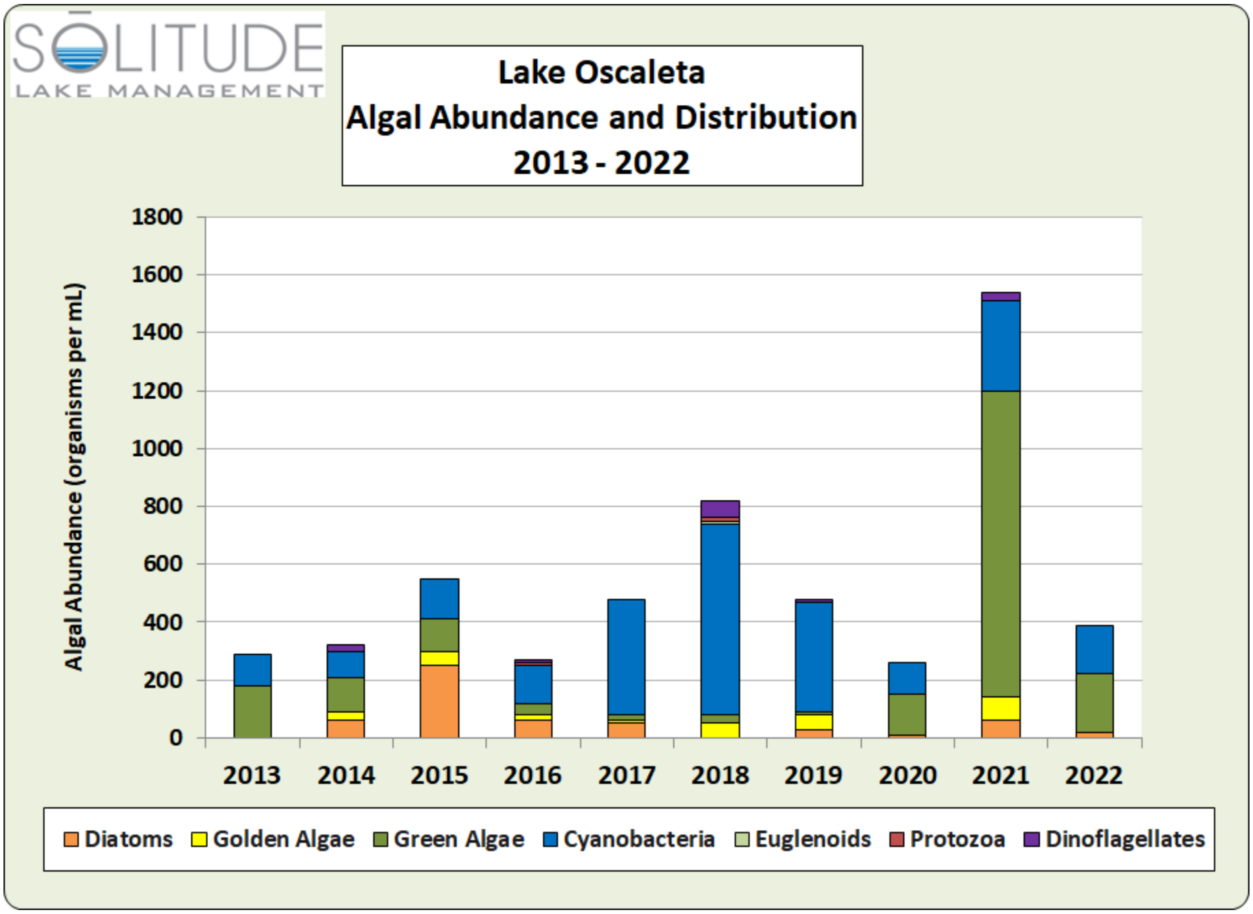

Figure 5. Lake Oscaleta Algal Abundance and Distribution (orgs./mL), 2013-2022

At Lake Oscaleta, overall algal abundance fluctuated from 2013 to 2022 (Figure 5) 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 basins 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. In 2024, a clear decrease in cyanobacteria was observed. 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 lowest algal density in 2024 at 3,857 cells/mL. Three different functional groups were observed including: euglenoids, green algae, and cyanobacteria. Overall, sample diversity was low at five (5) different genera observed. The most abundant functional group was green algae which accounted for 90.8% (or 3,506 cells/mL) of the total assemblage. Lake Waccabuc had the lowest abundance of cyanobacteria out of the three basins. The nuisance functional group only accounted for 2.2% (or 88 cells/mL) of the Lake Waccabuc algal assemblage with *Dolichospermum* as the only reported genus. Euglenoids accounted for 6.8% (or 263 cells/mL) of the assemblage.

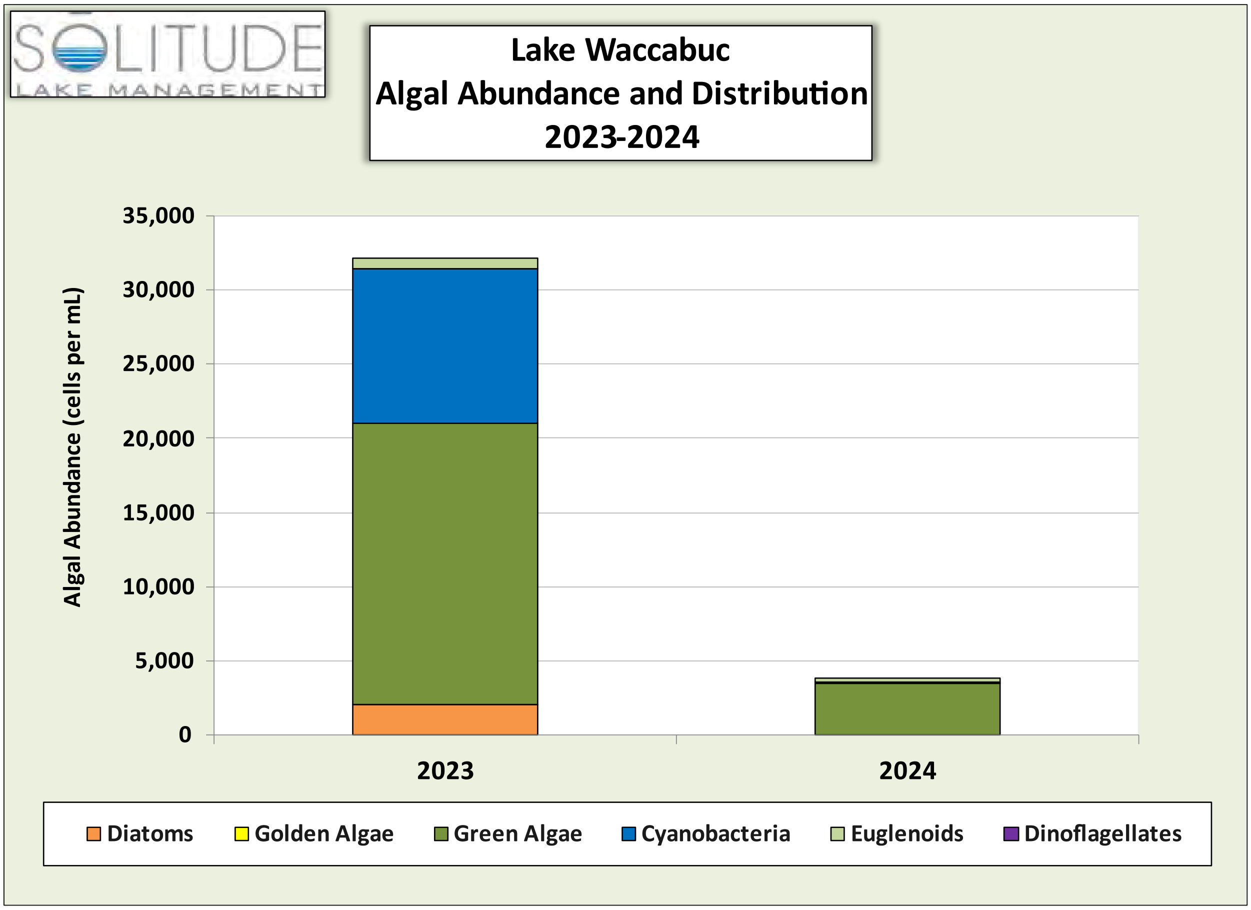

Figure 6. Lake Waccabuc Algal Abundance and Distribution (cells/mL), 2023-2024

From 2023 to 2024, algal abundance decreased significantly by 87.99% at Lake Waccabuc. However, the population continues to be dominated by green algae. Cyanobacteria decreased significantly in abundance as well which is a positive result for the basin. The increase in green algae populations started around 2021 but the dominance did not change until 2023. Even though the units of measurement have changed recently, the patterns of the algal populations overall can still be analyzed.

Water clarity at Lake Waccabuc was measured at 2.65 meters and is considered fair at the time of sampling. This is likely due to the low algal density that was present at Lake Waccabuc in early August. Late July through August is typically the time of year for peak photosynthetic production.

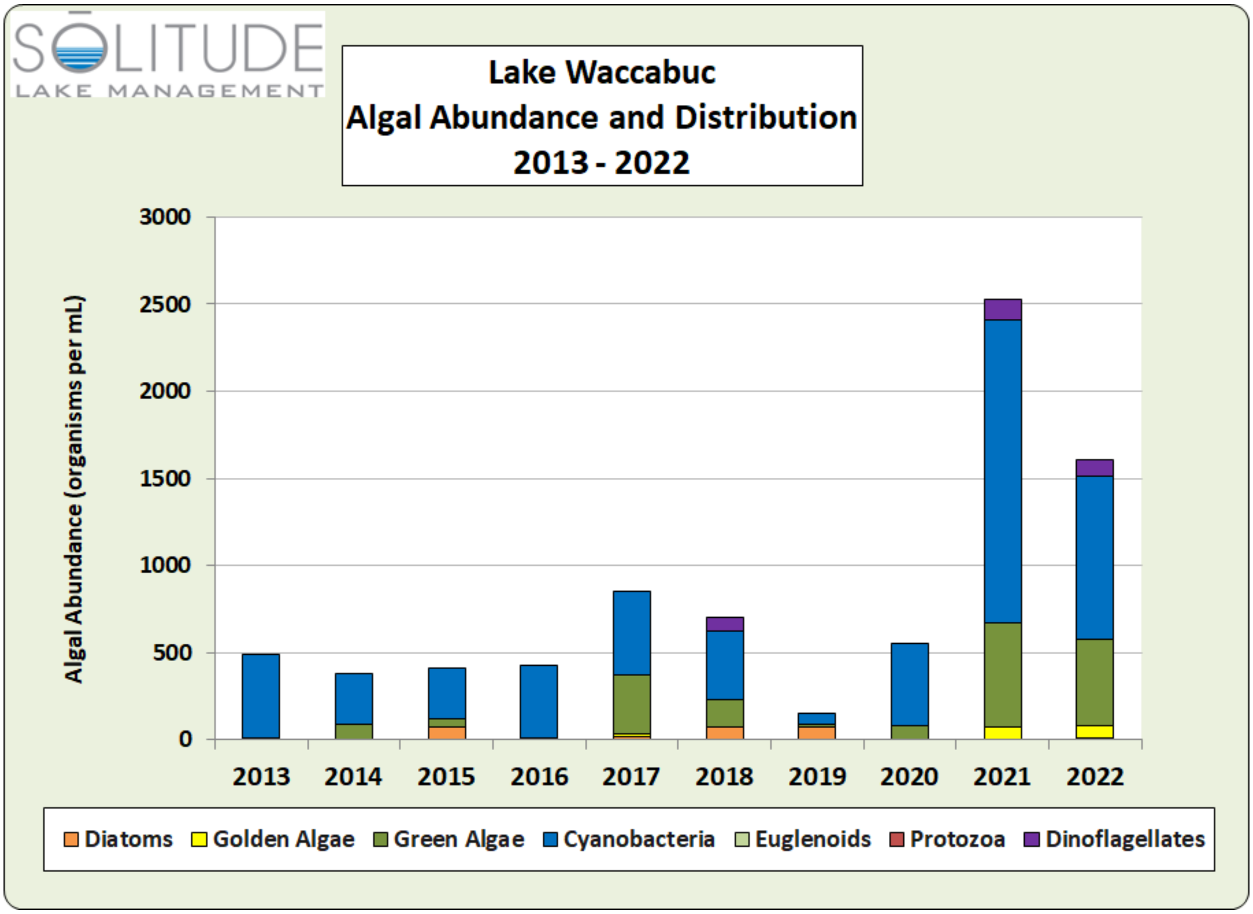

Figure 7. Lake Waccabuc Algal Abundance and Distribution (orgs./mL), 2013-2022

Based on the historical data (Figure 7), Lake Waccabuc contains the most consistent cyanobacteria population over the past decade. 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 basins 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: 2024 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	26.0	7.94	26.0	8.52	26.4	8.04
1	26.4	7.83	26.3	8.44	26.6	7.95
1.5	26.5	7.77	26.4	8.41	26.8	7.93
2	26.5	7.80	26.5	8.38	26.9	7.90
3	26.5	7.33	26.6	8.33	26.9	7.95
4	22.9	2.23	23.3	9.47	24.7	3.42
5	17.4	0.19	19.6	5.65	20.6	0.62
5.5	15.4	0.15	-	-	-	-
6			14.9	0.18	15.5	0.17
7			12.0	0.15	12.5	0.12
8			10.6	0.13	10.9	0.11
9			9.6	0.12	9.7	0.10
10			9.1	0.12	8.9	0.10
10.5			8.9	0.12	-	-
11					8.6	0.10
12					8.1	0.10
13					8.0	0.10
14					7.9	0.10

In 2024, temperature and dissolved oxygen profiles were measured at each lake station by the client and the data was provided to SLM for a summary. Data was collected at one-meter intervals with some extra measurements at half-meter marks based on the depth measurements of each basin. 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 at a normal range until reaching a depth of three 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 one-meter mark (7.94 mg/L). From the four-meteto the bottom of the basin, dissolved oxygen was effectively anoxic which is a concern for aquatic biota.

At Lake Oscaleta, dissolved oxygen levels were average from the surface with a slight decrease at the three-meter mark and had a slight increase at the four-meter depth (9.47 mg/L). Dissolved oxygen readings continued to decrease at the five-meter depth (5.65 mg/L) becoming anoxic at the six-meter mark. The anoxic conditions continued down through the water column to the bottom of the lake. Readings dropped as low as 0.12 mg/L which can cause stress to the aquatic biota within the basin.

At Lake Waccabuc this year, dissolved oxygen was average from the surface through the three-meter mark. By the four-meter depth, a significant decrease in dissolved oxygen was recorded with an anoxic reading of 3.42 mg/L. These anoxic conditions continued down the water column to the lake bottom.

Conclusion

Summary

Algal abundance and composition varied throughout the Three Lakes in 2024. At Lake Rippowam, we observed the highest overall algal abundance that supported the highest levels of cyanobacteria. However, green algae were the dominant functional group. At Lake Oscaleta, we observed the second highest overall algal abundance that was dominated by green algae. The assemblage showed the most favorable composition across all three lakes in 2024. At Lake Waccabuc, we observed the lowest algal abundance out of all three basins in 2024. However, green algae are now dominating the lake this year with low abundance in cyanobacteria and euglenoids.

Recommendations

It is recommended that the Three Lakes Council continues their historical monitoring program. It is strongly recommended that stakeholders invest in a more robust monitoring program including increased sampling frequency and water quality parameters. The data collected can be used to better inform the surrounding community of 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 (such as total phosphorus and nitrogen) would address root causes of the issue.

The Three Lakes Council has now compiled over a decade of algal data for Lake Rippowam, Lake Oscaleta, and Lake Waccabuc. Monitoring the health of a lake ecosystem requires sampling a diverse array of biological 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 Three Lakes Council to continue monitoring zooplankton and algae in the 2025 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 2024 does provide value. Therefore, at least a single sample event should be collected in mid-July of 2025, to coincide with the SAV surveys and historical data.

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 2025 lake management season.

Sincerely,

Vicky Thiel

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Appendix

Algae Primer
2024 Algae Examination Data and Pie Charts
2024 Algae Abundance and Distribution Graphs
Three Lakes Temperature and Dissolved Oxygen Profile Data and Graphs

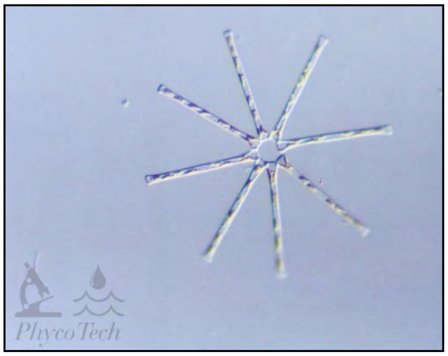
Algal Primer

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.

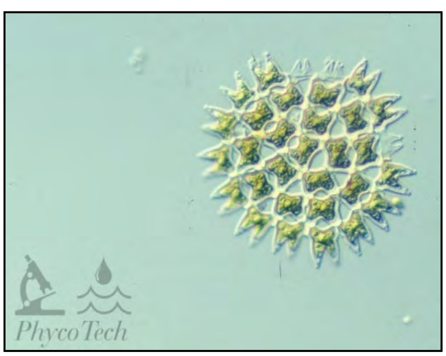
Filamentous algae are typically microscopic but can be visible to the naked eye if enough biomass accumulates. Filaments are generally composed of long chains of cells encompassed in a mucilaginous sheath or matrix that protects against cell desiccation and penetration. Growth is often associated with attachment to a substratum, typically the lake bottom or submersed and 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 swimming 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.

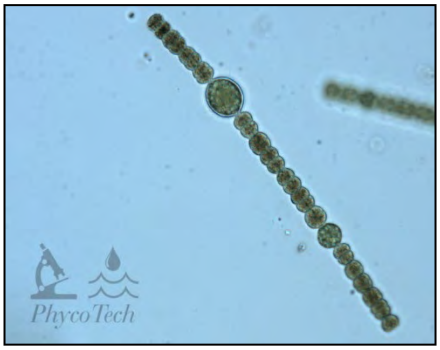


Diatoms are ubiquitous as a functional group and often possess a rigid silica shell with ornate cell wall markings or etchings. Living cells often grow on or in association with benthic substrate, floating debris, or macrophytes. Under ideal conditions, cells can become stratified. When cells die, their 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).

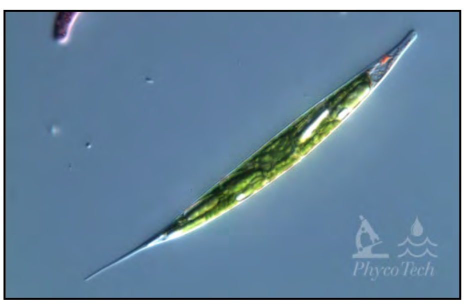
Golden Algae are typically yellow or light brown in color. Cell size is usually small oval shaped with a partially empty area, but several genera can be colonial or even filamentous. Most have two specialized flagella, and some type of scales or a rigid coating that grants it a fuzzy appearance. They 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.*



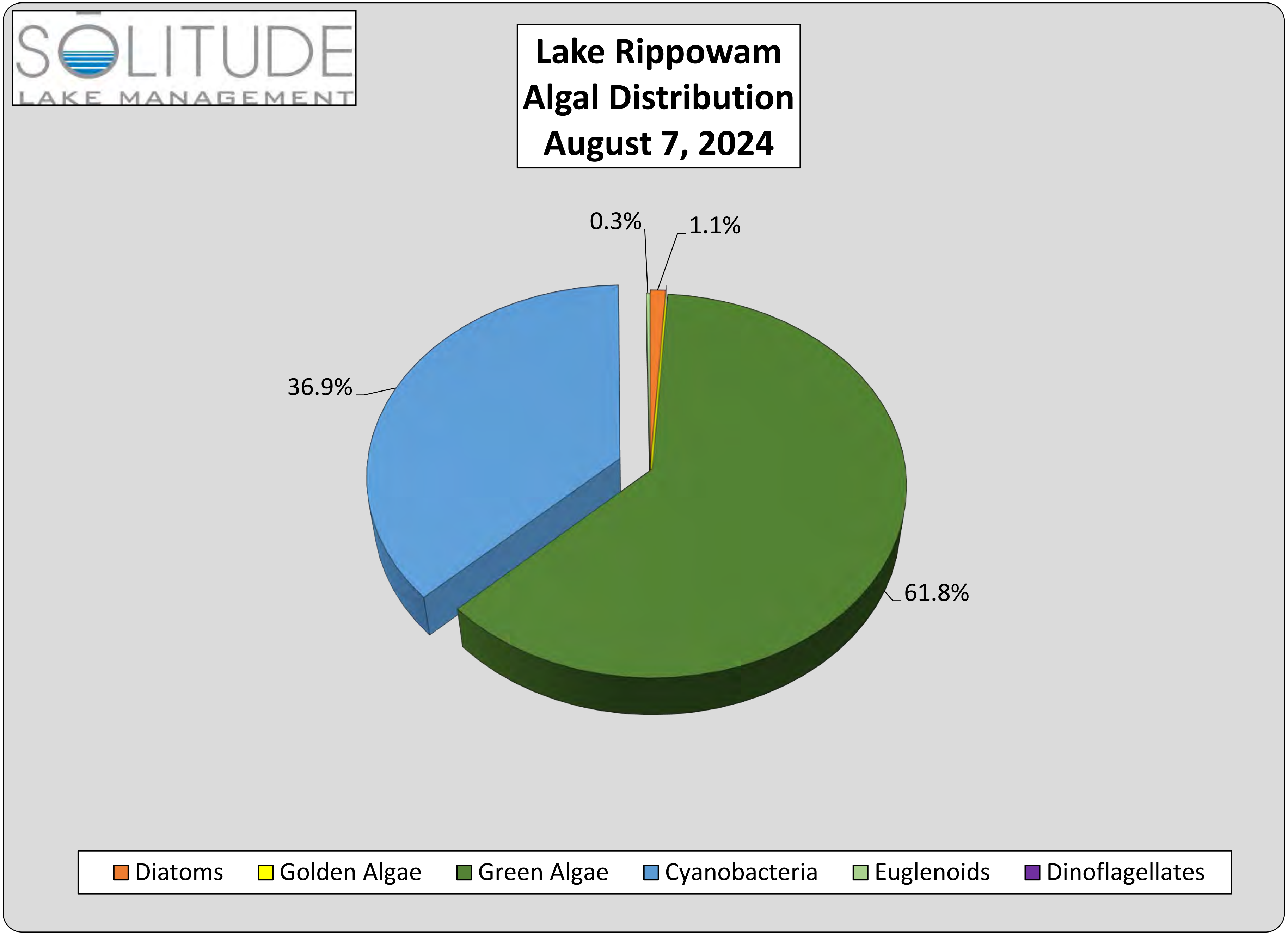
Euglenoids are single-celled eukaryotes typically with a primitive eyespot and flagellum or flagella. They are generally green, but some species are red or colorless. Euglenoids are often associated with quiescent, eutrophic waters containing high concentrations of organic matter. Common euglenoids that 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*.

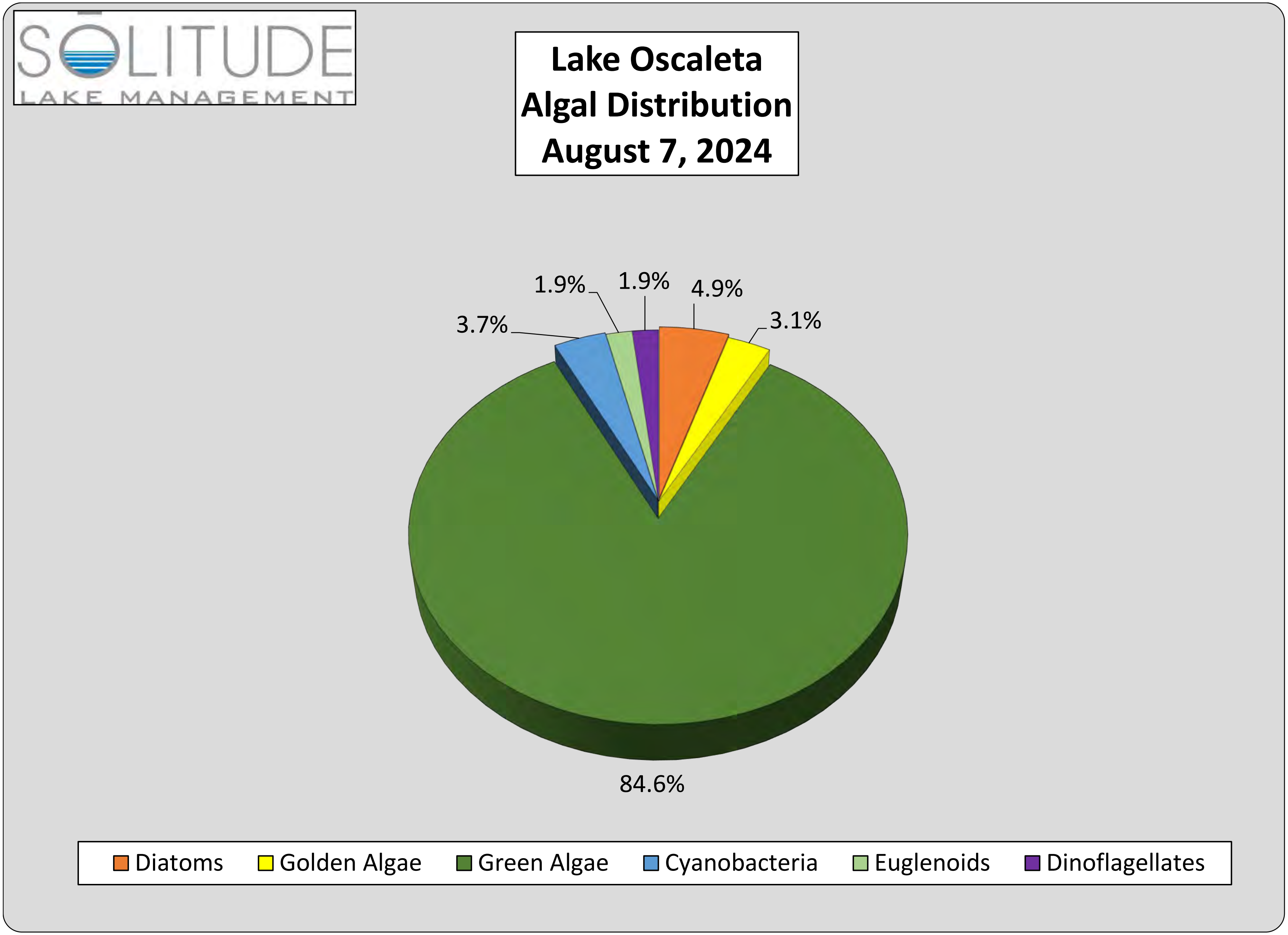
Site W: Lake Waccabuc			Site R: Lake Rippowam			Site O: Lake Oscaleta					
Diatoms	**W**	**R**	**O**	**Green Algae**	**W**	**R**	**O**	**Cyanobacteria**	**W**	**R**	**O**
Fragilaria			175	*Cosmarium*	1,402	1,753	1,578	*Dolichospermum*	88		438
Stephanodiscus		351	526	*Coelastrum*		6,398		*Aphanizomenon*			88
				Closterium		88	263	*Microcystis*		12,182	
				Gloeocystis	1,578	11,130	9,816				
				Scenedesmus	526	1,052	351				
Golden Algae	**W**	**R**	**O**								
Mallomonas			438					**Results**			
								Site	**W**	**R**	**O**
				Euglenoids	**W**	**R**	**O**	**Total Genera**	5	8	11
				Euglena	263			**Secchi Average (m)**	2.65	2.8	2.85
Dinoflagellates	**W**	**R**	**O**	*Trachelomonas*		88	263	**Cells/mL**	3,857	33,042	14,199
Ceratium			263								

Collection Date: 7 August 2024 **Examination Date: 12 August 2024**

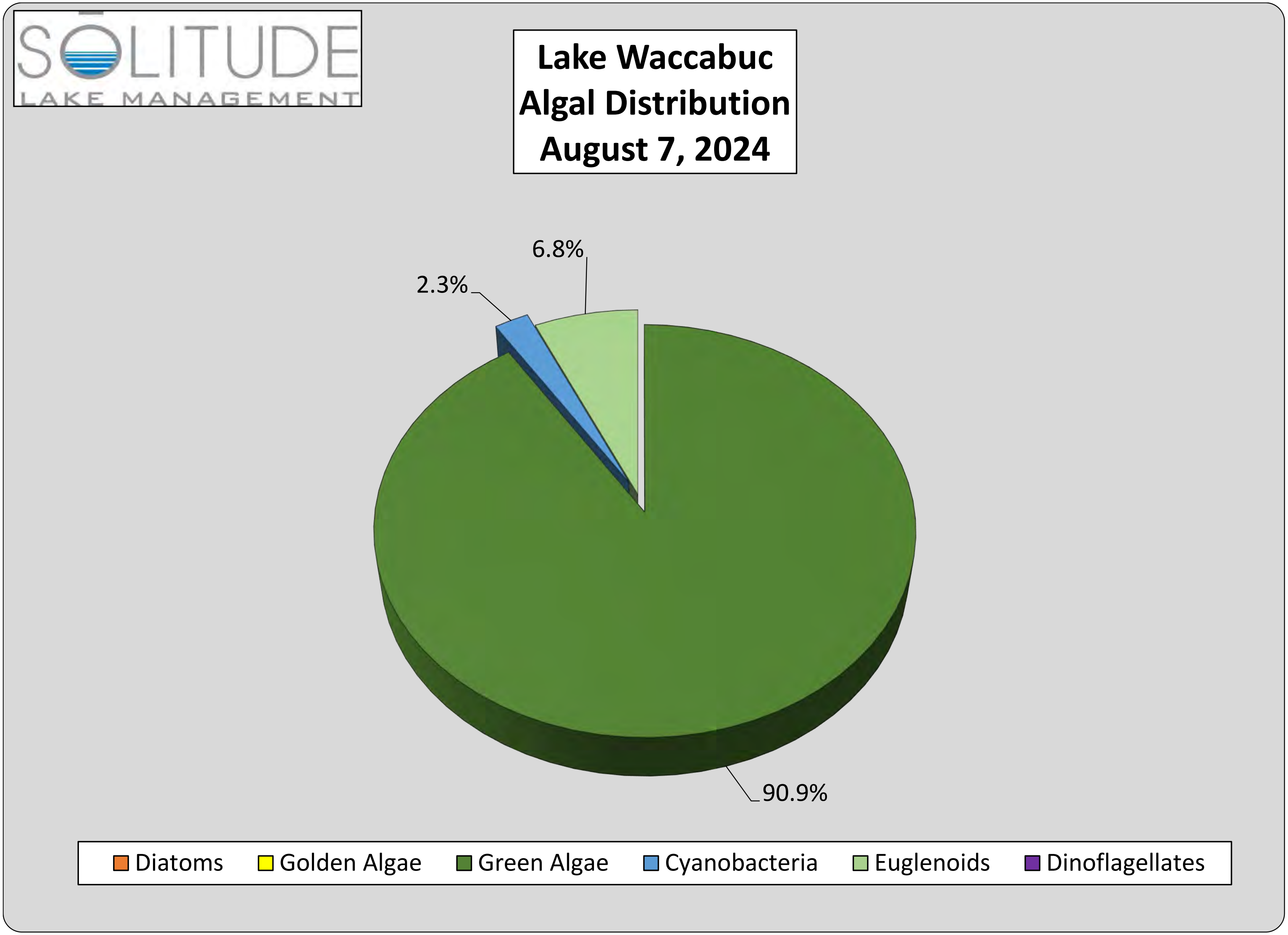
Samples were preserved with Lugol's Iodine upon returning to the SŌLitude Lake Management office in Washington, NJ. This was the first and only sampling event of the 2024 season. Algal diversity is considered to be low at Lake Waccabuc at five (5) observed genera. At Lake Rippowam, algal diversity is considered moderate at eight (8) observed genera. Algal diversity at Lake Oscaleta is considered high at 11 total genera. At Lake Waccabuc, algal density is considered low at 3,857 cells/mL recorded. Algal density at Lake Rippowam is moderate at 33,042 cells/mL recorded. At Lake Oscaleta, algal density is considered low at 14,199 cells/mL documented. The assemblage at all three lakes is dominated by green algae, specifically *Gloeocystis*. A mix of diatoms, golden algae, dinoflagellates, euglenoids, and cyanobacteria were also documented. The average water clarity is considered good at Lake Waccabuc while Lakes Rippowam and Oscaleta is excellent.

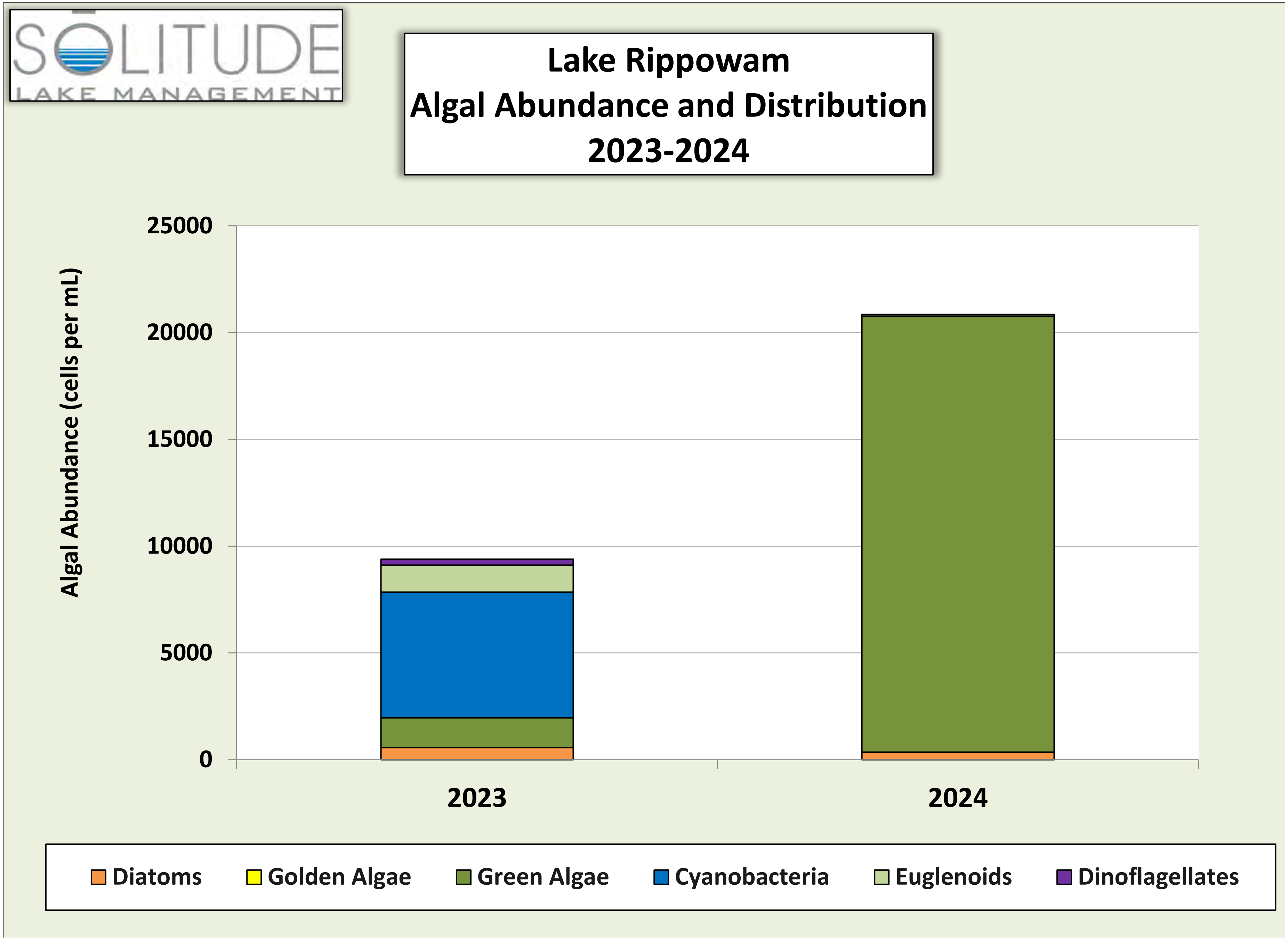


Lake Rippowam
Algal Distribution
August 7, 2024
0.3%
1.1%
36.9%
61.8%
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Dinoflagellates

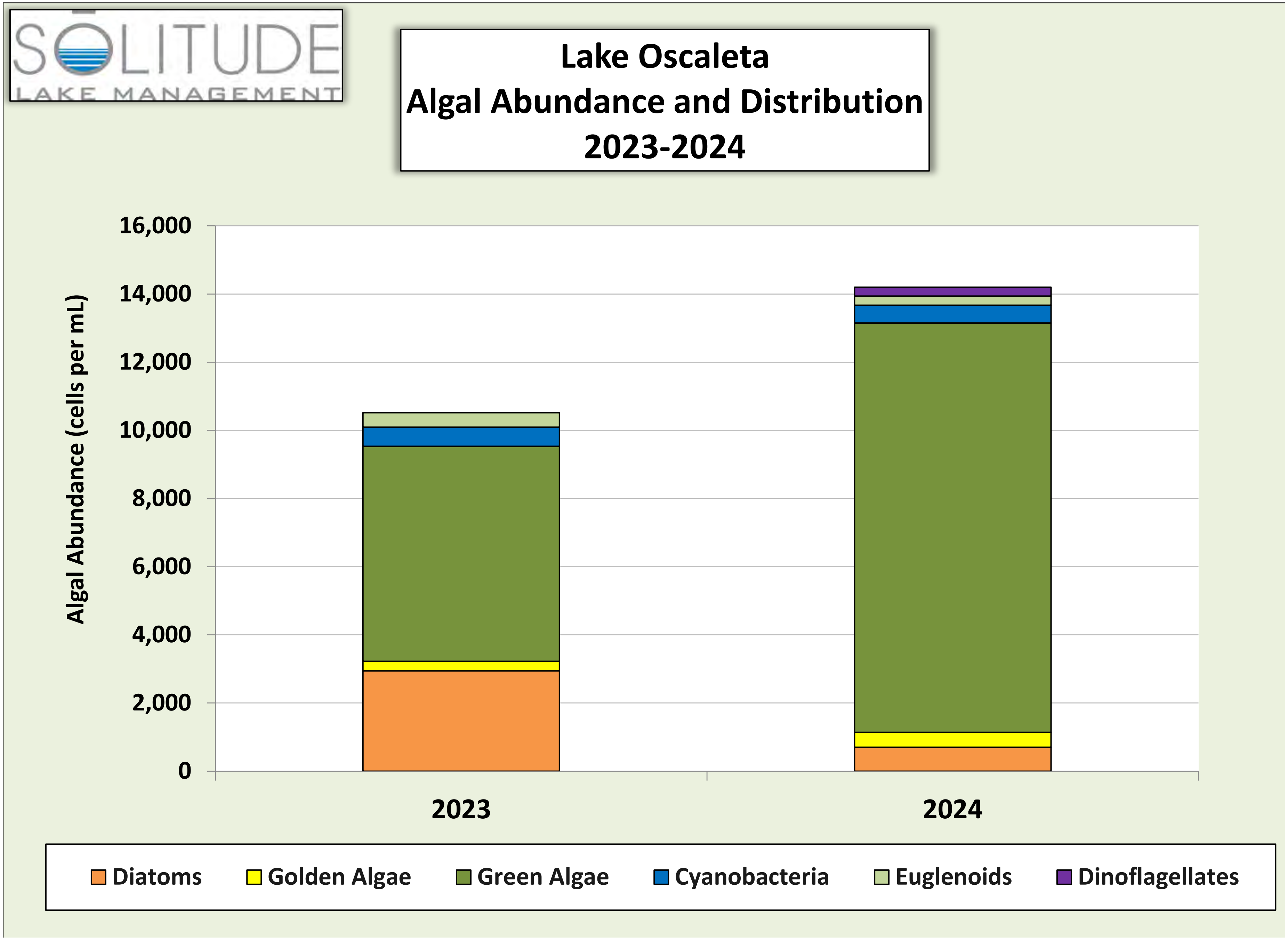


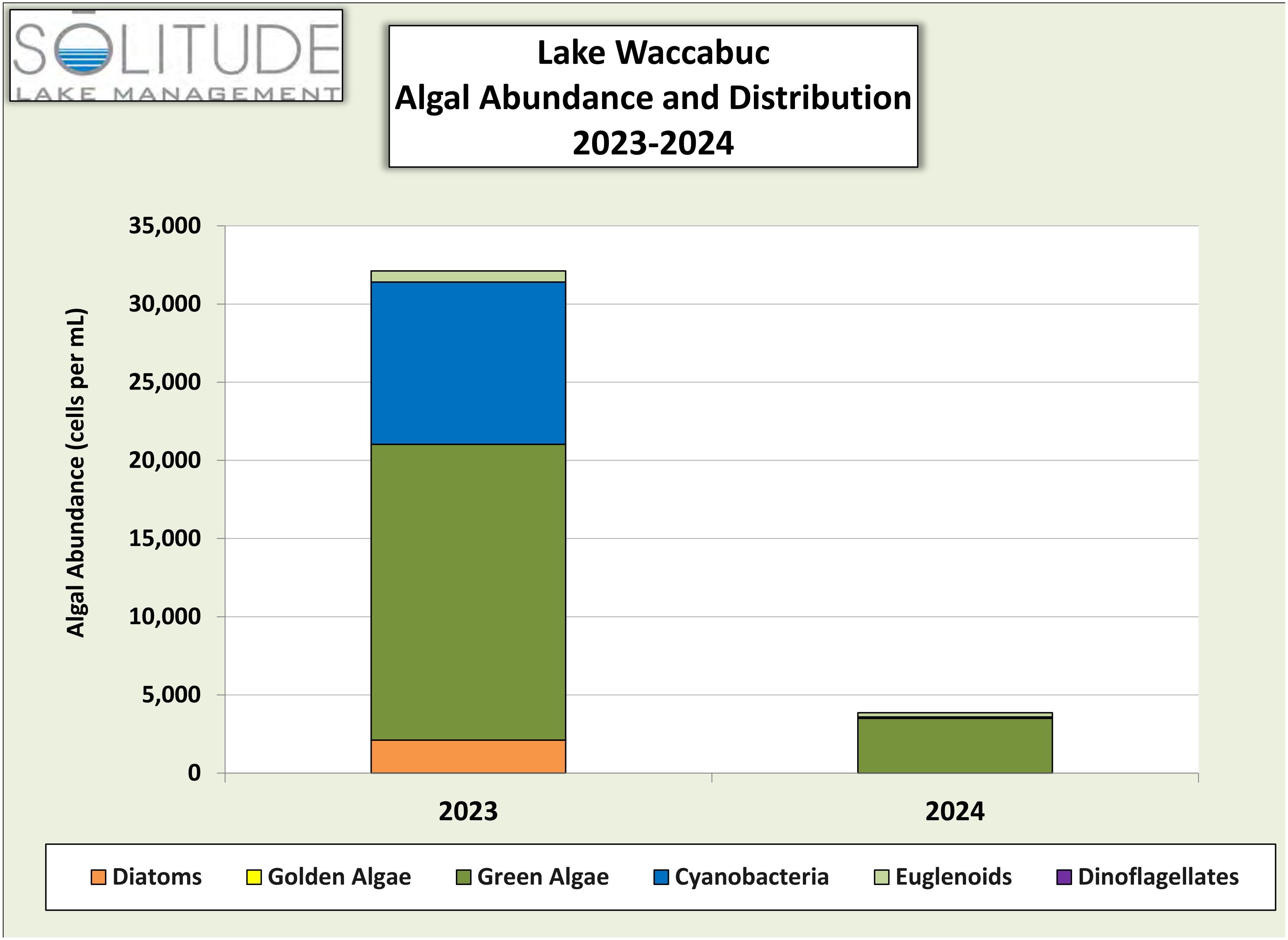
Lake Oscaleta
Algal Distribution
August 7, 2024
1.9%
1.9%
4.9%
3.7%
3.1%
84.6%
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Dinoflagellates


Lake Waccabuc
Algal Distribution
August 7, 2024
6.8%
2.3%
90.9%
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Dinoflagellates

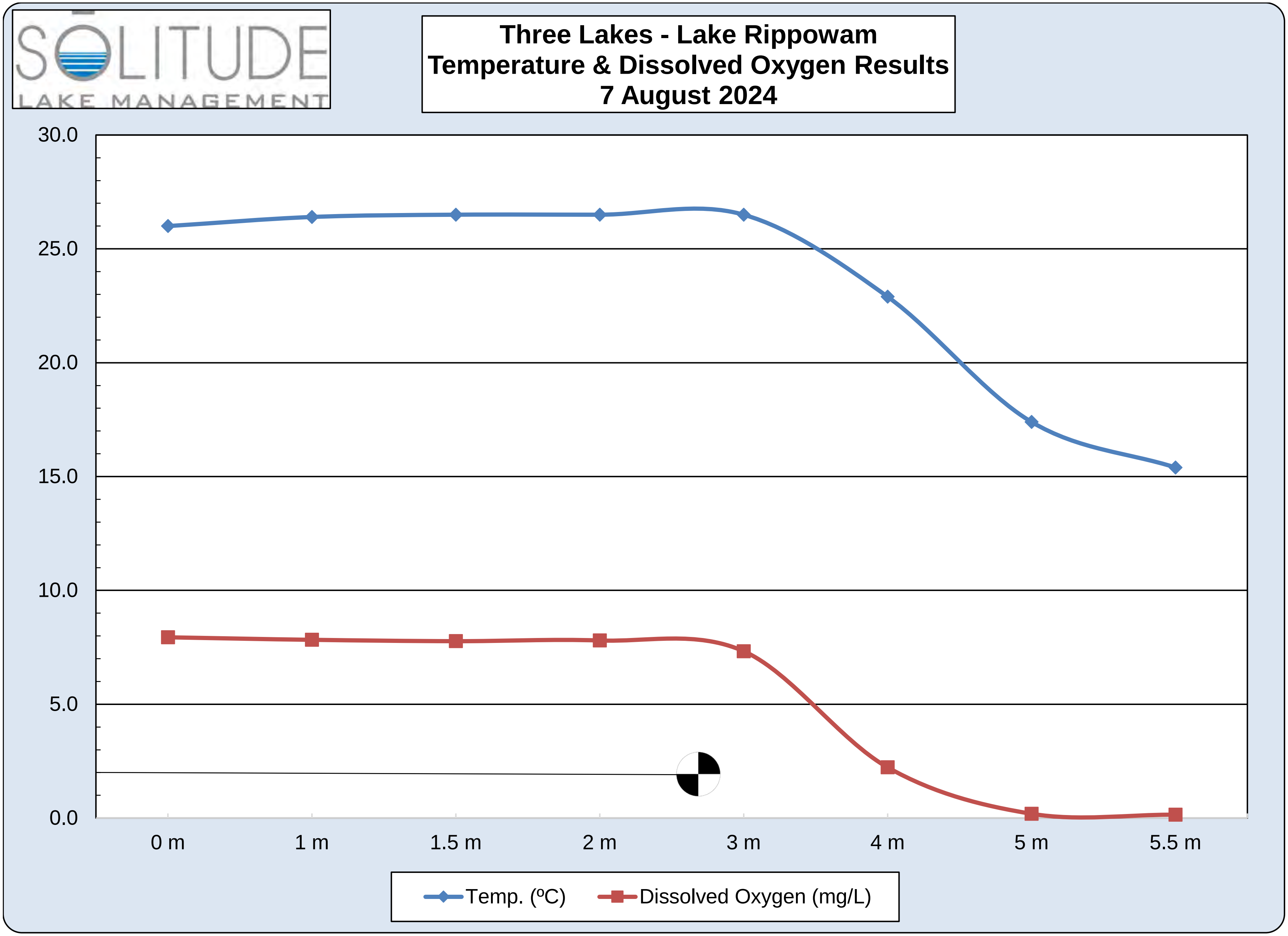


Lake Rippowam
Algal Abundance and Distribution
2023-2024
Algal Abundance (cells per mL)
25000
20000
15000
10000
5000
0
2023
2024
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Dinoflagellates

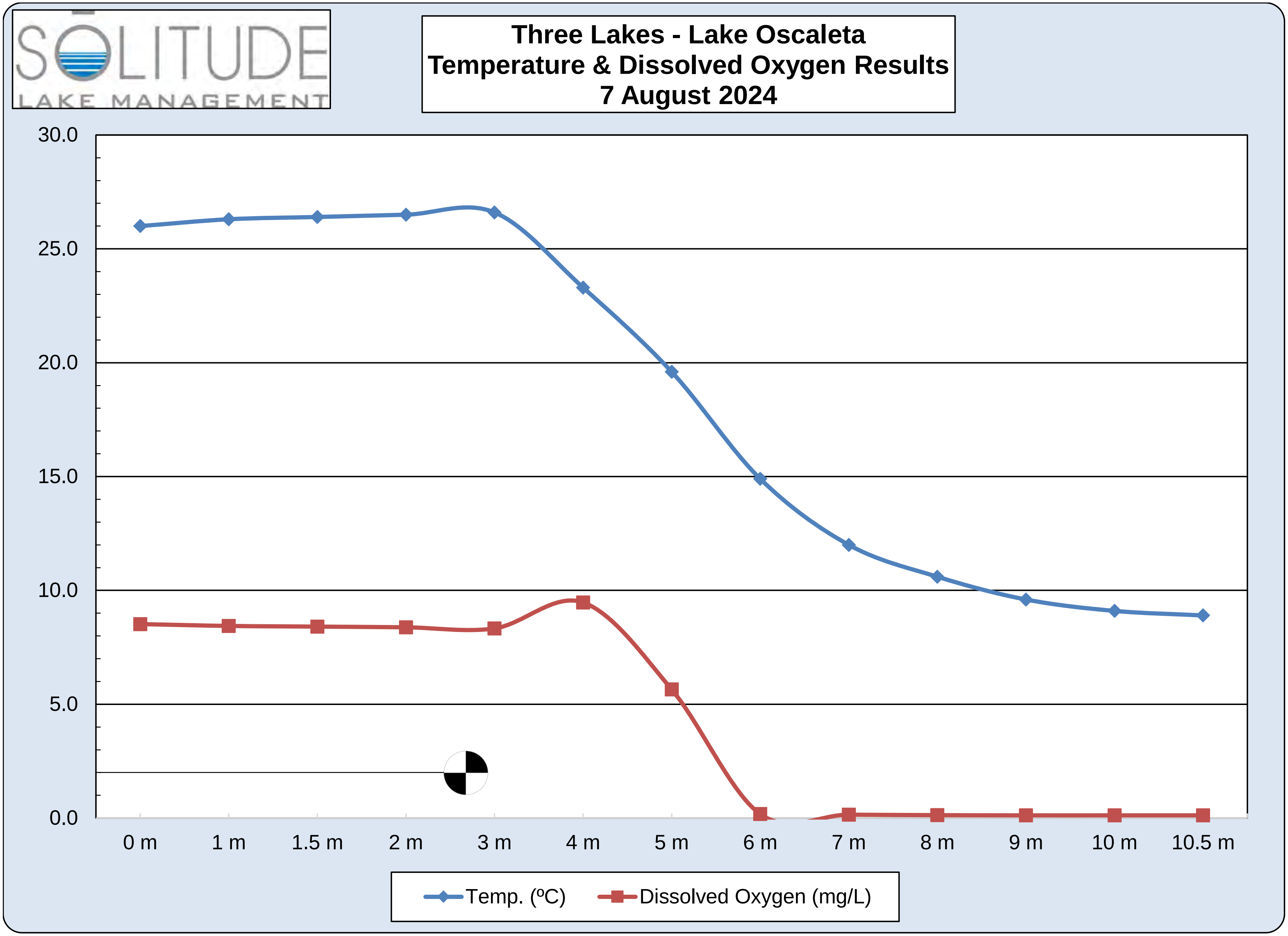

SOLITUDE
LAKE MANAGEMENT
Lake Oscaleta
Algal Abundance and Distribution
2023-2024
Algal Abundance (cells per mL)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2023
2024
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Dinoflagellates



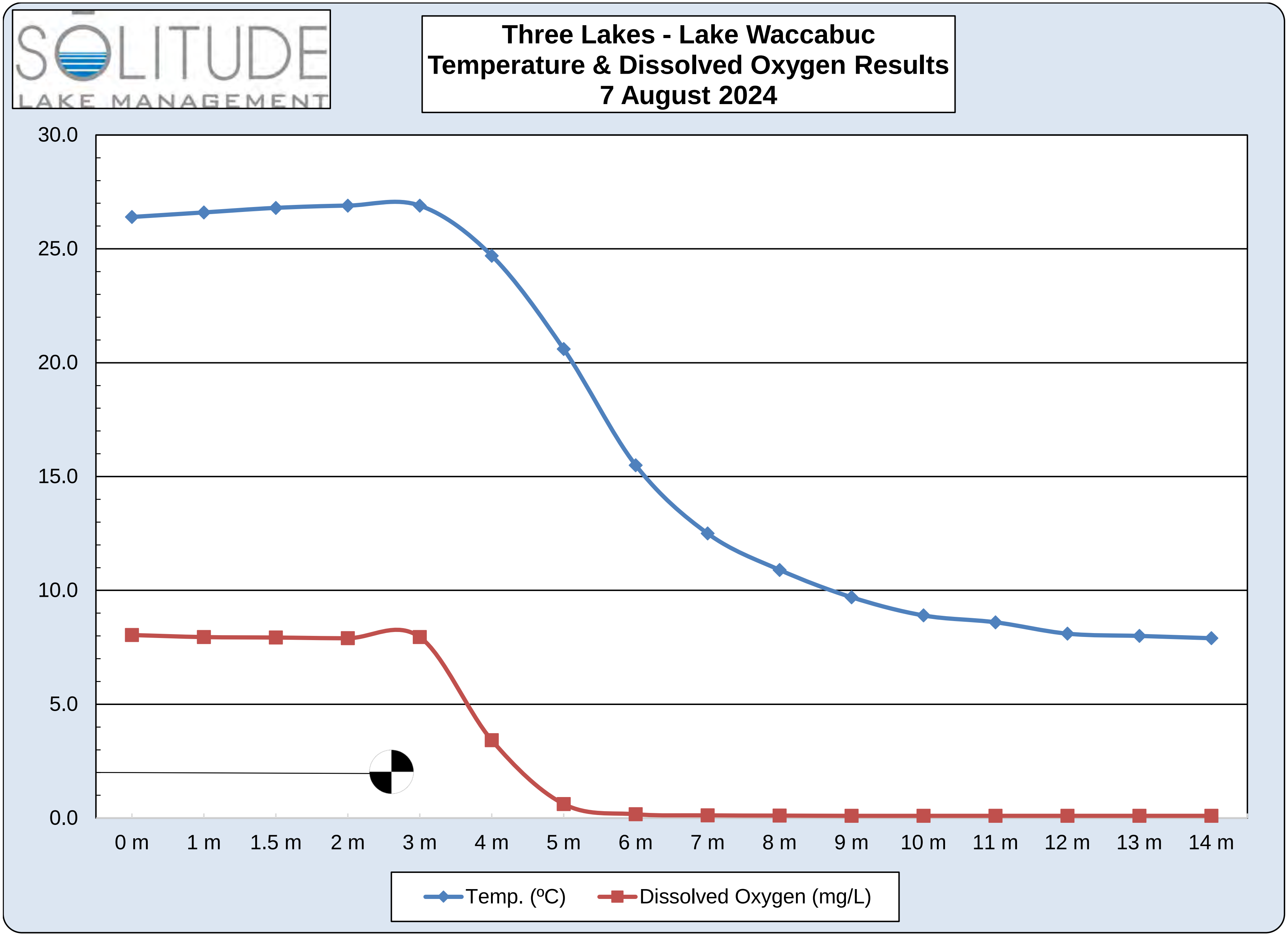
SOLITUDE
LAKE MANAGEMENT
Lake Waccabuc
Algal Abundance and Distribution
2023-2024
Algal Abundance (cells per mL)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2023
2024
Diatoms
Golden Algae
Green Algae
Cyanobacteria
Euglenoids
Dinoflagellates



SOLITUDE
LAKE MANAGEMENT
Three Lakes - Lake Rippowam
Temperature & Dissolved Oxygen Results
7 August 2024
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0 m
1 m
1.5 m
2 m
3 m
4 m
5 m
5.5 m
Temp. (ºC)
Dissolved Oxygen (mg/L)



Three Lakes - Lake Oscaleta
Temperature & Dissolved Oxygen Results
7 August 2024
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0 m
1 m
1.5 m
2 m
3 m
4 m
5 m
6 m
7 m
8 m
9 m
10 m
10.5 m
Temp. (ºC)
Dissolved Oxygen (mg/L)


SOLITUDE
LAKE MANAGEMENT
Three Lakes - Lake Waccabuc
Temperature & Dissolved Oxygen Results
7 August 2024
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0 m
1 m
1.5 m
2 m
3 m
4 m
5 m
6 m
7 m
8 m
9 m
10 m
11 m
12 m
13 m
14 m
Temp. (ºC)
Dissolved Oxygen (mg/L)