

***Conesus Lake Monitoring 2024:  
Internal Phosphorus Loading in the Three Basins***

**Report Submitted to  
The Livingston County Planning Department**



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## Summary

- The 2024 monitoring program investigated the internal loading of relic phosphorus (P) from the bottom sediments in the North, Center and South Basins of Conesus Lake. Characteristics associated with water column temperature stratification were also studied, including dissolved oxygen (DO) concentrations and changes in the oxidation-reduction potential (ORP), which are especially relevant to internal loading of P.
- Temperature data indicated that water column stratification was in place in all three basins by June 12, with a thermocline (change by 1.0 °C/m or higher) at depths of 7-10 m forming a density barrier to mixing between surface and bottom waters.
- A significant increase in surface temperatures to 24-25 °C in July strengthened stratification well into mid-August. The Schmidt Stability Index (energy required to mix a lake), calculated from temperature profiles of the South Basin, was at historically high levels in July and most of August 2024.
- A stratified water column persisted into late August and September in the North and Center basins, and past mid-October in the South basin. Generally, fall mixing occurred later in 2024 than in previous years, but this conclusion is tentative due to uncertainty in the precise time of mixing.
- The deepest few meters of the lake were without much oxygen from June to after mid-October in the hypolimnion of the South Basin. The oxygen depleted region extended to as shallow as 8-10 m, just below the thermocline or 4 m, 6 m and 8 m above the bottom for the North, Center and South Basin.
- In the South Basin, the loss of oxygen resulted in near-bottom oxidation-reduction potential (ORP) values that were below 150 mV and lasted from mid-July through September. These conditions are conducive to the internal loading of P.
- Internal loading was evident in all three basins, but P accumulation was 3-4x higher in the South Basin, where concentrations reached 635 µg/L by the end of September. Calculations that account for the greater depth and volume of the South Basin indicate that 92% of the internal loading of P in Conesus Lake likely originates in the South Basin. Lake-wide, there was a net 8,640 Kg of P added between June 12 and September 27, which is the highest mass of internally generated P reported to date.
- Researchers exploring the consequences of climate change have predicted that warming lakes should develop more pronounced stratification, which could extend periods of hypoxia/anoxia in the hypolimnion and promote a higher amount of internal P loading. While we are not ready to affirm that this is happening in Conesus Lake, the data on oxygen, ORP and TP collected in 2024 are consistent with these predictions.
- Monitoring studies of Conesus Lake in the foreseeable future should prioritize a better understanding of how a warmer climate might change internal loading and other physical/chemical conditions in the lake. A better understanding of these dynamics is essential to management of ecosystem health, water quality and other ecosystem services.

## Background

Internal loading is the process by which nutrients, primarily phosphorus (P), are released from the sediments of productive lakes back into the water column, where they become available for primary producers, like algae, to grow. Phosphorus may be released in shallow water areas of productive lakes through the breakdown of organic material, or in deeper waters of the hypolimnion under anoxic environments, in a process known as internal loading (Zhao et al., 2024). The conditions responsible for anoxic internal loading in temperate lakes are initiated by the warming of spring surface waters that create a density-stratified water column. At this point, mixing between the highly oxygenated upper lake and the colder bottom region is restricted. Over the next few weeks microbes in the deeper waters consume oxygen and release carbon dioxide, producing a chemical environment in which reducing conditions dominate. Reducing conditions, measured as the oxidation-reduction potential or ORP, change the chemistry of the surficial sediments and promote the release of phosphorus into the water column.

Internal loading has been recognized as the major source of P for Conesus Lake. Model calculations of the lake P budget conducted by New York State D.E.C. researchers indicated that anoxic internal loading accounts for approximately 50% of the annual P loading into Conesus Lake, while oxic internal loading was 30% and external loading was 20% of the total (USEPA and NYSDEC report, 2019). Lake warming, as seen already in Conesus Lake (Bosch and Chislock unpublished data) and other Finger Lakes (e.g. Lang et al., 2023), is expected to accelerate the spring onset of stratification and increase its stability and duration (Adrian et al. 2009, Butcher et al. 2015). It is likely that these changes will alter the dynamics of the internal loading phenomenon, even if the exact consequences remain uncertain. As we consider ways to reduce the internal sources of P to improve lake water quality, it is important to have information on the overall amount and rate of release from sediments, plus the seasonal timing of availability of the release P to the upper waters for algal growth, and how these dynamics are changing as Conesus Lake continues to warm.

The timing and magnitude of internal P loading has been studied over several years in Conesus Lake, starting with the work of Makarewicz and colleagues in 2001 and over 7 seasons thereafter (Table 1). Most of the previous work has focused on the deeper South Basin (n=7 yr) and Center Basin (n=6 yr) and sparingly in the shallow North Basin (n=2 yr). Typically, the seasonal increase in hypolimnetic P concentration has been 3-4x higher in the South Basin than in the Center and North Basin (Table 1). This is not unexpected considering the depth, volume

and relative stability of stratification in the South Basin. In 2004, Makarewicz and colleagues carried out a mass budget analysis of hypolimnetic P loading for the whole lake. By comparing the total mass of hypolimnion P at the beginning or soon after onset of stratification (usually May or early June) to the total mass in fall after weeks of internal loading, the researchers were able to estimate how much P is released from the sediments in the hypolimnion during the summer period. Similar calculations were carried out by Makarewicz and coworkers in 2009, 2012 and 2014 and by Bosch and colleagues in 2018. However, no previous study had sampled all three basins concurrently until the work of Bosch, Chislock, and colleagues in 2018 (Bosch et al., 2019). Unfortunately, the short duration of sampling in the 2018 study made it difficult to draw any definitive conclusions about the dynamics of internal loading in each basin.

The 2024 *in lake* monitoring program sampled all three basins concurrently every other week from June 12 to September 27. The results of this work allow for more definitive conclusions about internal loading in Conesus Lake, specifically about the relative importance of the three lake basins to this phenomenon.

## Methods

To study internal loading of P and document the distribution of total phosphorus (TP) in the water column we sampled on 10 different dates approximately two weeks apart from June 12 to September 27, 2024. The coordinates for each site sampled are as follows: North Basin N 42.81525° W 77.70951°; Center Basin, N 42.79251° W 77.71741°; South Basin, N 42.75512° W 77.71643° (**Fig. 1**).

Water column profiles were obtained on each sampling date for all three sites with a Hydrolab 5a sonde equipped with sensors for depth (m), temperature (°C), conductivity ( $\mu\text{Siemens}/\text{cm}^2$ ), irradiance (PAR in  $\mu\text{E}/\text{m}^2/\text{sec}$ ) and pH units, as well as sensors for dissolved oxygen (mg/L and % saturation), and redox potential (mV) that are especially important indicators of conditions that promote internal loading. Sensors were calibrated before and after sampling, in adherence to the procedures and recommendations of the manufacturer (OTT Hydromet) and guidelines in our quality assurance project plan (QAPP). Calibration sheets are provided with this report. The Secchi depth was measured with a black and white 20-cm disk following standard operating procedures. Water turbidity as nephelometer turbidity units (NTU) was measured with a calibrated Hach 2100P turbidity meter in the laboratory within two hours of collection.

Temperature sensor arrays were deployed in all three basins to monitor stratification and mixing between sampling trips. The coordinates for each site are as follows: North Basin N 42.812016° W 77.712402°; Center Basin, N 42.793056° W 77.71788°; South Basin, N 42.764370° W 77.713882°. Each array consisted of a vertical cable anchored at the location of interest and held vertically by a small, underwater buoy. Temperature sensors (Texas Instruments TMP-107) were positioned along the vertical cable from the lake bottom to approximately 3.5 - 4 m below the surface at 0.5 or 1 m spacing. At approximately 15 minutes intervals, all the sensors are triggered by a local shore-based microprocessor which is connected to the vertical cable by a long, underwater cable. The temperatures are recorded and uploaded to a server hosted by SUNY Geneseo (<http://iotdb.geneseo.edu/streams/>). The exact depth of each sensor was determined by matching sensor temperatures to Hydrolab sonde temperatures taken immediately adjacent to each array.

For nutrient analyses, 2.2 L water samples were collected with a Van Dorn bottle from designated depths in each of the three basins. In the shallow North Basin, samples were collected at 3, 6, and 10 m and just off the bottom, typically over a depth of 11-12 m. The same depths were sampled in the Center Basin, with a bottom typically at 12-13 m. In the deep South Basin, we collected samples from 6 depths at 3, 6, 10, 14, 16 m and near the bottom at 18 m. For quality control standards, two separate Van Dorn samples were taken for each depth. They were combined in a clean bucket at the surface and subsampled for analyses following standard quality control procedures. All sample containers were rinsed with the water being collected prior to sample collection. Samples were stored in acid-washed plastic bottles and held in ice for transport. On each collection date, an equipment blank and a field duplicate sample for a randomly selected depth were analyzed for quality control purposes. All laboratory analyses were conducted by the SUNY Brockport Limnology Laboratory (NYSDOH ELAP #12116, EPA NY01597). The data and QC information for these analyses are submitted separately. Here we report an analysis of the trends in the data.

To estimate the total P internal ~~load~~load, we followed procedures established by Makarewicz and colleagues in 2004. To estimate the volume of different depth strata, Makarewicz used a hypsographic curve (area vs. depth) for Conesus Lake that was attributed to Savaard and reported by Forest et al. (1978) in the book *Lakes of New York State: Ecology of the Finger Lakes*. Savaard's hypsographic curve was based on areal estimates for eight different depths from the surface to 20 m. Makarewicz extrapolated between these depths to develop a

finer scale area curve which was then used to calculate volume of different depth intervals. To determine the total Kg weight of P in the lake, the volume of each stratum was multiplied by the average measured concentration of P at those depths. The P produced via internal loading was estimated by comparing the total Kg in the hypolimnion at the beginning of stratification (June 12) to that in the last autumn collection or the sample prior to mixing for the Center Basin. The difference between those two time points is designated as the internal loading estimate. To have a basis for comparison with previous work, in the present study we used the volume estimates of Makarewicz and colleagues (2004) for the different depth strata. Additionally, to estimate internal P loading in each of the three lake basins, we calculated the volume for each basin separately. We first used Google Earth to estimate the surface area of each of the three basins, which were demarcated as follows: for the Center Basin, its southern margin was a horizontal line between the south end of Long Point and McPherson's Point and to the north by a similar line between the northern extreme of Eagle and Old Orchard Points; The North Basin was designated as the volume between the Eagle Point-Orchard Point diagonal and the northern margin of Conesus Lake (**Fig. 1**). The South Basin was designated as the volume south of the Long Point-McPhersons Point diagonal and the southern margin of the lake (**Fig. 1**). We also used distinct landmarks on Google Earth to create a distance scale that was applied in a digital analysis of a bathymetric chart of Conesus Lake. *ImageJ* (NIH Image) was used to determine the surface area at different depths. To calculate volume, each surface area was multiplied times the depth of each stratum from lake surface to bottom.

## **Results and Discussion**

### Temperature and Stratification

Sensor array temperatures on 6/21 and 9/5 were matched to Hydrolab profiles taken at approximately the same date/time and adjacent to the array units in each of the three basins. This allowed accurate determination of the depths at which the array sensors were positioned. Graphs comparing the array trends and the Hydrolab trends (**Fig. 2**) showed very close correspondence, which demonstrated that the arrays could provide accurate real-time data. With the combination of Hydrolab and array temperatures, the time of stratification onset and of late summer/autumn mixing for the three basins could be approximated. The arrays were deployed at the beginning of June and the first data were recorded on June 2, 3, 4 respectively for the North, Center and South Basins (**Fig. 3**, Appendix IA).

By June 2-4 all three basins were stratified (**Fig. 3**). The first manual data collections were made on June 12. Those profiles show a thermocline (defined by a  $> 1$  °C/m rate of change) at depths of 8-10 m, 7-10 m and 7-9 m for the North, Center, and South Basins respectively (**Fig. 4**). Notably, both the array (**Fig. 3**) and Hydrolab profile data (**Fig. 4**) show a very sharp temperature peak after mid-June with average temperatures reaching 25 °C in the upper 6 m of the North and Center sites (and 27 °C near the surface), and 24 °C in the South Basin. We searched through 16 previous monitoring studies that included seasonal temperature data for Conesus Lake, beginning with Makarewicz and Forest (1986), and 2017 was the first year in which June temperatures reached 24-25 °C. Such high June temperatures were also reported in 2021 and 2022 by Bosch and colleagues. Historically, these temperatures are typical of July and August in Conesus Lake.

The lake remained stratified through July and into mid-August as seen in array profiles (**Fig. 5**). Breakdown of stratification to a depth of 9-10 m in the shallow North Basin occurred in mid-August (**Fig. 3, Fig. 5**). Interestingly, mixing is progressive, not episodic. This can be seen clearly in North Basin array profiles by comparing the August 3 fully stratified pattern to August 22, which shows uniform temperatures from the surface to a depth of 10 m. A very cold layer of water about 1-2 m thick remained near the bottom and mixing top to bottom was not evident until a month later in late September. Similarly, in the slightly deeper Center Basin, partial mixing was evident to 10 m in late September, to 12 m by October 11 and to a fully mixed water column (14 m) by October 21 (**Fig. 5**). In contrast to the shallower north and center regions of the lake, the thermal stratification of the deeper/larger South Basin was very stable. There was evidence of mixing to 11-12 m by late September, but as late as October 10 the deeper sections of the lake remained relatively undisturbed (**Figs. 3-5**).

In climate change scenarios, the stratification of the water column in warming lakes is expected to be more pronounced and stable. There is concrete evidence that over the last 14 years Conesus Lake surface waters (0-6 m) in July have warmed by 2 °C on average, while the hypolimnion has cooled by approximately 1.2 °C (Bosch and Chislock, unpublished data). Before 2010, the average temperature difference between the epilimnion and hypolimnion in July was 10.9 °C; from 2012-2024 the average difference has been 14.1 °C. The difference in temperature between the epilimnion and the hypolimnion has increased by 3.2 °C. These measurements suggest increases in the thermal/density stratification of the water column. To confirm this, we calculated historical changes in the Schmidt Index of (water column) Stability

for Conesus Lake (RStudio software Version 2024.09.1+394 with LakeAnalyzer Package). The Schmidt Index is a measure of how much wind energy would be needed (in Joules/m<sup>2</sup> of lake surface) to cause the complete mixing of a lake. Temperature v. depth data from monitoring reports dating back to Makarewicz and Forest (1986) were used in this analysis. The results comparing Pre-2010, 2012-2023, and 2024 trends (**Fig. 6**) show that water column stability has increased markedly (by 39% in July), and 2024 was well above the norm even for the last 13 years. The disproportionately high Schmidt Index calculated for late June 2024 is related to the surge in temperature recorded for that period (see **Fig. 4**).

### Dissolved Oxygen and Oxidation Reduction Potential

All three of the Conesus Lake basins go through extended periods of hypoxia and anoxia from early July continuing to late August in the shallower North and Center Basins, and past mid-October in the South Basin (**Figs. 7-9**). Anoxic conditions extend into shallower waters. In 2024, all three basins lost most of their hypolimnetic oxygen as shallow as 7-9 m (4-10 m from the bottom) at least for a short time in late July and August. In the future we hope to analyze data on the distribution of oxygen in the hypolimnion over time to see if any major changes have taken place in recent years as the lake has warmed.

As outlined earlier in this report, most of the oxygen loss in the hypolimnion can be attributed to microbial metabolism, which also releases carbon dioxide into the water. These changes create a reducing environment that brings about the release of P from the bottom sediments. The oxidation reduction potential (ORP) serves as a key indicator for conditions that bring about internal P loading. This is readily measurable with a calibrated ORP sensor. Typically, ORP decreases when oxygen concentrations decrease and as carbon dioxide accumulates in the water. Surface waters normally have ORP values of more than 400 mV, whereas ORP values below 200 mV near the bottom are associated with conditions that cause internal P release.

The ORP data for 2024 highlights the differences in the chemical environment of the three basins. The lowest ORP measured in the North Basin (**Fig. 7**) was about 250 mV, still above the general threshold for conditions favoring internal loading. In the Center Basin, the ORP in the deepest layer drops below 250 mV in August but is never lower than the 200 mV threshold (**Fig. 8**) despite a prolonged period of anoxia near the bottom. By contrast, ORP values below 150 mV occur in the deeper more stable South Basin beginning in mid to late July

and well into October (**Fig. 9**). Notably, stratification may have persisted for two weeks or more after our last sampling which means that P buildup would have continued. These patterns indicate that of the three basins, the South had the most internal P loading in 2024. The trends in P concentrations and P loading presented in the following section support this prediction.

#### Accumulation of Phosphorus in the Hypolimnion

As anticipated from the extent of oxygen depletion and reducing conditions, the maximum concentrations of TP near the lake bottom were 3x higher in the South Basin than in the Center Basin, and 4x higher than in the North Basin (**Table 2, Fig. 10**). The maximum TP concentrations in 2024 are comparable but slightly higher than any previous measurement for each of the basins (**Table 2, Fig. 11**). The maximum TP concentration of 635 µg/L at 18 m in the South Basin is, to the best of our knowledge, the highest recorded in Conesus Lake.

Another interesting trend in the 2024 data is revealed by comparing the seasonality of TP buildup to previous years (**Fig. 12**). This comparison shows that the maximum concentration of TP occurred later in the season in 2024. Internal loading in the South Basin may have continued well into the second week of October, which is our best estimate (based on winds) of when mixing finally occurred. Ultimately, the timing of when stratification breaks down and the accumulated P in the hypolimnion reaches the surface waters to support algal growth is a key consideration for overall water quality and future lake management alternatives.

More pronounced stratification and delayed mixing are predicted in future warmer lake scenarios. The 2024 data for Conesus Lake are inconclusive with respect to this pattern. The Schmidt Stability Index in August is very similar to that of previous years, a sign that the stability of the water column as summer ends is little changed. Therefore, we cannot account for the later peaks in internal TP loading. The greatest change in the Schmidt stability at least for 2024 was in June, which suggests that the spring onset of stratification may have occurred earlier than normal. In that case, earlier onset of oxygen depletion, reducing conditions, and TP accumulation might be expected, but we see very little evidence of that in our data (**Fig. 12, personal observations**).

Makarewicz and colleagues (2004) were first to calculate the total mass of hypolimnetic P buildup in Conesus Lake. In this and later studies, a whole lake bathymetric chart was used to produce a hypsographic curve of surface area with depth, which in turn is used to calculate the volume of the lake at different depth intervals. Measurements of P concentrations at

corresponding depths are then multiplied times the volume of each stratum to estimate the total amount of P in the whole lake. We used this same approach to calculate the internal loading of P for Conesus Lake, and compared this to estimates for other years that we have recalculated using the same procedure (**Table 3**). The estimate for Kg of TP added to the hypolimnion in 2024 was 8,640 Kg at a rate of 87 Kg of TP per day. The average for all years is 5,331 Kg at 58 Kg P/day. The only other year that had comparably high values to 2024 was 2009. The summer 2024 was especially warm, but a cursory look at the 2009 report by Makarewicz and Lewis (2009) indicated that temperatures for the summer season were moderate.

In addition to the whole lake calculations, in 2024 hypsographic curves for each of the three basins were created and used in a comparison of basin P loading. The between-basin comparison provides robust estimates of the relative contributions of each basin to P loading (**Table 4**). These results show that the South Basin contributes an estimated 92% of the P to the hypolimnion, while the North and Center Basins have negligible contributions at approximately 5% and 3%. A fair conclusion of this analysis is that any future interventions to reduce anoxic P internal loading in Conesus Lake should prioritize the South Basin.

We calculated a whole-lake estimate of internal P loading from the 3-basin volume analysis. The internal loading total was 6,864 Kg., 21% lower than the 2024 estimate based on the Makarewicz whole-lake volumes. The difference is likely explained by the fact that the Makarewicz et al. (2004) hypsographic curve has slightly higher volume estimates for the deepest sections of the lake, which would disproportionately increase the total Kg estimate.

## **Conclusions**

The results of the 2024 June 12- Sept. 27 monitoring study show that internal loading of P from the sediments into the hypolimnion continues to be the major contributor to the trophic state of Conesus Lake. An estimated mass of 8,640 Kg was released into the hypolimnion in 2024. While this is the highest mass of internal P release reported for Conesus Lake, it is consistent with previous estimates and with the 10,641 Kg/yr calculation of anoxic P internal loading (representing 50% of total P loading) reported by DEC scientists in a TMDL report (USEPA and NYSDEC 2019).

A second important finding of the 2024 study was that approximately 92% of all the hypolimnetic P internal loading took place in the deep and voluminous South Basin, whereas the contributions of the shallower North and Center Basins was negligible at 4% and 3%,

respectively. Any future management efforts to reduce internal P loading should focus on the South Basin. However, the great depth and volume of the water column and the broad area of anoxic sediments in this basin will certainly pose a practical challenge to any management approach and require a much higher investment on the intervention.

Conesus Lake has undoubtedly warmed in the last 14 years. Surface waters from June to August have increased by approximately 2-4 °C since 2010 while bottom waters are about 2°C colder. The increasing difference in temperature between the upper and bottom lake has increased the stability of the water column and its resistance to mixing according to model calculations. How these changes might affect the onset of stratification in spring, the isolation of the hypolimnion in summer, and the resistance to fall mixing remains to be seen.

Historical analysis of trends in physical and chemical conditions in the lake pertaining to internal P loading are difficult because of differences in the start, duration, and frequency of sampling in earlier studies. Studies of P loading in the future should follow a more consistent research plan. While it might be tempting to focus future studies on the South Basin because of its importance as a site of internal loading, the shallow North and Central Basins are more likely to be affected by a changing climate and should continue to draw attention.

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**Tables**

**Table 1.** Timing of TP buildup and water column mixing dating back to 2000. The date when the maximum TP was measured in 2024 was the latest on record for the South and Center Basins. The record for the North Basin has only 3 years and they are all recent.

<b>Year</b>	<b>Date of Maximum</b>	<b>TP (µg/L) Maximum</b>	<b>Approx. Mixing Date</b>	<b>Source</b>
<b>South Basin</b>				
2000	9/7	480.1	9/7-9/21	Makarewicz 2001
2003	8/7	579.2	9/11-10/8	Bosch & Makarewicz 2003
2009	8/11	557.9	Post 8/18	Makarewicz & Lewis 2009
2012	8/14	393.8	Post 8/14	Makarewicz & Lewis 2012
2014	9/16	484.9	Post 9/16	Makarewicz & Lewis 2014
2017	9/12	560.0	Post 9/12	Bosch et al., 2018
2018	8/23	230	Post 8/23	Bosch et al., 2019
2019	8/20	580.0	8/20-9/22	Bosch et al., 2020
2024	9/27	635.0	Post 10/20	This study
<b>Center Basin</b>				
2000	7/11	142.4	9/7-9/21	Makarewicz 2001
2015	9/2	174.5	9/16-10/2	Bosch et al., 2015
2017	9/5	230.0	9/5-9/12	Bosch et al., 2018
2018	8/23	152.0	8/21-9/1	Bosch et al., 2019
2019	8/20	190.0	8/20-9/22	Bosch et al., 2020
2024	9/19	239.0	9/19-9/27	This study
<b>North Basin</b>				
2015 10m	9/16	33.4	8/18-9/2	Bosch et al., 2015
2015 12m	9/2	280.4	Post 9/2	Bosch et al., 2015
2019	8/20	140.0	8/20-9/22	Bosch et al., 2020
2024	9/11	90.0	8/5- 8/20	This study

**Table 2.** Total Phosphorus concentration data for multiple depths in all three basins of Conesus Lake sampled between 12 June and 27 September 2024.

Depth	Total P ( $\mu\text{g/L}$ )									
	12-Jun	24-Jun	9-Jul	24-Jul	8-Aug	30-Aug	6-Sep	11-Sep	19-Sep	27-Sep
<b>North Basin</b>										
3 m	21.2	19.6	17.6	18.1	16.5	14.8	21.3	22.3	20.1	66.1
6 m	15.7	15.6	15.8	15.1	18.8	14.2	19.8	20.5	18.8	21.9
10 m	14.1	16.7	17.9	14.1	24.0	59.1	28.5	20.0	15.6	81.0
off bottom 11 m	20.9	-	37.4			50.2		90.0	16.8	152.0
<b>Center Basin</b>										
3 m	20.2	22.4	20.4	16.0	17.8	20.4	23.1	21.2	17.4	30.7
6 m	16.3	18.9	18.1	18.5	16.1	16.8	19.7	18.5	16.5	26.7
10 m	14.9	17.4	12.7	17.2	23.0	14.9	19.4	26.2	19.9	42.9
near bottom 12 m	20.9	13.4	16.0	92.4	17.2	186.0	32.8	195.0	239.0	58.5
<b>South Basin</b>										
3 m	22.7	18.3	19.4	19.4	19.6	17.6	23.4	17.8	16.1	27.2
6 m	22.2	25.5	15.6	15.6	17.2	14.7	18.9	18.1	17.9	23.8
10 m	12.8	15.6	16.6	16.6	17.0	21.8	17.8	20.3	13.5	22.4
14 m	13.6	16.2	10.5	10.5	72.2	38.8	65.9	75.2	51.0	158.0
16 m	14.8	14.6	17.8	17.8	58.6	155.0	96.0	345.0	419.5	412.0
near bottom 18 m	12.1	16.5	20.6	20.6	383.5	540.0	265.0	530.0	630.0	635.0

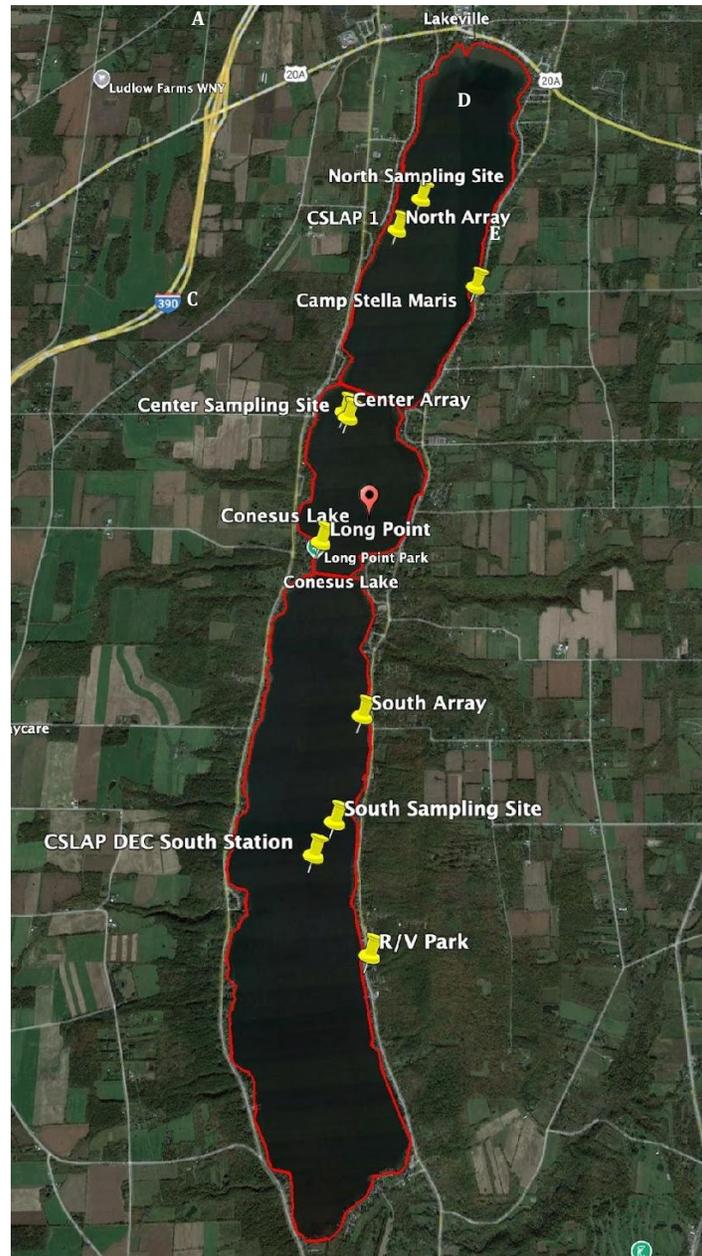
**Table 3.** Estimates of internal loading magnitude for Conesus Lake based on previous studies and in 2024. The calculated value for 2024 is the highest on record.

Whole Lake Internal Phosphorus Loading Estimates					
Year	Sample Dates	Days Start-End	Kg of TP added	Kg P /day	Areal P Release mg P/m <sup>2</sup> /day
2004	5/10- 9/14	128	2,358	18.4	2.97
2009	5/19- 8/18	92	8,041	87.4	14.07
2012	5/22- 8/14	84	5,144	61.2	9.86
2017	6/12- 9/12	92	5,045	54.8	8.83
2018	6/13- 8/13	71	2,758	38.8	6.26
2024	6/12-9/19	99	8,640	87.3	14.05
		<b>Mean</b>	<b>5331</b>	<b>58.0</b>	<b>9.3</b>
-	-	<b>St. Dev.</b>	<b>2603</b>	<b>27.1</b>	<b>4.4</b>

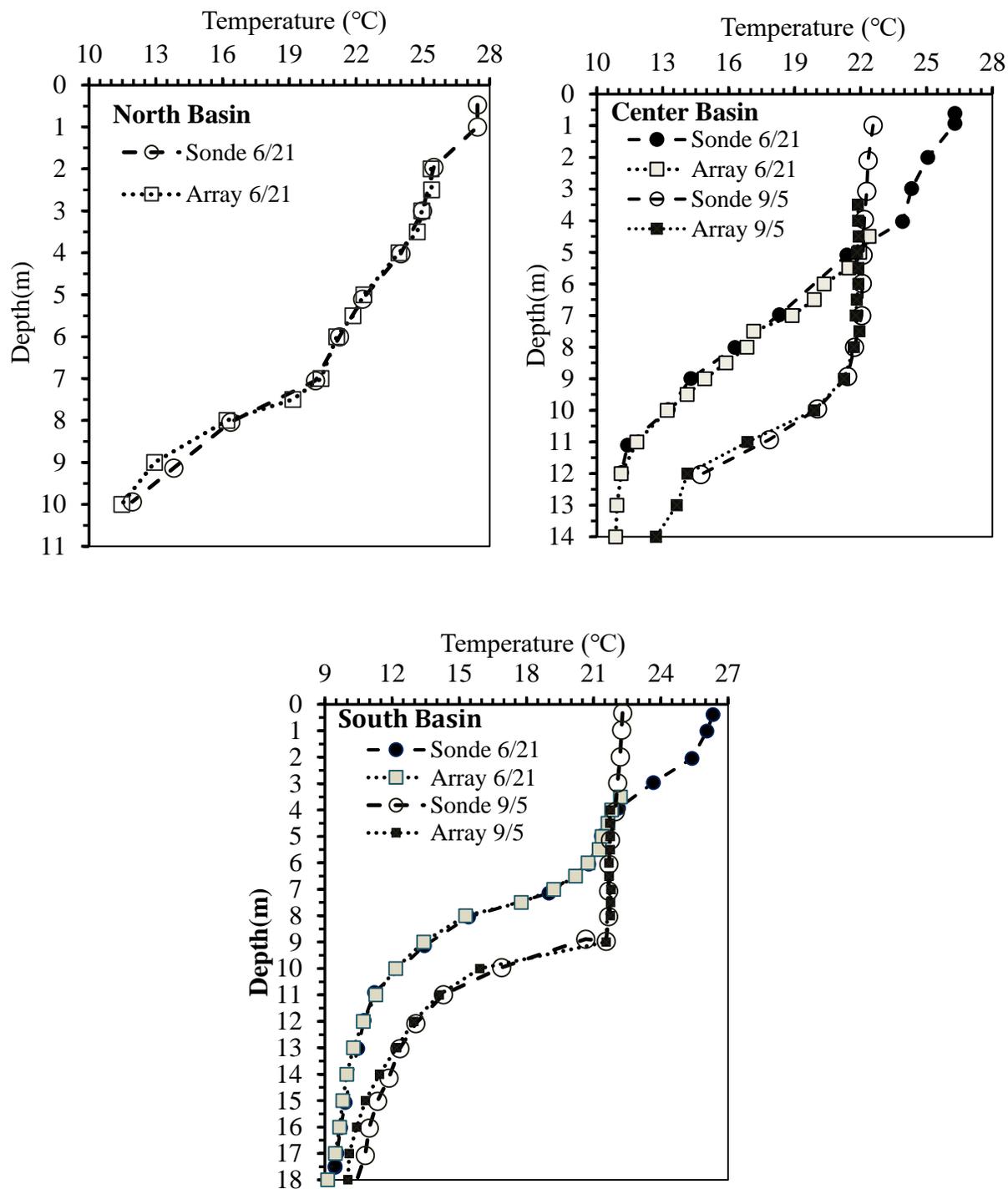
**Table 4.** Calculated estimates of internal loading for the three basins of Conesus Lake.

Location	Volume x 10 <sup>6</sup> m <sup>3</sup>	Start Basin TP kg	End Basin TP Kg	# Kg TP Change	# Days Loading	Avg. Kg/day buildup	% of TP Buildup
North Basin	49.68	167.35	455.44	288.10	83	3.47	4.97
Center Basin	11.58	49.26	367.72	192.69	91	2.12	3.03
South Basin	84.63	461.58	6,823.48	6,361.90	99	64.26	92.00
<b>Total</b>	<b>145.89</b>	<b>678.19</b>	<b>7,646.64</b>	<b>6,842.69</b>		<b>69.85</b>	<b>100.00</b>

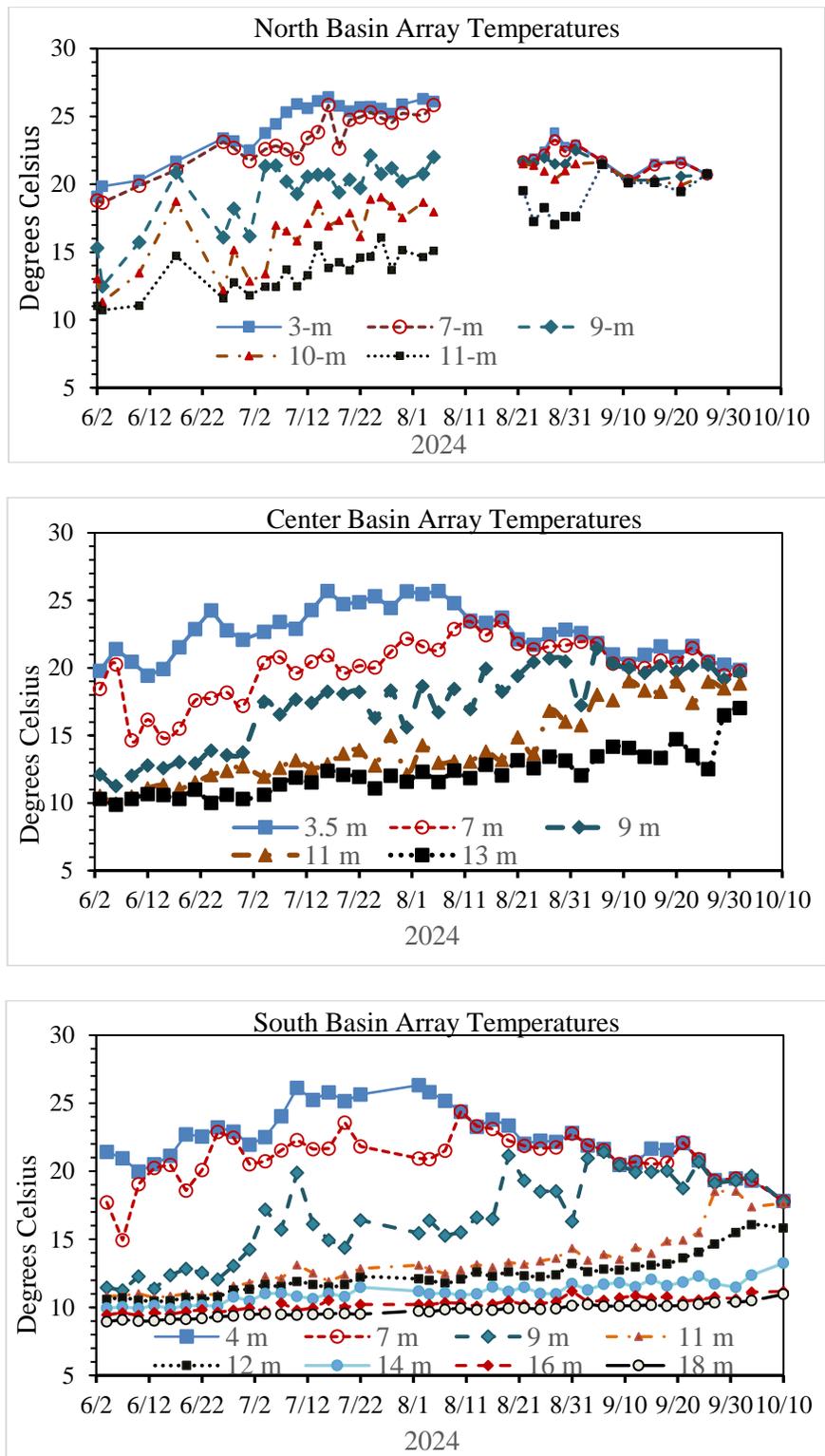
## Figures



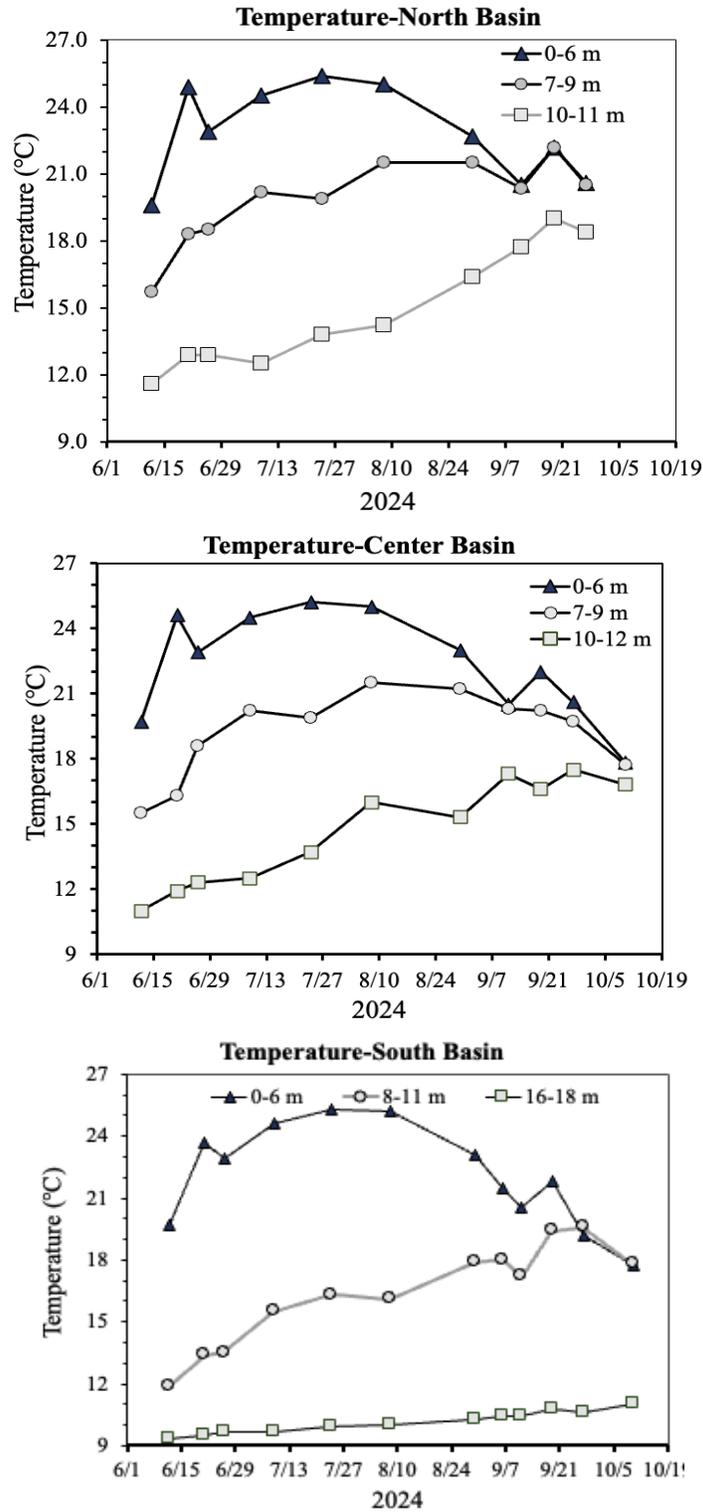
**Figure 1.** Google Earth map of Conesus Lake with the designated boundaries for each basin in red. The placemarks show the georeferenced locations of the three sampling sites for this study and the position of deployed temperature arrays. GPS coordinates are provided in the methods section of this report.



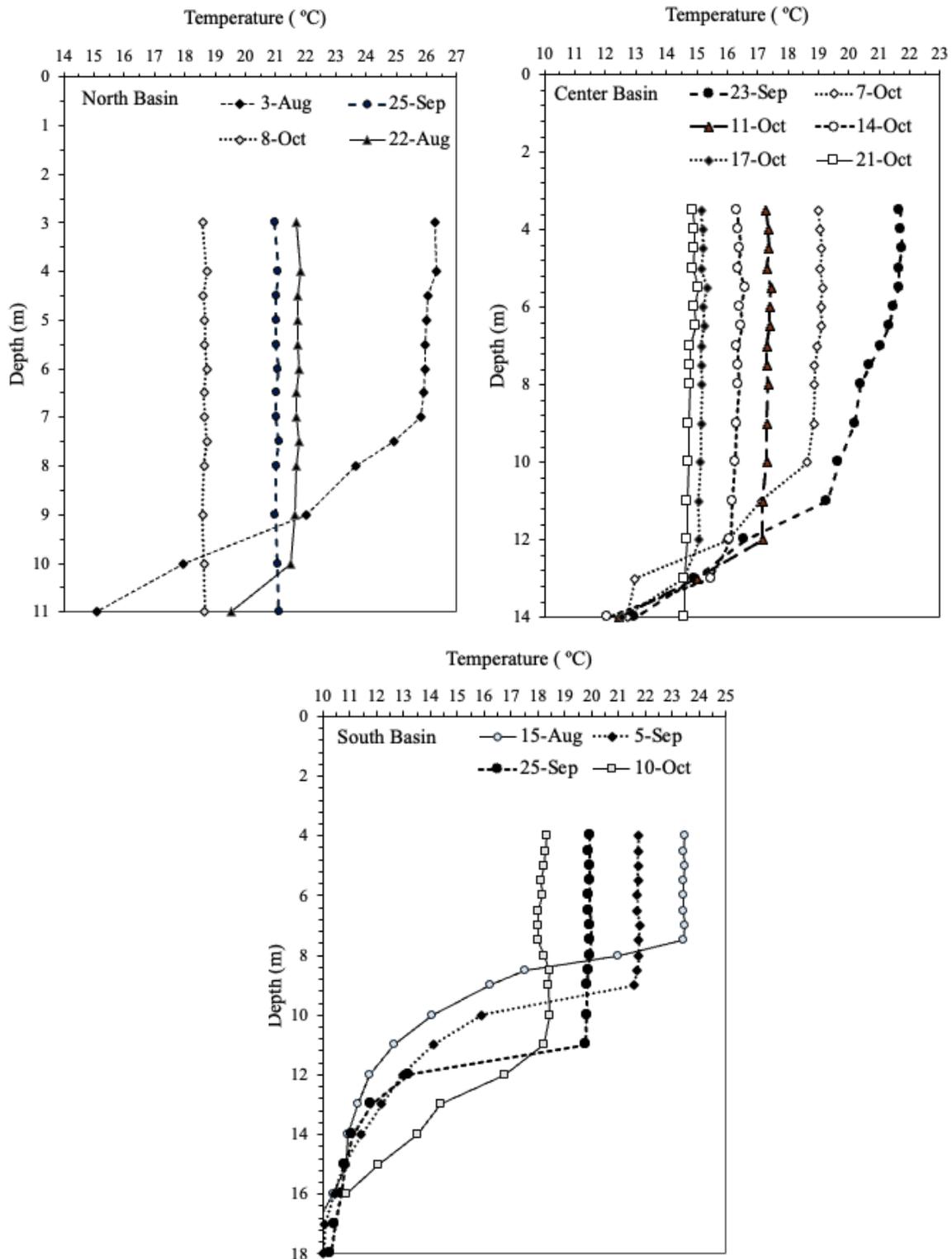
**Figure 2.** Comparison of temperatures from *in situ* temperature arrays in the North, Center and South Basins and Hydrolab sonde profiles at the same time and date. We used the Hydrolab to pinpoint the exact depth at which the array sensors were positioned in the water column. The temperatures correspond very closely.



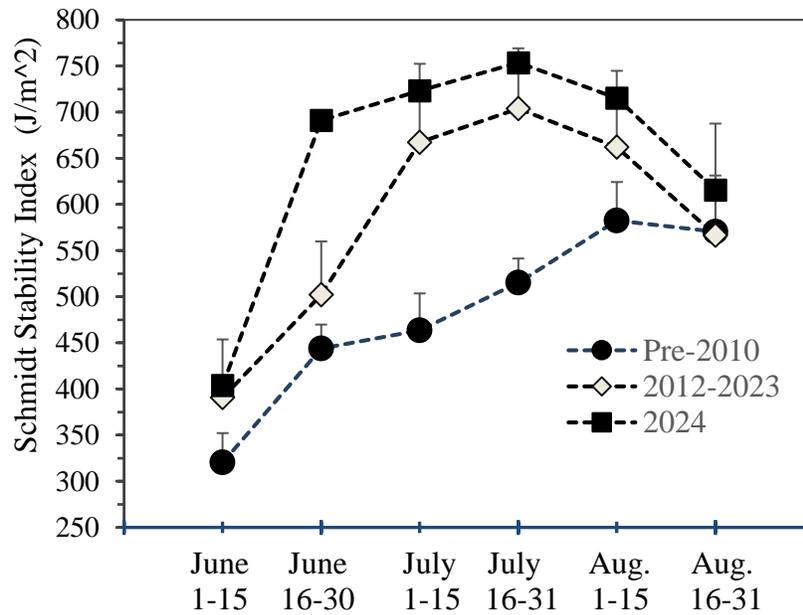
**Figure 3.** Temperature record for the three basins obtained from the *in situ* arrays. From these data we can estimate the times when major mixing events took place.



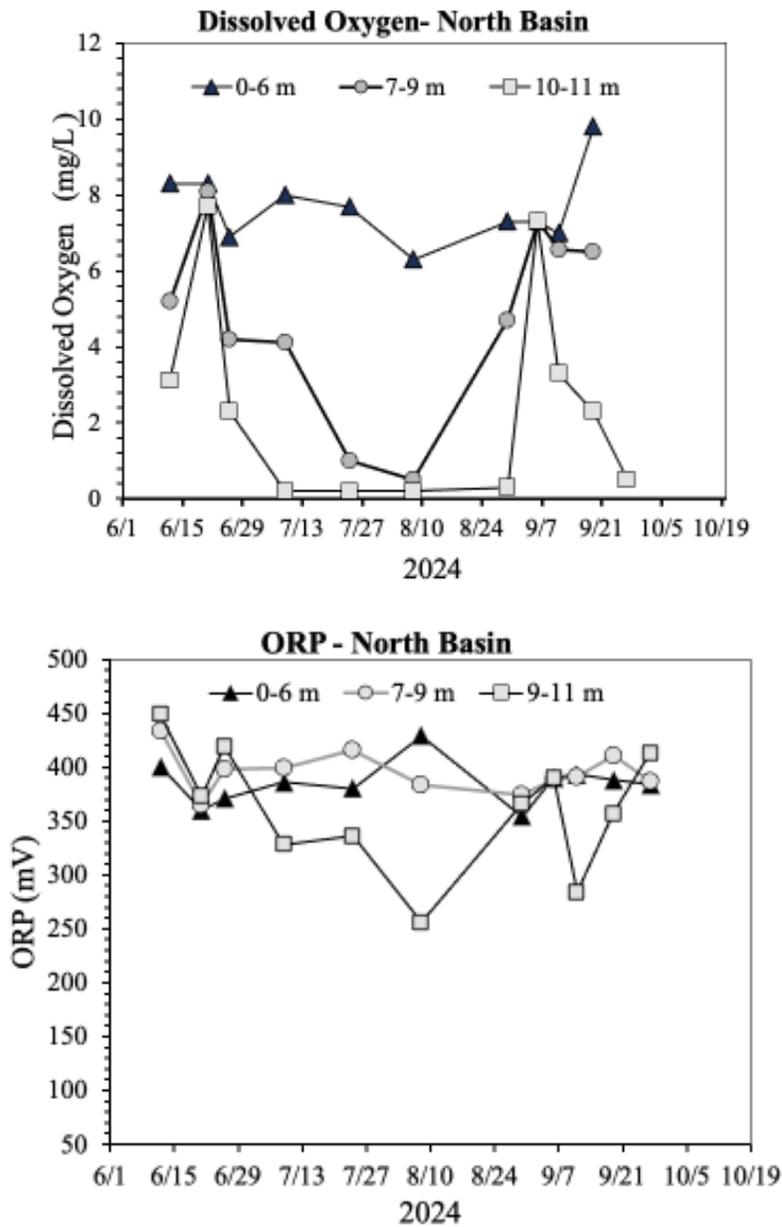
**Figure 4.** Seasonal temperatures in the epilimnion (0-6 m), midwater (7-9, 8-10) and near bottom shown for the three basins from Hydrolab profiles. Please note the surge in temperature in mid-late June. The average temperature of the epilimnion was a very warm 24 °C for most of July and into early August. By Oct. 10 the South Basin had not mixed and the average temperature within 2 m above the bottom was still below 12°C, reflecting its stable stratification.



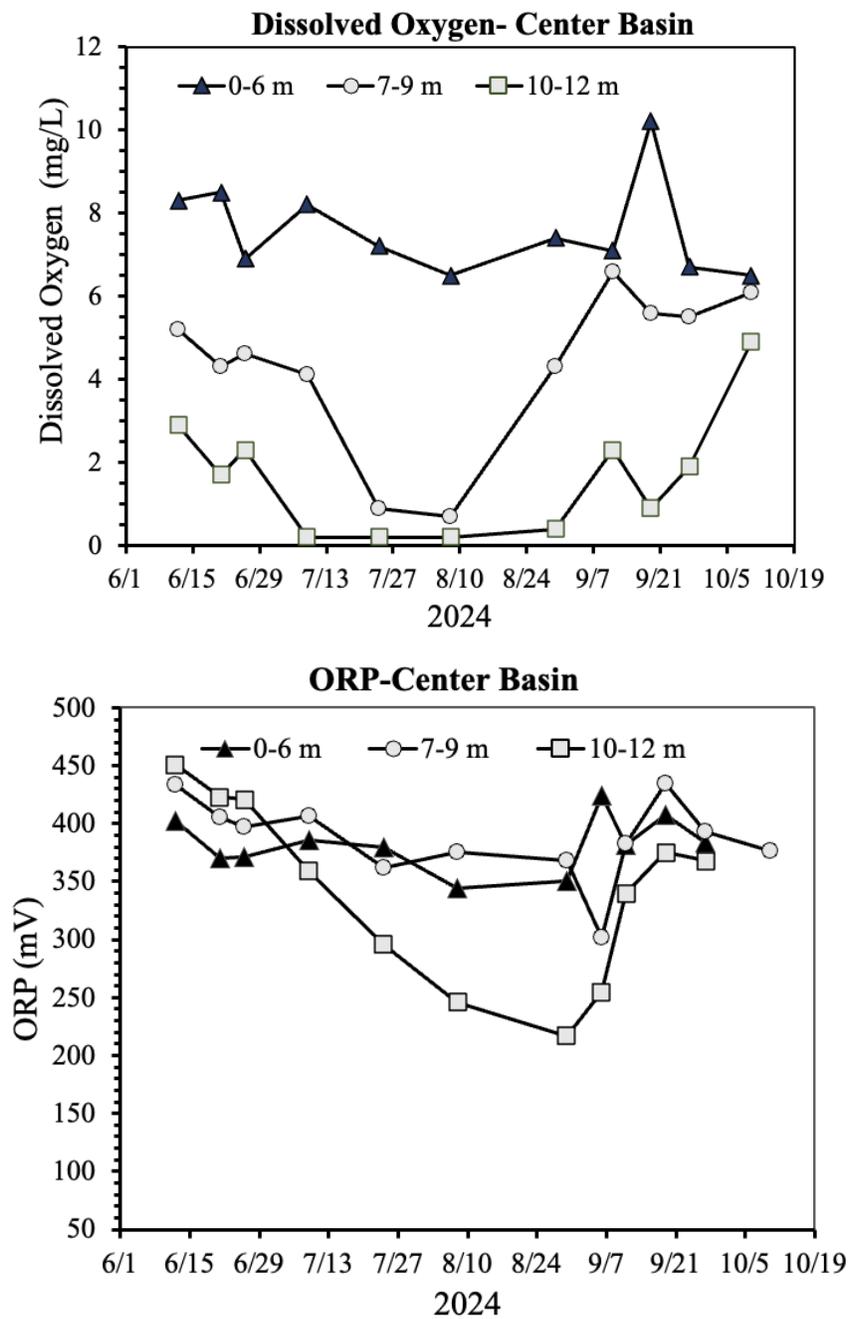
**Figure 5.** Temperature profiles from the arrays showing changes in water column stratification late in the season. The North Basin (top left) mixed to all but the deepest meter by late August, and completely by late September. The Center Basin (top right) mixed gradually and by early October had mixed to a depth of 12 m. Complete mixing was seen by October 21. The South Basin (bottom) had not mixed completely as of October 10.



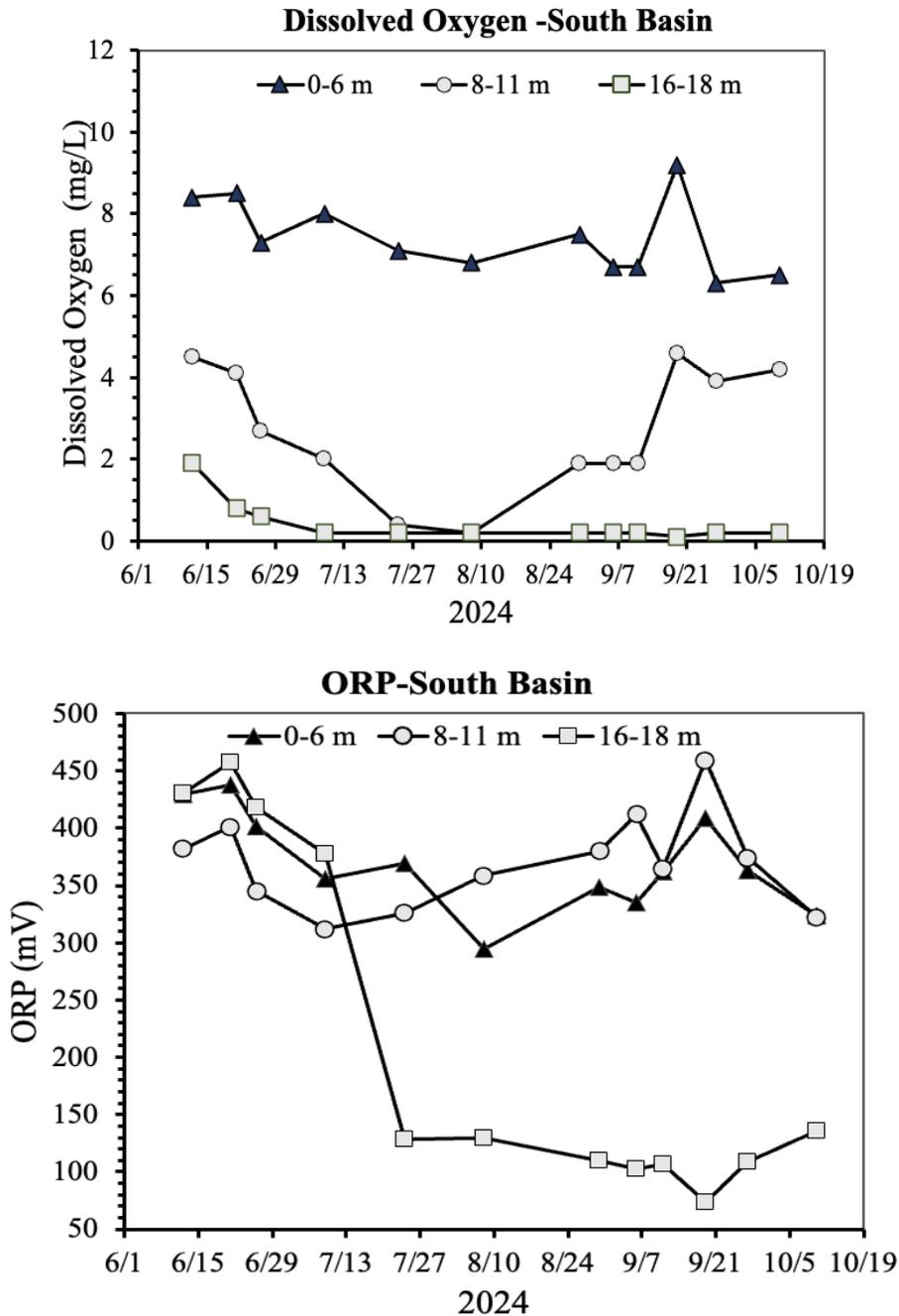
**Figure 6.** Comparison of the Schmidt Stability Index for the South Basin. The calculated values (mean  $\pm$  standard deviation) are based on temperature profiles collected in years before 2010, between 2011-2023 and in 2024. The index is a theoretical measure of how much surface wind energy (in  $J/m^2$ ) would be necessary to break the temperature-mediated density stratification of a water column and cause mixing from surface to bottom. According to the Schmidt Index the water column was more stable in 2024 than in 2012-2023, which was considerably higher than Pre-2010 values.



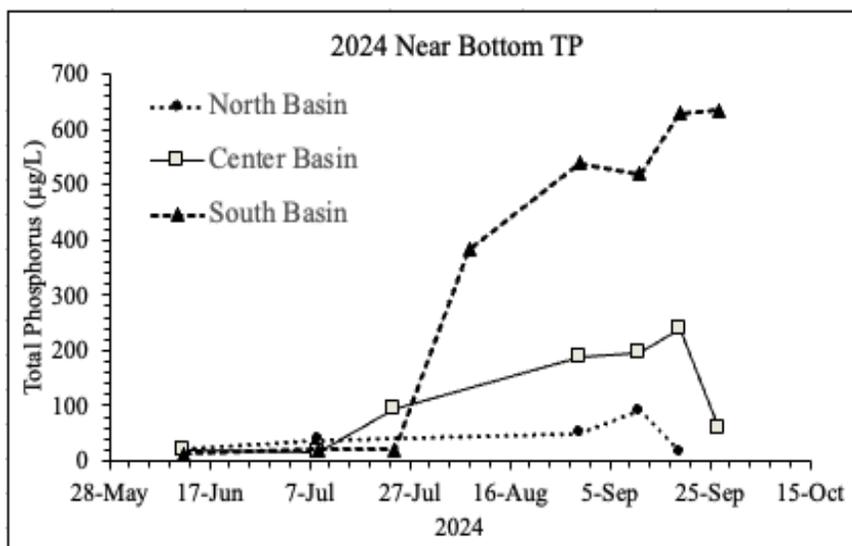
**Figure 7.** Seasonal trends in dissolved oxygen concentrations (top) and Oxidation Reduction Potential (bottom) are shown at different depths in the North Basin. Water near bottom (10-11 m) and below the thermocline (7-9 m) become hypoxic in July and August. The ORP, however, remains above 250 mV. Generally, ORP values below 200 mV are considered low enough to promote chemical reactions that release phosphorus and other nutrients from the lake bottom.



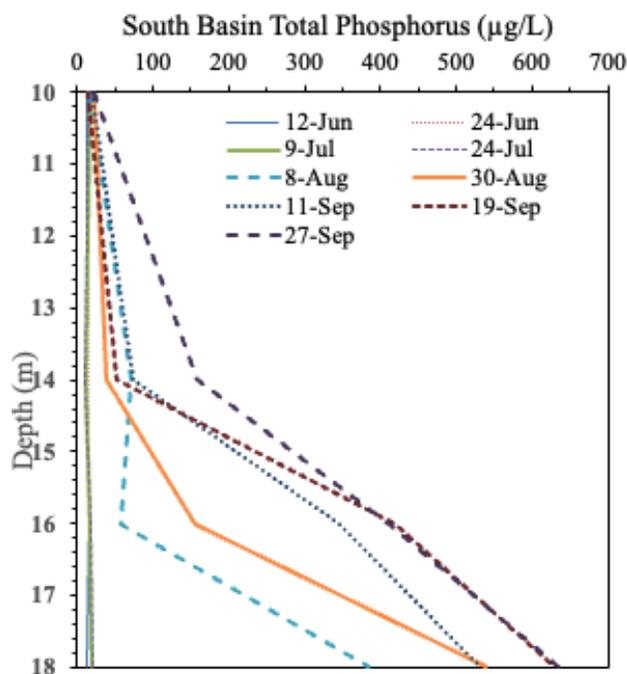
**Figure 8.** Dissolved oxygen concentrations (top) and oxidation-reduction potential (bottom) shown for the Center Basin. This basin is 1-2 m deeper than the North basin. The trends in dissolved oxygen and ORP are like that of the North Basin except for slightly lower ORP values that are below 250 mV for late July and August.



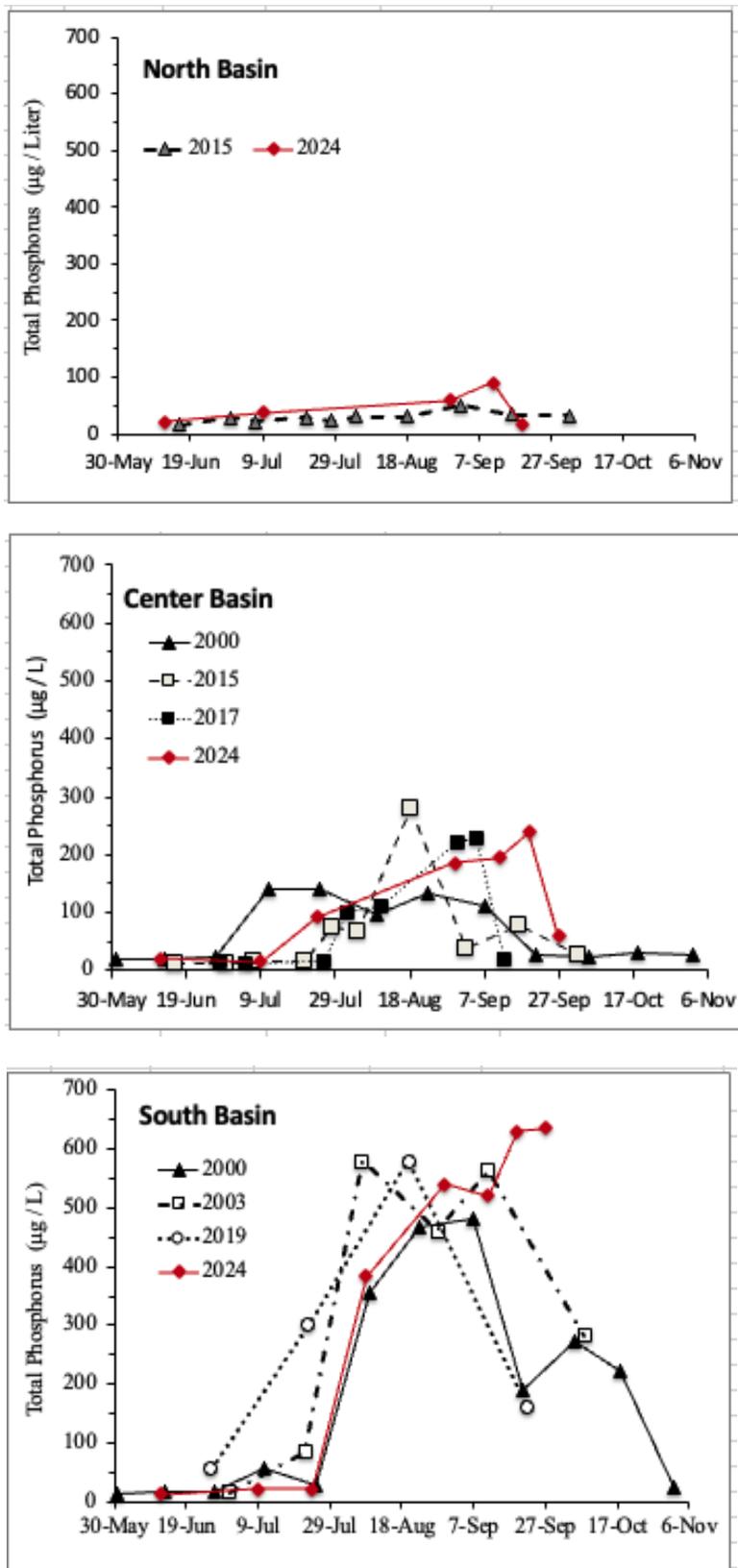
**Figure 9.** Dissolved oxygen concentrations (top) and oxidation-reduction potential (bottom) shown for the much deeper South Basin. Dissolved oxygen values remain below 1 mg/L from mid-June well into October and from mid-July to mid-August in the 8-11 m zone. In conjunction with these low oxygen levels, the ORP drops below 150 mV in mid-July and those conditions persist well into October and create a chemical environment in which phosphorus is released from the lake sediments.



**Figure 10.** Seasonal trends in near bottom TP concentrations for samples taken within one meter off the bottom in each of the three basins. The South Basin has by far the highest concentrations of TP peaking at 635 µg/L, compared to 239 µg/L and 152 µg/L for the Center and North Basins.



**Figure 11.** This figure shows seasonal TP concentrations in the hypolimnion (10-18 m) of the South Basin. Measurements were made at depths of 3,6,10,14,16 m and within 1 m of the bottom on each sampling date. The four profiles in July and August show very little change along the depth gradient. Accumulation of TP begins in August, and the process continues to the last date sampled on 27 September. Surface TP concentrations remained below 25 µg/L for the summer season.



**Figure 12.** Historical comparison of TP buildup near-bottom in all 3 basins shown on the same concentration scale for comparison. The peak concentration measured in 2024 for the South Basin (bottom panel) is the highest on record.

**Appendix I:**

- A. Temperatures from the three temperature arrays at noon for selected days that illustrate seasonal trends. See graphs of these data in Figure 3.

<b>North Basin Array Temperature Summary</b>													
<b>2024</b>	<b>3 m</b>	<b>4 m</b>	<b>4.5 m</b>	<b>5 m</b>	<b>5.5</b>	<b>6 m</b>	<b>6.5</b>	<b>7 m</b>	<b>7.5</b>	<b>8 m</b>	<b>9 m</b>	<b>10 m</b>	<b>11 m</b>
6/2	19.08	19.23	19.08	19.08	18.98	19	18.88	18.81	18.81	18.09	15.31	13.03	11.03
6/3	19.84	20.08	19.83	19.62	19.47	19.5	19.31	18.64	18.3	16.36	12.47	11.31	10.72
6/10	20.27	20.42	20.28	20.3	20.28	20.36	20.23	19.88	18.81	17.55	15.73	13.45	11.05
6/17	21.67	21.88	21.64	21.5	21.31	21.3	21.14	21.06	21.05	20.88	20.84	18.73	14.72
6/26	23.39	23.56	23.41	23.3	23.23	23.27	23.17	23.12	23.16	21.62	16.08	12.16	11.58
6/28	23.16	23.34	23.17	23.14	22.94	22.89	22.8	22.67	22.62	21.22	18.2	15.14	12.77
7/1	22.5	22.66	22.48	22.44	22.33	22.12	21.89	21.7	20.95	19.28	16.17	12.86	11.81
7/4	23.77	23.78	23.41	23.12	22.94	22.8	22.69	22.59	22.58	22.38	21.33	13.39	12.44
7/6	24.44	24.56	24.28	24.22	23.77	23.27	23.06	22.84	22.67	22.11	21.38	16.98	12.42
7/8	25.3	25.14	24.59	24.38	24.23	24.12	23.69	22.56	21.69	21.19	20.2	16.55	13.73
7/10	25.91	25.98	25.69	25.42	25.3	24.3	23.47	21.89	21.5	20.8	19.3	15.81	12.48
7/12	25.59	25.64	25.33	25.22	25.16	25.23	25.03	23.42	22.23	21.52	20.55	17.11	13.3
7/14	26.12	26.16	25.83	25.61	25.5	25.42	25.03	23.84	23.28	21.89	20.69	18.53	15.48
7/16	26.41	26.55	26.39	26.17	26.08	26.12	25.98	25.83	24.16	21.62	20.72	16.92	13.84
7/18	25.78	25.88	25.67	25.66	25.59	25.66	24.86	22.64	21.03	20.31	19.41	17.34	14.25
7/20	25.38	25.38	25.09	25.05	24.95	24.97	24.84	24.75	23.64	21.97	20.33	17.88	13.66
7/22	25.69	25.69	25.42	25.33	25.23	25.19	25.05	24.95	24.41	21.14	19.72	16.12	14.59
7/24	25.7	25.88	25.67	25.52	25.42	25.47	25.38	25.3	25.06	23.88	22.12	18.88	14.66
7/26	25.58	25.66	25.33	25.22	25.08	25.12	25.08	24.91	23.62	22.09	20.75	19.05	16.09
7/28	25.2	25.34	24.95	24.83	24.73	24.7	24.61	24.53	24.42	23.61	21.19	18.39	13.67
7/30	25.88	26	25.7	25.56	25.44	25.44	25.33	25.23	25.08	23.19	20.23	17.52	15.14
8/3	26.28	26.44	26.31	26.31	26.22	26.03	25.67	25.06	24.45	22.75	20.77	18.67	14.64
8/5	26.08	26.31	26.05	25.98	25.94	25.97	25.89	25.83	24.92	23.67	22	17.95	15.11
8/22	21.69	21.81	21.72	21.73	21.73	21.8	21.7	21.7	21.8	21.7	21.66	21.5	19.52
8/24	21.91	22.05	21.97	22	21.98	21.98	21.81	21.78	21.78	21.62	21.55	21.39	17.23
8/26	22.44	22.56	22.48	22.5	22.48	22.44	22.3	22.19	22.22	22.03	21.94	20.95	18.27
8/28	23.83	23.97	23.86	23.91	23.84	23.77	23.61	23.25	22.5	21.92	21.5	20.36	17.02
8/30	22.77	22.89	22.81	22.83	22.81	22.83	22.7	22.41	21.94	21.64	21.48	20.98	17.62
9/1	22.94	23.06	22.98	23.02	22.97	22.98	22.91	22.86	22.86	22.69	22.48	21.5	17.59
9/6	21.7	21.84	21.77	21.78	21.78	21.83	21.75	21.7	21.75	21.62	21.58	21.62	21.44
9/11	20.34	20.48	20.38	20.42	20.44	20.42	20.33	20.31	20.41	20.33	20.28	20.28	20.09
9/16	21.55	21.69	21.61	21.64	21.64	21.66	21.5	21.36	21.19	20.48	20.31	20.3	20.11
9/21	21.7	21.8	21.72	21.77	21.77	21.75	21.62	21.55	21.11	20.84	20.58	19.92	19.45
9/26	20.69	20.81	20.72	20.75	20.75	20.81	20.72	20.7	20.81	20.73	20.67	20.72	20.75

**Appendix I:**

- B. Tables with data from Hydrolab sonde profiles from June 12-Oct 10, 2024 for the North, Center and South Basins of Conesus Lake. Original excel files for these data are provided with accompanying material as one M/S Excel file with multiple worksheets for each basin.

North Basin 6/12/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 10:14	0	19.89	8.53	402	439	1170	107.6	8.02	0.0168
	1	19.69	8.6	402	438	372	107.7	8.04	0.0294
	2	19.6	8.57	402	438	232	108	8.08	0.0037
	3	19.56	8.57	403	438	161	107.4	8.04	0.0328
Secchi	4	19.54	8.56	404	438	164	105.7	7.93	0.0039
3.2 m	5	19.53	8.54	405	438	110	104.2	7.8	0.0355
	6	19.41	8.48	407	439	79	101	7.6	0.037
	7	18.69	8.27	418	441	58	87.3	6.58	0.0286
	8	15.12	7.76	427	441	38	61.7	5.06	0.0256
	9	13.18	7.6	436	441	27	52.5	4.5	0.0224
End: 10:30	10	11.6	7.47	449	444	20	33.6	2.99	0.025

North Basin 6/21/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 15:00	0.47	27.45	8.74	362	455	160	123.3	7.94	0.0248
	0.96	26.99	8.76	361	455	114	124.5	8.08	0.0296
	1	27.44	8.74	359	455	117	124	7.99	0.0251
	1.96	25.49	8.82	358	452	96	130.3	8.7	0.0328
Secchi	3	24.97	8.82	359	452	63	130.8	8.82	0.0395
3.2 m	3.94	24.4	8.7	364	453	43	122.1	8.33	0.0526
	4.02	24.01	8.68	365	454	40	115.4	7.93	0.0551
	5.1	22.28	8.71	365	452	28	114.2	8.11	0.0583
	6	21.25	8.67	368	453	18	110.2	7.98	0.0751
	7.05	20.17	8.46	377	452	15	99.2	7.35	0.0614
	8.04	16.36	7.93	399	455	13	57.1	4.58	0.0262
	9.13	13.8	7.68	408	457	12	37.1	3.15	0.0209
End: 15:30	9.94	11.94	7.53	413	459	12	19.8	1.75	0.0263

North Basin 6/26/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 9:10	0	23.17	8.42	370	457	1266	101.3	7.07	0.017
	1	23	8.42	369	457	949	100.5	7.03	0.021
Secchi	2	23.06	8.41	370	457	549	100.3	7	0.022
3.0 m	3	22.89	8.42	370	457	237	100.7	7.06	0.027
	4	22.85	8.41	371	457	155	100.4	7.05	0.026
	5	22.74	8.34	374	459	62	94.5	6.65	0.026
	6	22.59	8.33	375	456	73	95.5	6.73	0.027
	7	22.18	8.27	378	460	51	89.9	6.38	0.029
	7.5	21.35	8.12	384	459	44	81.6	4.5	0.032
	8	18.86	7.72	402	461	31	51	3.97	0.022
	8.5	15.35	7.56	410	460	25	39	3.18	0.02
	9	14.59	7.45	414	460	21	36.4	3.02	0.02
	9.5	14.13	7.42	416	461	21	33.1	2.81	0.021
	10	13.52	7.38	418	461	17	29.8	2.54	0.019
	11	12.2	7.34	420	460		24.1	2.11	0.017
	12	11.25	7.3	423	461		21.3	1.91	0.016
End: 9:40	13	10.44	7.26	424	459		20.2	1.84	0.014

North Basin 7/9/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 09:30	0	25.13	8.51	398	445	416	125.5	8.42	0.0337
Secchi	1	25.2	8.54	386	446	315	125.6	8.41	0.0385
1.15 m	2	24.97	8.53	383	446	181	124	8.34	0.0426
	3	24.42	8.51	383	447	81	120.3	8.21	0.0448
	4	24.27	8.48	382	448	47	117.3	8.02	0.0453
	5	24.1	8.49	382	448	32	117.9	8.08	0.048
	6	23.1	8.3	390	453	22	93.6	6.59	0.0423
	7	22.28	8.13	395	453	18	83.7	5.96	0.0366
	8	21.07	7.9	403	454	16	66.5	4.74	0.025
	9	17.23	7.46	423	460		20.6	1.58	0.025
	10	12.82	7.31	425	463		2.8	0.23	0.0384
End 11:05	10.45	12.09	7.33	230	466		2.2	0.2	0.0309

North Basin 7/24/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 09:00	0	25.44	8.55	384	424	2317	115.7	7.73	0.028
Secchi	1	25.44	8.55	382	424	551	116.2	7.77	0.0373
1.75 m	2	25.42	8.53	380	424	344	116.7	7.75	0.0516
	3	25.4	8.52	379	424	176	117.2	7.61	0.0535
	4	25.4	8.51	379	424	91	117.7	7.7	0.0567
	5	25.38	8.49	378	424	58	118.2	7.61	0.0606
	6	25.38	8.49	378	425	38	118.7	7.63	0.0614
	7	22.5	7.12	409	444	25	32.2	2.28	0.0364
	8	20.13	7.5	416	448	19	12.1	0.4	0.0202
	9	17.21	7.36	422	451	15	2.4	0.18	0.0198
	10	14.81	7.29	425	452		2.2	0.18	0.0174
	11	12.8	7.31	247	458		2.3	0.2	0.0174
End 09:30	12	12.83	7.32	216	459		2.2	0.19	0.018

North Basin 8/8/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 09:00	0	25	8.41	390	415	231	97.3	6.54	0.0422
	1	25	8.43	383	415	150	96.3	6.48	0.0494
Secchi	2	25	8.43	383	415	110	95.4	6.46	0.0541
2.25 m	3	24.99	8.41	382	416	70	94.9	6.41	0.0584
	4	24.96	8.39	382	415	63	93.6	6.31	0.0611
	5	24.94	8.36	383	415	33	91.2	6.13	0.0601
	6	24.88	8.29	386	416	18	84.6	5.72	0.056
	7	23.5	7.72	410	427	16	16	1.19	0.0481
	8	22.03	7.51	434	416		2.5	0.18	0.0334
	9	19.02	7.43	443	417		2.3	0.18	0.036
	10	16.03	7.34	256	443		2.1	0.17	0.0182
End 09:30	11	12.4	7.34	256	452		2.2	0.19	0.017

North Basin 8/30/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 09:00	0	22.93	8.49	352	406	348	108.4	7.56	0.0341
	1	22.95	8.46	352	406	74	108.2	7.58	0.0345
Secchi	2	22.94	8.46	351	406	54	107.9	7.58	0.0372
3.15 m	3	22.91	8.46	350	406	46	108.1	7.58	0.0438
	4	22.83	8.47	350	406	39	108.6	7.63	0.0441
	5	22.81	8.46	351	406	29	108.4	7.59	0.0446
	6	21.85	8.11	367	410	20	74.7	5.35	0.0452
	7	21.7	7.97	370	409	16	70.5	5.07	0.044
	8	21.58	7.89	374	409		6.45	4.69	0.0435
	9	21.35	7.82	377	410		58.4	4.24	0.0432
End 09:20	10	16.42	7.54	366	374		3.2	0.27	0.0215

North Basin 9/6/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 09:30	0	21.85	8.57	395	429	424	101.5	7.2	0.0268
	1	21.89	8.37	390	429	101	102	7.29	0.0262
Secchi	2	21.9	8.39	390	430	85	102	7.28	0.0275
2.7 m	3	21.9	8.37	389	429	76	102.2	7.31	0.0219
	4	21.9	8.36	389	429	43	102.2	7.32	0.0294
	5	21.84	8.36	389	429	32	102.3	7.31	0.0283
	6	21.89	8.36	389	429	24	102.1	7.31	0.0291
	7	21.87	8.33	389	429	18	101.2	7.26	0.0318
	8	21.87	8.35	389	429	15	101.9	7.29	0.0305
	9	21.87	8.33	389	429		101.4	7.27	0.0297
End 10:00	10	21.9	8.34	390	429		102.2	7.3	0.0295

North Basin 9/11/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 10:23	0	20.52	8.29	393	427	677	97.4	7.16	0.0236
	1	20.51	8.22	391	428	682	97.4	7.16	0.0267
Secchi	2	20.5	8.21	391	428	361	96.8	7.13	0.0334
2.9 m	3	20.46	8.2	391	428	217	95.5	7.04	0.0358
	4	20.42	8.18	391	428	95	94	6.92	0.0364
	5	20.42	8.17	391	428	69	93.7	6.9	0.0386
	6	20.42	8.16	392	428	39	92.8	6.84	0.0512
	7	20.38	8.14	392	428	25	91.8	6.8	0.043
	8	20.36	8.12	393	428	19	89.8	6.65	0.0302
	9	20.28	8.04	396	429	16	83.7	6.2	0.0234
	10	20.02	8.06	397	427		84.3	6.37	0.018
End 10:37	11	15.45	7.67	170	460		2.8	0.23	0.048

North Basin 9/27/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 09:06	0	20.54	8.57	387	426	63	97.1	7.14	0.0319
	1	20.61	8.61	384	426	43	96	7.05	0.0359
Secchi	2	20.61	8.62	384	426	37	95.7	7.03	0.037
2.9 m	3	20.6	8.61	384	426	32	95.5	7.01	0.0344
	4	20.59	8.61	383	426	29	95.5	7.01	0.0382
	5	20.59	8.61	383	426	28	95.6	7.02	0.0364
	6	20.59	8.6	384	426	22	94.6	6.94	0.0392
	7	20.59	8.6	383	426	18	95.4	7	0.0407
	8	20.58	8.57	385	426	15	92.3	6.78	0.0291
	9	20.46	8.44	391	428		78.7	5.8	0.0261
End 09:24	10	18.42	7.94	413	439		5.8	0.45	0.0203

Center Basin 6/12/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 14:21	0	20.92	8.61	389	438	1345	109.8	9.14	0.0156
	1	19.71	8.61	402	438	981	110.6	8.27	0.0197
Secchi	2	19.59	8.62	402	438	553	111.4	8.34	0.034
2.83 m	3	19.54	8.61	401	438	231	111.4	8.34	0.0404
	4	19.47	8.6	401	438	92	109.6	8.22	0.0374
	5	19.37	8.55	403	439	64	105.8	7.94	0.0382
	6	19.2	8.47	405	439	62	101	7.65	0.0343
	7	17.86	8.05	422	441	45	81.7	6.25	0.03
	8	15.51	7.79	434	441	32	59.8	4.93	0.03
	9	13.23	7.58	442	441	24	49.8	4.29	0.0317
	10	11.52	7.44	448	443	19	36.8	3.28	0.0289
	11	10.85	7.37	450	443	16	31.6	2.86	0.023
	12	10.52	7.33	451	443		28.1	2.57	0.022
	13	10.5	7.225	452	444		22.4	2.06	0.0189
End 14:30	14	10.46	7.143	452	445		20.5	1.86	0.0206

Center Basin 6/21/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 14:30	0.61	26.3	8.79	370	453	327	125.8	8.28	0.0317
	0.93	26.36	8.79	369	454	421	126.8	8.33	0.0325
	2	25.06	8.83	368	452	258	130.6	8.79	0.0393
Secchi	2.99	24.32	8.81	369	452	387	127.9	8.73	0.0479
2.8 m	4.03	23.91	8.8	370	451	87	126.7	8.72	0.0557
	5.09	21.39	8.69	374	453	47	115.5	8.35	0.0465
	6.98	18.31	8.16	396	457	23	70.1	5.39	0.0345
	8.01	16.29	7.78	409	456	18	50.8	4.07	0.0233
	8.99	14.28	7.66	414	456	15	42.5	3.57	0.0196
	9.98	13.25	7.52	419	456		27.6	2.37	0.0172
	11.1	11.4	7.38	424	459		16.4	1.46	0.0164
End 14:50	11.97	11.12	7.34	425	458		15.4	1.38	0.0161

Center Basin 6/26/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 9:58	0.4	23.08	8.42	369	457	924	100.8	7.05	0.0212
	1	22.97	8.43	369	457	683	100.3	7.03	0.0242
Secchi	3	22.89	8.42	370	458	242	100.7	7.07	0.0272
3.9 m	4	22.85	8.41	371	458	179	100.4	7.05	0.0254
	5	22.74	8.35	374	458	68	96.4	6.79	0.0252
	6	22.59	8.33	374	458	52	94.8	6.69	0.0285
	7	22.18	8.28	377	458	51	92.2	6.56	0.0282
	8	18.86	7.73	400	458	30	56	4.26	0.0224
	9	14.61	7.46	414	460	22	36.6	3.05	0.0178
	10	13.51	7.38	418	460	17	30	2.56	0.0178
	11	12.2	7.35	420	460		27.4	2.41	0.0172
	12	11.18	7.29	422	460		22.6	2.03	0.015
End 10.18	13	10.44	7.26	424	460		20.3	1.85	0.0139

Center Basin	Depth	Temp	pH	ORP	SpCond	PAR	LDO%	LDO	CHL a
7/9/24	[meters]	[°C]	[Units]	[mV]	[µS/cm]	[µE/s/m2]	[Sat]	[mg/l]	[Volts]
Start 9:30	0.0	25.13	8.51	398	445	416	125.5	8.42	0.0337
	1	25.2	8.54	386	446	315	125.6	8.41	0.0385
	2	24.97	8.53	383	446	181	124	8.34	0.0426
	3	24.42	8.51	383	447	81	120.3	8.21	0.0448
	4	24.27	8.48	382	448	47	117.3	8.02	0.0453
	5	24.1	8.49	382	448	32	117.9	8.08	0.048
	6	23.1	8.3	390	453	22	93.6	6.59	0.0423
Secchi	7	22.28	8.13	395	453	18	83.7	5.96	0.0366
1.15	8	21.07	7.9	403	454	16	66.5	4.74	0.025
	9	17.23	7.46	423	460		20.6	1.58	0.025
End 10.05	10	12.82	7.31	425	463		2.8	0.23	0.0384
	10.4	12.09	7.33	230	466		2.2	0.2	0.0309

Center Basin	Depth	Temp	pH	ORP	SpCond	PAR	LDO%	LDO	CHL a
7/24/24	[meters]	[°C]	[Units]	[mV]	[µS/cm]	[µE/s/m2]	[Sat]	[mg/l]	[Volts]
Start 9:00	0.0	25.67	8.56	310	425	900	119.2	7.92	0.028
Secchi	1	25.66	8.56	311	425	656	119.3	7.96	0.033
1.75 m	2	25.6	8.56	312	425	357	119.9	7.94	0.0553
	3	25.55	8.56	313	425	199	119.4	7.95	0.0594
	4	25.5	8.56	316	425	99	115.9	7.74	0.0667
	5	25.19	8.46	319	425	61	107.5	7.09	0.0552
	6	23.4	8.13	348	431	38	48.1	3.72	0.036
	7	21.98	7.56	357	446	26	22.6	1.62	0.0292
	8	19.52	7.5	363	448	18	9.96	0.74	0.021
	9	18.14	7.36	366	449	15	5	0.35	0.0234
	10	16.05	7.31	368	451		2.2	0.18	0.0214
	11	13.1	7.31	224	454		2.2	0.19	0.0197
End 9:30	12	11.85	7.3	176	455		2.2	0.2	0.017
	13	11.7	7.28	76	456		2.2	0.2	0.0038

Center Basin 8/8/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 10:31	0	25.14	8.48	343	415	488	100.3	6.73	0.0419
	1	25.16	8.47	341	416	289	99.4	6.68	0.0495
Secchi	2	25.18	8.47	341	416	167	99.7	6.68	0.054
2.3 m	3	25.15	8.47	340	416	110	98.8	6.63	0.0569
	4	25.13	8.44	341	416	69	96.5	6.47	0.0587
	5	24.9	8.31	347	419	47	84.8	5.7	0.0536
	6	24.55	8.04	357	423	40	61.9	4.17	0.05
	7	23.84	7.73	373	430	30	13.1	1.46	0.0377
	8	21.45	7.52	375	438	22	2.6	0.19	0.0181
	9	19.16	7.48	377	445		4.5	0.32	0.0341
	10	17.71	7.42	298	443		3.1	0.16	0.0195
	11	15.5	7.4	243	443		2.1	0.17	0.0205
End 10:45	11.3	14.77	7.39	196	446		2.1	0.19	0.023

Center Basin 8/30/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 9:31	0	23.41	8.39	349	408	125	109.3	7.59	0.031
	1	23.31	8.44	347	407	92	109.2	7.61	0.0367
Secchi	2	23.3	8.44	346	407	90	109.2	7.61	0.038
2.95 m	3	23.26	8.43	346	408	100	108.6	7.57	0.0406
	4	23.06	8.38	348	408	101	104.4	7.31	0.0441
	5	22.59	8.24	353	408	55	93.5	6.95	0.046
	6	22.37	8.16	357	409	42	86.9	6.2	0.0465
	7	21.88	8.01	362	409	32	74.8	5.54	0.0434
	8	21.25	7.84	368	411	19	57.8	4.19	0.037
	9	20.52	7.7	375	413	18	42.4	3.19	0.0345
	10	18.35	7.51	384	422		7.3	0.6	0.0351
	11	14.4	7.42	208	433		2.6	0.22	0.0199
	12	13.2	7.38	174	436		2.7	0.23	0.0153
	13	12.47	7.35	162	436		2.6	0.22	0.0141
End 9:56	14	12.39	7.34	155	436		2.4	0.21	0.0148

Center Basin 9/11/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 10:45	0	20.6	8.19	387	428	1361	99.7	7.31	0.0242
	1	20.56	8.22	383	428	656	99.7	7.33	0.033
Secchi	2	20.49	8.23	380	428	386	99.1	7.28	0.0395
3.1 m	3	20.46	8.22	380	428	233	98.2	7.22	0.0423
	4	20.42	8.19	380	428	117	95.4	7.03	0.051
	5	20.38	8.16	381	428	74	93.3	6.89	0.0415
	6	20.36	8.14	381	428	49	92	6.81	0.041
	7	20.35	8.14	381	428	32	91.8	6.79	0.0345
	8	20.3	8.11	383	428	24	88.6	6.6	0.0304
	9	20.17	8.03	386	428	18	85.8	6.49	0.0217
	10	19.97	8.04	384	428	15	84.5	6.27	0.0203
	11	17	7.66	407	442		5.1	0.4	0.0182
	12	15.01	7.43	229	456		2.3	0.19	0.0159
	13	13.68	7.39	174	459		2.2	0.19	0.0142
End 11:04:	14	13.01	7.34	150	459		2.3	0.2	0.0144

Center Basin 9/19/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 16:31	0	22.6	8.5	398	438.3	-	127.9	10.73	-
	1	22.6	8.5	400	438.2	-	128.2	10.77	-
	2	22.5	8.5	402	438.1	-	128.1	10.8	-
Secchi	3	22.2	8.5	409	438.3	-	126.9	10.74	-
3.66 m	4	21.9	8.4	408	438.9	-	122.6	10.53	-
	5	21.4	8.2	414	439.8	-	105.1	10.51	-
	6	20.9	7.9	424	441	-	85.3	7.41	-
	7	20.4	7.8	427.8	441.5	-	71.6	6.23	-
	8	20.1	7.7	432.5	442.1	-	63	5.58	-
	9	20	7.6	443.3	442.7	-	57.2	5.11	-
	10	18.9	7.4	439.1	448.7	-	22.4	2.21	-
	11	17.5	7.2	438.4	456	-	3.7	0.37	-
End 16:39	12	13.3	7.2	246.5	476.6	-	1.7	0.17	-

Center Basin 9/27/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 9:40	0	20.65	8.54	387	426	614	95.4	6.49	0.028
	1	20.67	8.56	385	426	359	95.2	6.98	0.0396
Secchi	2	20.64	8.57	382	426	176	94.1	6.97	0.0434
2.5 m	3	20.62	8.55	381	426	96	93.6	6.88	0.0433
	4	20.59	8.55	381	426	49	93.5	6.86	0.0404
	5	20.45	8.47	383	427	31	87.2	6.53	0.0368
	6	20.29	8.4	387	428	21	84.2	6.21	0.0257
	7	20.05	8.33	389	429	16	85.1	6.31	0.0244
	8	19.8	8.27	392	429		75.2	5.66	0.0241
	9	19.17	8.14	398	432		59.4	4.55	0.023
	10	18.49	8	404	435		40.6	3.17	0.019
	11	18.17	7.41	407	436		26.8	2.09	0.0156
End 9:57	12	15.9	7.82	292	442		7.3	0.57	0.0144

Center Basin 10/10/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 14:45	0.5	17.92	8.46	413	435	69	85.7	6.64	0.0339
	1	17.9	8.41	413	435	64	84.6	6.56	0.037
Secchi	2	17.87	8.37	412	434	47	84.3	6.54	0.0398
	3	17.84	8.33	412	434	30	83.8	6.51	0.0393
	4	17.8	8.31	412	434	25	82.2	6.39	0.0371
	5	17.75	8.29	412	435	17	81.4	6.34	0.0342
	6	17.74	8.27	412	435		80.3	6.25	0.036
	7	17.71	8.26	412	435		79.4	6.19	0.0329
	8	17.67	8.24	412	436		79.2	6.18	0.0326
	9	17.63	8.21	413	436		76.3	5.96	0.0071
	10	17.57	8.21	412	435		75.9	5.93	0.0289
	11	17.47	8.2	412	435		74.2	5.81	0.0269
	12	15.29	8.18	303	456		34.6	2.84	0.0176
	13	13.02	8.03	192	465		4.7	0.41	0.0124
End: 14:50	13.7	12.6	7.95	159	469		2.5	0.22	0.0446

South Basin 6/12/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 12:15	0.33	20.27	8.7	379	438	1195	113	8.35	0.0145
	1	19.99	8.71	378	437	1139	113.6	8.4	0.0173
Secchi	2	19.77	8.72	378	437	642	114	8.54	0.0305
2.5 m	3	19.509	8.72	379	437	166	113.6	8.52	0.0373
	4	19.46	8.7	390	437	127	113.6	8.52	0.049
	5	19.43	8.65	382	438	84	112	8.42	0.0489
	6	19.36	8.05	385	438	39	108	8.12	0.0457
	7	16.35	7.73	411	440	21	70.4	5.6	0.0272
	8	13.66	7.64	424	440	18	58.1	4.79	0.0305
	9	12.06	7.58	429	440	15	54.7	4.61	0.0234
	10	11.14	7.56	432	440		48.7	4.35	0.0224
	11	10.67	7.52	433	441		46.8	4.26	0.0177
	12	10.38	7.46	436	440		48.1	4.41	0.026
	13	10.2	7.46	437	440		47.4	4.36	0.0194
	14	9.96	7.45	430	437		44	4.5	0.0155
	15	9.66	7.36	440	440		35.7	3.34	0.0145
	16	9.43	7.32	443	441		25.7	2.46	0.0131
End: 13:00	17	9.27	7.27	444	441		21.4	1.99	0.0129
	18	9.16	7.24	443	442		14.6	1.36	0.0123

South Basin 6/26/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 10:37	0.5	23.31	8.5	340	457	239	105.5	7.35	0.028
	1	23.27	8.5	340	457	137	105.7	7.35	0.028
	2	23.24	8.51	340	457	90	106.2	7.41	0.03
Secchi	3	23.13	8.53	340	456	63	107.9	7.54	0.031
3.1 m	4	22.99	8.53	341	456	47	107.4	7.51	0.0365
	5	22.49	8.42	369	458	31	100.8	7.13	0.041
	6	21.59	8.28	374	459	24	89.9	6.47	0.03
	7	20.45	8.07	382	459	19	75.4	5.54	0.025
	8	15.59	7.55	403	460	16	40.3	3.29	0.021
	9	13.85	7.43	409	461		27.5	2.32	0.02
	10	12.91	7.38	411	460		30	2.63	0.02
	11	11.77	7.36	413	459		29.1	2.58	0.019
	12	11.42	7.35	414	460		25	2.18	0.016
	13	11.15	7.3	416	461		17	1.52	0.016
	14	10.55	7.3	415	459		29	2.67	0.014
	15	10.36	7.29	416	459		23.4	2.06	0.015
	16	9.9	7.24	418	460		12.7	1.17	0.014
End 11:22	17	9.58	7.2	420	460		4.3	0.4	0.013
	18	9.48	7.18	421	460		3.7	0.34	0.013

South Basin 6/21/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 13:45	0.39	26.33	8.78	405	454	346	126.5	8.31	0.0296
	1.01	26.06	8.77	400	453	133	127.3	8.41	0.0278
	2.05	25.39	8.74	400	453	122	125.6	8.4	0.037
Secchi 2.8 m	2.96	23.67	8.81	398	451	93	130.1	9	0.0711
	3.93	22.11	8.73	401	452	72	122	8.69	0.0806
	4.98	21.34	8.66	402	452	51	117.2	8.48	0.1016
	6.05	20.78	8.54	407	453	33	107.5	7.86	0.0927
	7.14	19	8.16	420	455	23	83.6	6.34	0.0476
	8.05	15.42	7.7	438	456	18	49.4	4.04	0.0247
	9.14	13.45	7.53	444	455	17	40.1	3.43	0.0281
	10.91	11.21	7.41	449	456	17	28.6	2.57	0.0192
	11.96	10.75	7.37	450	455	14	26.9	2.44	0.0167
	13.03	10.46	7.32	452	456		25.1	2.3	0.0158
	15.07	9.91	7.27	453	455		23.9	2.22	0.016
	16.02	9.71	7.22	455	455		15.9	1.48	0.0149
	16.99	9.54	7.16	457	456		10.7	1	0.0158
	17.52	9.46	7.15	457	456		8	0.75	0.0148
End 13:54	17.48	9.46	7.15	457	456		7.9	0.74	0.0148

South Basin 6/26/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 10:37	0.5	23.31	8.5	340	457	239	105.5	7.35	0.028
	1	23.27	8.5	340	457	137	105.7	7.35	0.028
	2	23.24	8.51	340	457	90	106.2	7.41	0.03
Secchi	3	23.13	8.53	340	456	63	107.9	7.54	0.031
3.1 m	4	22.99	8.53	341	456	47	107.4	7.51	0.0365
	5	22.49	8.42	369	458	31	100.8	7.13	0.041
	6	21.59	8.28	374	459	24	89.9	6.47	0.03
	7	20.45	8.07	382	459	19	75.4	5.54	0.025
	8	15.59	7.55	403	460	16	40.3	3.29	0.021
	9	13.85	7.43	409	461		27.5	2.32	0.02
	10	12.91	7.38	411	460		30	2.63	0.02
	11	11.77	7.36	413	459		29.1	2.58	0.019
	12	11.42	7.35	414	460		25	2.18	0.016
	13	11.15	7.3	416	461		17	1.52	0.016
	14	10.55	7.3	415	459		29	2.67	0.014
	15	10.36	7.29	416	459		23.4	2.06	0.015
	16	9.9	7.24	418	460		12.7	1.17	0.014
End 11:22	17	9.58	7.2	420	460		4.3	0.4	0.013
	18	9.48	7.18	421	460		3.7	0.34	0.013

South Basin 7/9/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m <sup>2</sup> ]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 11:05	0.33	25.83	8.57	305	447	751	129.7	8.6	0.024
Secchi	1	25.75	8.54	308	447	639	130.2	8.65	0.0264
1.15 m	2	25.69	8.58	309	447	397	129.8	8.63	0.0324
	3	25.59	8.58	311	447	205	128.6	8.61	0.0397
	4	24.48	8.51	315	448	109	123	8.33	0.0353
	5	22.48	8.34	324	452	60	100.6	7.13	0.0383
	6	21.97	8.19	331	454	33	88.2	6.3	0.0335
	7	21.46	7.95	341	457	22	71.3	5.14	0.0316
	8	18.99	7.72	352	458	21	49.6	3.72	0.0321
	9	17.46	7.53	360	460	15	29.6	2.32	0.0334
	10	13.18	7.32	370	460		15	1.24	0.0417
	11	12.22	7.26	372	459		10	0.83	0.0344
	12	11.76	7.26	373	459		9.7	1.39	0.0224
	13	11.35	7.22	376	458		6.8	0.74	0.0198
	14	10.65	7.21	376	459		4.1	1.37	0.017
	15	10.26	7.17	378	460		2.6	0.22	0.0184
	16	9.83	7.16	378	460		2.4	0.22	0.0162
End: 11:34	17	9.69	7.19	378	462		2.4	0.22	0.0179
	18	9.58	7.21	377	464		2.4	0.22	0.0193

South Basin 7/24/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m <sup>2</sup> ]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 16:53	0.33	26.25	8.6	316	425	1046	128.9	8.47	0.0249
	1	26.14	8.59	314	425	810	128.6	8.5	0.0282
Secchi	2	26.16	8.59	315	425	369	128.9	8.49	0.046
1.4 m	3	25.98	8.59	316	425	214	127.9	8.41	0.0537
	4	25.7	8.53	319	426	104	124.4	8.34	0.0671
	5	24.38	8.05	344	436	59	67.7	4.73	0.052
	6	22.63	7.72	355	442	35	38.5	2.77	0.0339
	7	21.2	7.56	360	447	25	24.2	1.78	0.0256
	8	20.47	7.47	365	447	19	12.9	1.06	0.021
	9	17.01	7.31	369	451	15	2.2	0.17	0.026
	10	14.69	7.26	371	451		2.2	0.18	0.0197
	11	13	7.19	373	448		2.2	0.19	0.0178
	12	12.07	7.16	374	450		2.2	0.2	0.0167
	13	11.63	7.15	374	449		4.2	0.35	0.015
	14	11.21	7.14	375	447		6.1	0.32	0.0156
	15	10.72	7.12	375	449		2.6	0.24	0.0143
	16	10.21	7.2	152	457		2.4	0.22	0.0156
	17	9.94	7.25	121	461		2.4	0.22	0.0154
	18	9.63	7.28	112	463		2.4	0.22	0.0148
End: 17:10	19	9.49	8.3	103	465		2.4	0.22	0.0637

South Basin 8/8/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 9:41	0	25.23	8.53	358	416	202	102.8	6.9	0.055
	1	25.23	8.52	358	416	157	103.8	6.91	0.0524
Secchi 2.1 m	2	25.22	8.51	357	417	80	102.5	6.89	0.0511
	3	25.21	8.51	358	416	47	102	6.85	0.0556
	4	25.22	8.5	358	416	33	101.4	6.84	0.0552
	5	25.19	8.49	360	416	22	99.3	6.74	0.0556
	6	25.16	8.42	361	417	13	96	6.46	0.0536
	7	24.75	8.79	384	424		47	3.28	0.0501
	8	19.31	7.5	329	444		2.4	0.18	0.0236
	9	16.7	7.41	344	443		2.1	0.17	0.0188
	10	14.55	7.36	275	444		2.2	0.18	0.0243
	11	13.74	7.33	229	444		2.2	0.19	0.0159
	12	12.5	7.32	197	445		2.2	0.2	0.0132
	13	12.04	7.31	189	444		2.2	0.2	0.0128
	14	11.64	7.3	181	444		2.3	0.2	0.0129
	15	10.96	7.27	195	441		2.3	0.21	0.0122
	16	10.15	7.28	152	447		2.2	0.21	0.0129
	17	10.05	7.3	131	457		2.3	0.22	0.0131
End 10:00	18	9.66	7.34	107	457		2.4	0.22	0.0128

South Basin 8/30/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 10:13	0	23.13	8.38	387	407	437	107.9	7.51	0.029
	1	23.13	8.41	383	407	144	107.8	7.56	0.0323
	2	23.08	8.43	381	407	76	108.4	7.54	0.0381
Secchi	3	23.07	8.42	379	407	77	107.4	7.56	0.0422
2.8 m	4	23.02	8.42	378	407	131	106.6	7.46	0.0416
	5	23.01	8.41	377	407	59	106.6	7.46	0.039
	6	23	8.4	377	408	36	105.7	7.4	0.0418
	7	22.97	8.34	379	408	28	100.1	7.03	0.0389
	8	21.78	8.04	393	408	23	71.5	5.16	0.0399
	9	19.79	7.7	388	405	23	25.1	1.87	0.0368
	10	16	7.442	361	432	15	2.2	0.18	0.0215
	11	14.13	7.37	252	434		2.2	0.19	0.0186
	12	12.86	7.35	191	434		2.3	0.2	0.0141
	13	12.1	7.33	187	431		2.3	0.2	0.0123
	14	11.6	7.3	187	430		2.3	0.2	0.0135
	15	11.11	7.27	146	435		2.3	0.2	0.0129
	16	10.64	7.26	125	441		2.3	0.22	0.0128
	17	10.17	7.25	115	444		2.3	0.22	0.0134
	18	10.06	7.25	111	445		2.4	0.22	0.013
End: 10:47	19	9.8	7.25	104	447		2.4	0.22	0.013

South Basin 9/6/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 9:30	0	21.52	8.12	417	431	1463	94.4	6.8	0.0231
	1	21.53	8.15	413	431	491	94.1	6.77	0.025
	2	21.55	8.16	411	431	295	94	6.74	0.0314
Secchi	3	21.56	8.16	410	431	153	93.6	6.77	0.0346
2.8 m	4	21.52	8.15	410	432	89	91.9	6.71	0.034
	5	21.53	8.14	411	432	73	90.6	6.57	0.0363
	6	21.44	8.11	411	432	38	89.4	6.52	0.0364
	7	21.29	8.06	413	432	28	85.5	6.14	0.0362
	8	21.22	8	415	433	22	80.7	5.47	0.0349
	9	20.56	7.63	428	437	16	40.7	1.7	0.0331
	10	16.27	7.41	270	451		2.2	0.18	0.0237
	11	13.98	7.38	227	453		2.2	0.14	0.0212
	12	13.33	7.37	175	457		2.3	0.2	0.0153
	13	12.83	7.34	161	457		2.3	0.2	0.0145
	14	11.89	7.32	169	456		2.3	0.2	0.0125
	15	11.54	7.31	152	455		2.4	0.21	0.0119
	16	10.89	7.29	133	460		2.4	0.21	0.0127
	17	10.35	7.26	111	467		2.4	0.22	0.013
	18	10.09	7.27	104	468		2.4	0.22	0.0129
End: 10:00	19	9.99	7.26	95	470		2.5	0.23	0.0162

South Basin 9/11/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start 11:17	0.5	20.79	8.17	368	429	1281	98.4	7.24	0.0133
	1	20.64	8.16	364	429	812	97.2	7.12	0.0173
	2	20.55	8.12	365	430	557	94.3	6.99	0.0242
	3	20.49	8.1	365	430	304	92.9	6.84	0.0319
Secchi	4	20.42	8.1	364	430	189	92.3	6.8	0.0331
3.7 m	5	20.39	8.09	365	429	122	91.6	6.75	0.0366
	6	20.36	8.07	366	429	75	89.9	6.64	0.0354
	7	20.32	8.07	366	429	47	90.1	6.65	0.0316
	8	20.3	8.05	367	430	33	89.4	6.6	0.0335
	9	20.24	8	369	430	26	84.3	6.24	0.026
	10	18.9	7.55	388	440	20	23.4	1.78	0.0233
	11	16	7.38	322	454	16	2.4	0.2	0.0175
	12	13.6	7.3	262	455	13	2.2	0.19	0.0137
	13	12.84	7.29	202	456	11	2.3	0.2	0.013
	14	12.28	7.27	188	455	11	2.3	0.2	0.0124
	15	11.65	7.26	156	459	11	2.3	0.21	0.0121
	16	11.01	7.22	126	464	10	2.4	0.22	0.0129
	17	10.53	7.2	112	468	10	2.4	0.22	0.0131
End 11:30	18	10.32	7.19	100	469	10	2.4	0.22	0.0143

South Basin 9/19/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 10:22	0	22	8.23	460	440.6	-	111.1	9.46	-
	1	22	8.25	456.5	440.6	-	111.3	9.49	-
	2	21.9	8.26	454.8	440.5	-	111.3	9.49	-
	3	21.9	8.26	454	440.5	-	111.1	9.48	-
Secchi	4	21.8	8.26	453.9	440.5	-	111	9.47	-
4.1 m	5	21.7	8.11	457.2	441.4	-	104.2	8.81	-
	6	21	7.94	463.5	441.2	-	91.6	7.94	-
	7	20.7	7.77	468.7	441.7	-	82.3	7.2	-
	8	20.6	7.7	471	441.9	-	80.2	6.47	-
	9	20.2	7.55	365.3	442.2	-	64.7	5.73	-
	10	19.1	7.23	397.2	448.9	-	25.3	2.3	-
	11	17.6	7.1	404.6	461	-	6.7	0.62	-
	12	15	7.1	396.3	474	-	4	0.35	-
	13	13.1	7.06	288.3	473.4	-	2.2	0.23	-
	14	13.3	7.06	19.8	473.6	-	1.8	0.19	-
	15	11.8	7.12	41.9	473.5	-	1.5	0.16	-
	16	11.4	7.13	67.3	482.6	-	1.3	0.1	-
	17	10.7	7.12	71.2	488.1	-	1.1	0.12	-
End: 11:00	18	10.2	7.11	74.8	490	-	1	0.12	-

South Basin 9/27/24	Depth [meters]	Temp [°C]	pH [Units]	ORP [mV]	SpCond [µS/cm]	PAR [µE/s/m2]	LDO% [Sat]	LDO [mg/l]	CHL a [Volts]
Start: 10:15	0	19.72	8.37	360	422	513	89.3	6.67	0.0492
	1	19.71	8.37	359	428	329	88.4	6.61	0.0593
Secchi	2	19.63	8.36	360	428	174	88.8	6.65	0.0581
2.3 m	3	19.56	8.32	362	429	84	85	6.37	0.0658
	4	19.45	8.28	364	429	43	81.9	6.15	0.0414
	5	19.43	8.26	365	429	27	80.5	6.05	0.0436
	6	19.42	8.25	365	429	19	80.8	6.08	0.0564
	7	19.42	8.25	366	429	16	81.6	6.13	0.0557
	8	19.36	8.21	368	429	13	76.4	5.75	0.043
	9	19.32	8.16	371	430	12	71.9	5.41	0.0347
	10	19.2	8.09	374	431	11	63.5	4.8	0.0268
	11	19.08	8.06	393	431	11	59.8	4.52	0.0197
	12	15.78	7.82	335	451	11	3	0.24	0.0154
	13	13.65	7.76	215	454	11	2.3	0.19	0.012
	14	12.78	7.74	199	453	11	2.3	0.2	0.0122
	15	11.55	7.71	150	458	10	2.4	0.21	0.0129
	16	10.85	7.68	124	465	10	2.4	0.22	0.0132
	17	10.55	7.66	111	466	10	2.4	0.22	0.0135
End: 10:30	18	10.48	7.66	106	467	11	2.4	0.22	0.0137

**Appendix I:**

C. Secchi depths and turbidity measurements for the three basins from June 12 to 27 September 27.

Date	North Basin		Center Basin		South Basin	
	Secchi Depth (m)	Turbidity (NTU) 0-3 m	Secchi Depth (m)	Turbidity (NTU) 0-3 m	Secchi Depth (m)	Turbidity (NTU) 0-3 m
12-Jun	3.1	-	2.8	-	2.5	1.75
21-Jun	3.2	0.95	2.8	1.08	2.8	1.26
26-Jun	3.0	1.30	3.9	1.33	3.1	1.63
4-Jul	2.8	2.86	-	-	2.8	2.40
9-Jul	1.2	4.49	1.7	4.35	1.5	4.26
13-Jul	1.2	4.86	-	-	1.2	5.20
19-Jul	2.1	2.99	2.2	-	1.9	2.60
22-Jul	1.7	3.68	1.6	-	1.6	3.77
24-Jul	1.8	3.51	1.5	-	1.4	4.07
8-Aug	2.3	2.15	2.3	2.57	2.1	2.49
30-Aug	3.0	1.45	3.2	1.87	2.8	1.77
6-Sep	2.7	-	2.8	-	2.8	-
11-Sep	2.9	-	3.1	-	3.7	-
19-Sep	3.1	-	3.7	-	4.1	-
27-Sep	2.5	-	2.9	-	2.3	-