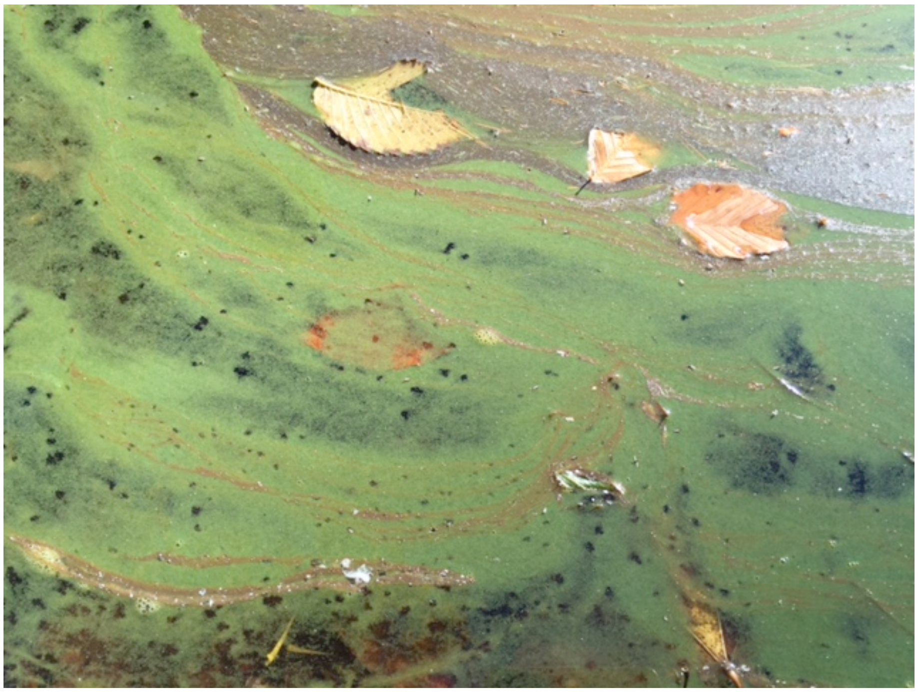
Linkage Between Water Column Mixing of Phosphorus and Onset of Cyanobacteria Blooms In Conesus Lake, (NY)



Report Submitted to
The Livingston County Planning Department

by

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I. SUMMARY

- . The goal of this project was to determine if summer blooms of cyanobacteria in the shallow north basin of Conesus Lake are associated with episodes of wind-driven, partial mixing of the water column that deliver soluble phosphorus nutrients to cyanobacteria in surface waters.

- Five stations in the north basin were sampled from June 16-Oct. 20, 2015. A combination of wind data, weekly water column profiles and biweekly laboratory chlorophyll *a* assays, analysis of surface and near bottom nutrient concentrations and direct counts of cyanobacteria colony and cell numbers were used to explore the link between the mixing of the water column and the onset of blooms.

- On three occasions, following days of high winds, we observed a 1-2 m deepening of the thermocline, which indicated that partial mixing of the water column had occurred. These partial mixing events were associated with increases in surface concentrations of dissolved phosphorus, elevated phytoplankton chlorophyll *a* concentrations and spikes in the numbers of single cell and colonial cyanobacteria in surface waters. With intensive monitoring of winds and water column stratification it may be possible to forecast potential cyanobacterial blooms in Conesus Lake.

- The dominant colonial cyanobacteria during blooms were species of *Anabaena* that historically have been dominant in Conesus Lake. Colonies of *Microcystis aeruginosa* were seen in nearly all samples, but the numbers throughout the season were relatively low compared to *Anabaena*.

- Concentrations of microcystins and anatoxins during blooms were not detectable or were well below the caution thresholds for recreational public health advisory of 6 and 80 µg/L, respectively (Ohio EPA). The blooms of cyanobacteria that took place in Conesus Lake in summer and early autumn 2015 did not pose a significant health risk to lake users or to the water supply.

II. Introduction

Potentially toxic cyanobacterial blooms pose one of the most serious threats to water quality and recreational use of waters in the Great Lakes watershed. The most common potentially toxic species in our region *is Microcystis aeruginosa*, which is known to produce microcystins, which may have acute and chronic affects on human health. Cyanobacterial blooms do occur naturally, but they have increased in frequency since the 1990's. Research has shown that a link exists between zebra mussel invasion of North American lakes and increases in cyanobacterial blooms, but the nature of this relationship is not fully understood (e.g.VanderPloeg *et al*., 2001; Raikow *et al*., 2004).

The mechanisms that trigger cyanobacterial blooms are diverse. Urban and agricultural runoff, malfunctioning septic systems, warmer temperatures and turbidity are some of the possible causes. It may be that blooms are the result of interactions between multiple processes that could involve biological, chemical and physical conditions.

Blooms of cyanobacteria occurred naturally in Conesus Lake long before zebra mussels arrived in 1992, and the species that comprise these blooms have been known for some time (Forest et al., 1978). Several species of colony forming *Anabaena* have been reported, including most recently the frequently toxic *A. circinalis* (Makarewicz and Lewis, 2014). *Anabaena* blooms have been a common summer occurrence in Conesus Lake for more than a decade (I.B., personal observations). The spatial and temporal extent of these blooms varies from one year to the next. In some years the bloom have been sparse and short lived, while in other years surface slicks have covered the northern region of the lake. Typically the colonies die off within a week or two, but in 2014 the summer bloom persisted well September and forced multiple days of beach closings, especially in the north basin. There is no record of an *Anabaena* bloom having produced significant levels of cyanotoxins in Conesus Lake. However the risk posed by high-density slicks of any cyanobacteria species cannot be ignored. By contrast, blooms of *Microcystis aeruginosa* are less frequent and typically have occurred in the fall, but there are several reports of these blooms producing elevated concentrations of microcystins that could pose risks to human health (Makarewicz *et al*, 2009b; pers. comm. with Livingston County Watershed Inspector).

The predictable onset of *Anabaena* blooms locally in mid-summer indicate that some consistent set of conditions might be acting as a trigger in Conesus Lake. Since *Anabaena* species are capable of fixing their own nitrogen, the trigger may be related to the availability of phosphorus, which is in very limited supply during mid-summer. The goal of this study was to determine whether phosphorus accumulated in deeper waters through internal loading processes (Makarewicz *et al.*, 2009) could be delivered to surface waters by wind-mediated mixing and serve as a trigger for summer blooms. This sequence of events is more likely to unfold in the north basin of Conesus Lake, where water column stratification may be less stable due to shallower waters and a smaller hypolimnion volume.

III. Methods

Prevailing Wind Patterns

Hourly wind data obtained from the *Wunderground* web site for Dansville airport showed there were many days this summer when sustained wind speeds were above 15 mph (**Figure 1)**. In our analysis we took into account that on some days the winds were not from northerly or southerly direction ($335^{o} – 25^{o}$ and $155^{o} – 205^{o}$), along the north-south fetch of Conesus Lake that produced the greatest turbulence on the lake surface. Wind data collected by a local weather station "Frosty's on the Lake" (West Lake Road, Sleggs Landing) were consistent with those of the Dansville station but generally much lower, indicating that the weather station may have been sheltered from the strongest winds (**Figure 2**).

Water Column Profiles

Water column profiles at our five stations in the north basin of Conesus Lake **(Figure 3)** were obtained with a Hydrolab 5a Sonde equipped with sensors that determine depth (m) temperature (°C), photosynthetically active radiation (in µEinsteins per m^2 per seconds at wavelengths of 400-700 nm), chlorophyll equivalents (as millivolts, mV), conductivity (µSiemens per cm), dissolved oxygen (mg per liter and % saturation) and redox potential (mV). With the exception of the on board fluorometer, all sensors in the sonde were calibrated within a few hours of sampling, in adherence to the procedures and recommendations of the manufacturer.

Two independent measures of water transparency were recorded. Water turbidity as nephelometer turbidity units (NTU), was measured on site with a calibrated Hach 2100 P turbidimeter. The Secchi depth was determined using a black and white 20-cm disk.

Laboratory Analysis of Water Samples

Integrated samples were taken from a depth of 0-3 m by using clear plastic tubing to draw up water from the different depths. Samples were also collected from the water column at depths of 3 and 6 m and within 1 m from the bottom using a 5 L Van Dorn water sampler. Immediately upon collection water for laboratory analyses was stored in amber bottles and held in ice for transport. All sample containers were rinsed with the water being collected prior to sample collection. In general, all procedures followed Standard Methods for the Analysis of Water and Wastewater (1999).

For chlorophyll a analyses, samples were transported to the laboratory, filtered through a Whatman GF/F fiber filter and stored at -20 °C for subsequent analysis of extracted chl *a*. For extraction the filters were immersed in alkalized 90% acetone, broken up using a tissue grinder and extracted for 10 hr in a refrigerator. We followed EPA guidelines (method 445.0) for *in vitro* determination of chl *a* and phaeophytin (USEPA Revision 1.2, 1977) using the acidification method for the Turner Trilogy fluorometer. The fluorometer was calibrated using a five-point calibration generated using a chl *a* standard extracted from *Anacystis nodulans* (Sigma-Aldrich # C6144). A laboratory reagent blank was tested prior to running the analyses.

Analysis of water samples for total phosphorus and soluble reactive phosphorus (TP, SRP; APHA Method 4500-P-F), nitrate (NO_3^-; APHA Method 4500-NO_3-F) and total nitrogen (TN APHA Method 4500-N-C) were carried out at the Water Chemistry Laboratory, The College at Brockport, State University of New York (NELAC – EPA Lab Code # NY01449). Sample water for dissolved dissolved nutrient analysis was filtered immediately on site with 0.45-µm MCI Magna Nylon 66 membrane filters and held at 4°C until analysis. Quality control procedures for all chemical analyses are described in a number of reports from the laboratory (e.g. Makarewicz *et al*., 2013) and are not detailed here.

Cyanobacteria Cell Counts and Toxin Concentrations

Cyanobacteria colonies were counted by subsampling freshly collected samples taken weekly from the skim layer and from 0.3 m in the water column at all 5 stations throughout the sampling season. Subsamples of 1 mL were taken from each collection and examined with a Zeiss compound microscope at 20X magnification. Individual colonies were counted and identified to various general categories (e.g. *Anabaena* filaments, *Microcystis, Anabaena* clumps, etc.) pending more detailed taxonomic analyses by a taxonomic expert. Preliminary cell counts for each colony type were determined directly from glutaraldehyde preserved samples (2%) at 100x magnification under a compound microscope. Counts of single cell cyanobacteria were carried out by placing subsamples from the skim and grab collections in a blood counter (hemocytometer) and counting cell numbers with a fluorescence microscope under a FITC light filter set.

Toxin levels were analyzed by immunoassay (ELISA technique) using Microcystin kits (Abraxis 520011 Microcystin/Nodularin) and Anatoxin kits (Abraxis 520050 Anatoxin-A Receptor-Binding Assay Kit) purchased from Abraxis (www.abraxiskits.com). We followed general sampling guidelines and best practices as reported in the U.S.G.S. publication "Guidelines for Design and Sampling for Cyanobacterial Toxin and Taste-and-Odor Studies in Lakes and Reservoirs" (Graham *et.al*., 2008). Field samples were collected during bloom periods throughout the study and filtered immediately in the laboratory to remove any cellular material. Abraxis instructions as approved by the EPA were followed in conducting the analyses. The final absorbance of samples was read in a Microplate reader and converted to concentrations using standard curves run with each analysis.

IV. Results and Discussion

Wind Conditions and the Potential for Partial Mixing

From June 1-16 there were high winds every day except on June 14 (8 mph; **Figure 1**). On 5 of those days the winds were along the fetch of the lake with the strongest occurring on with a high of 22 mph on June 16 from the N by NW. On July 7 sustainable wind speeds were as high as 24 mph from the SSE. Winds were high once again from July 21-23 with peak, sustained winds of 24 mph and gusts reaching 34 mph during a 5 hr period on the 21st **(Figure 1, 2**). Conditions were milder in August when sustained winds along the fetch of the lake never reached 15 mph twice on the 11th and the 19th and 13 mph with gusts of 17-18 mph on the 24th and the 31st. The highest winds along the fetch of the lake in September were on the 19th and 20th and especially from the 27th to the 30th with sustainable winds at 12-16 mph and gusts exceeding 20 mph.

Indications of Partial Mixing in Water Column Profiles

We conducted weekly vertical profiles of the water column at all stations in an attempt to document changes in the depth of the thermocline that might indicate partial mixing of the water column. Temperature and oxygen profiles were the most useful for this purpose, but other physico-chemical and biological parameters such as redox potential and conductivity, were measured with the Hydrolab Sonde (**See Figures 4-6, Appendix I**).

Representative temperature profiles are shown in **Figures 4.** These profiles were not as telling as one might expect, especially in June through mid July when the stratification of the lake is still changing, as surface and bottom temperature differences become firmly established. There is evidence of mixing in some of the subsequent profiles. At stations 1 and 5, for example, one can easily discern the change from a deep thermocline to a nearly fully isothermal water column in October (**Figure 4**). This was the culmination of the mixing process that was likely initiated by high winds during the last week of September and in early October (See **Figures 1 and 2**). Similarly, on stations 3 and 5, there was a noticeable deepening of the thermocline between 16 September and 2 October, which coincides with a period of very high winds shown in **Figures 1 and 2**.

Several of the oxygen profiles show better-defined deepening of the mixed layer that can be attributed to wind-aided mixing. Station 5 in **Figure 5**, for example, shows that the depth of the mixed layer drops from 6 m on July 15 to about 7 m by August 25, 8.5 m by September 16 and 9.5 m by October 2. The same progression can be seen in station 4 and station 5.

In conclusion, changes in the structure of the water column that could be attributed to high winds were observed, but overall the level of resolution afforded by these profiles does not allow for more concrete analyses and conclusions.

Internal Loading of Soluble Reactive Phosphorus

Soluble reactive phosphorus (SRP) is the most limiting nutrient for phytoplankton growth in Conesus Lake. We documented maxima in near surface SRP with on 16 June, July 7, July 28, September 2 and October 2 (**Figure 7, Appendix II**). Nitrates were low or not detectable in all of those samples, as they were most of the summer, indicating that the spikes in SRP were likely due to internal loading of phosphorus by partial mixing rather than to external loading, which would deliver nitrates and phosphorus into the lake.

Precipitation data indicated that external loading could not have been the cause of the phosphorus peaks. There were no major rain events in mid June that could produce significant external loading. Similarly, there was no significant rainfall between our collections on the 30th of June, which showed very low SRP values, and our collections on 7th of July, which showed very high SRP concentrations. Rain on the 7th was recorded in the evening and late at night long, after we had collected our water samples. As in early July, there was no significant rainfall event between the 21st of July and the 28th of July, yet median SRP levels more than tripled between those two dates. On September 2 we measured a small increase in SRP, but there had been no significant rainfall during the previous ten days. Lastly, we documented an increase in SRP from levels that were generally not detectable on September 16 to a median of 3.9 (max 6.2) µg/L on our next sampling, October 2. This increase in surface SRP was matched by major losses of SRP from near-bottom areas, a sign that the major fall turnover had begun in the north basin.

Indicators of Phytoplankton Biomass Related to SRP Levels

Data on turbidity, secchi depth, chlorophyll *a in vivo* and *in vitro* and numerical abundance of colonial and unicellular cyanobacteria show a definitive pattern of blooms that is consistent with changes in phosphorus levels in surface waters. There was a massive bloom of cyanobacteria from mid to late July, which we recorded in our samples beginning on July 15. This is shown very clearly in the in *vivo* fluorescence profiles shown in **Figure 5, Appendix I**, which coincide with extremely high turbidity values of 6.96-11.96 NTU and *in vivo* chlorophyll a values of 18.58-22.37 µg/L (**Table 2**, **Appendix III).**

Overall, the *in vivo* chlorophyll *a* data, which indicate the total biomass of phytoplankton in the water column, showed an increase in biomass starting on June 30, through July 6 and peaking on July 15, before declining to a low point on August 4 and 19 and ticking up again by September 2nd (**Figure 8**). In late September, specifically by October 2nd , the fall turnover had begun after several days of high winds, SRP levels were up once again, and chlorophyll *a* levels increased to an median of 12 µg/L, more than twice what they had been in August.

The peaks and lows in the seasonal chlorophyll a data, turbidity and secchi depth are consistent with the trends in surface SRP, which show peaks on the 7th of July, the 28th of July and on September 2nd and once again on October 2nd when complete turnover had begun. These SRP trends, in turn, can be connected to wind patterns that caused partial mixing of the water column.

Corresponding Increases in Biomass of Cyanobacteria

We closely monitored the abundance of cyanobacteria throughout the sampling season by counting numbers of colonies using a dissection microscope and numbers of single cell cyanobacteria by their fluorescence in a compound microscope. We did not keep track of microalgal abundance (e.g. diatoms, dinoflagellates), consequently there is no way to know how much of the chlorophyll in was of cyanobacterial origin. However our colony and cell counts show very clearly that cyanobacterial numbers were consistent with the trends in chlorophyll *a* and with other estimates of phytoplankton biomass.

Trends in cyanobacterial abundance are shown in **Figure 9** in cells/mL and in **Appendix IV in** colonies/L**.** There was a massive bloom of cyanobacteria in mid July. We first detected the bloom by the blue-green color of the lake water. This color is typical of cyanobacteria and their characteristic blue-green pigment, phycocyanin. Colony counts exceeded 125/ mL in skim samples (**Figure 9A, Table 3**). The dominant types were in the genus *Anabaena*, although *Microcystis*, *Oscillatoria*, and *Lyngbia* were also present. The bloom also consisted of unicellular cyanobacteria in very high numbers ranging from 0.26 – 0.32 x 10^6 cells/mL. We tentatively assigned the single-celled species to the common genera *Synechocystis* and *Synechococcus,* which have been identified in Conesus Lake in previous years (Forest et. al., 1978; Makarewicz *et al*., 2013). Samples have been sent to taxonomic experts for analysis and identification.

Cyanobacteria numbers continued to be high into late July, but by August 4 and into September the colony numbers had dropped to fewer than 25 /mL (**Table 3, Figure 9A)**. and the abundance of single celled species had declined to an average of 0.19 x 10^6 cells/mL on August 4 and 0.13 x 10^6 cells/mL on August 11.

Starting on the 3rd of September and coinciding with a slight uptick in surface SRP, cyanobacterial numbers increased to a peak on September 23rd of more than 200 colonies/mL and single cell numbers ranging from 0.17-0.37 x 10^6 cells/mL. The numbers continued to be high into mid-October, beyond which growth seems to have abated as a result of decreasing temperatures. By October 19, colony numbers were 10.5 /mL and single cell species averaged 0.094x10^6 cells/mL.

In summary, the colonial and single celled cyanobacteria bloomed in mid-July, late September and early October. These blooms correspond very nicely to major (Jul. 15, Oct. 2) and minor (Sep. 2) upticks in SRP that were related to wind-aided mixing of the water column. Studies of these interactions at finer spatial and temporal scales will be needed to fully establish these connections, but we believe the data presented in this paper is evidence that partial mixing of the water column during the summer may be an important trigger for cyanobacterial blooms in Conesus Lake.

Cyanotoxins in Conesus Lake

The results of ELISA immunoassays designed to detect low levels of microcystins and anatoxins are shown in **Table 4**. Cyanotoxin levels in general were not detectable even in samples taken during the massive bloom of colonial and single-celled species in mid to late July. The few positive results that were detected for microcystins were orders of magnitude below the threshold public health advisory level of 6.0 µg/L and the recreational no contact advisory 20 µg/L. Anatoxin levels were less than 5% of the 80 µg/L threshold for recreational public health advisory and well below the 300 µg/L threshold for recreational no contact advisory (Graham *et al.*, 2008). All of the species that we identified are capable of producing microcystins or other toxins. However, to our knowledge, only blooms of *Microcystis aerugionosa* in Conesus Lake have ever shown significant a level of toxicity (Makarewicz *et al*., 2009).

V. Conclusions

The results of this study support the hypothesis that delivery of phosphorus to surface waters by wind-driven partial mixing of the water column in summer can trigger the onset of basin-wide blooms of cyanobacteria. The sequence of events that produce these blooms are more likely to unfold in the north basin, where water column stratification may be less stable due to shallower waters and a smaller hypolimnion volume. Our findings not only add to our understanding of bloom formation but also improve our ability to anticipate and prepare for their onset in Conesus Lake.

Another significant finding of this project was that *Anabaena* species were the dominant cyanobacteria in 2015, while *Microcystis aeruginosa*, a frequently toxic species, was never present in high concentrations. *Anabaena* species are unusual in having the ability to fix molecular nitrogen into biologically usable forms such as nitrate and ammonium. Environmental factors such as external nutrient loading or hot temperatures can also favor outbreaks of cyanobacteria. It may be that partial mixing of phosphorus from bottom waters creates conditions that favor nitrogen-fixers like *Anabaena*, whereas species like *Microcystis aeruginosa* that are incapable of fixing nitrogen are more likely to dominate after external loading events which deliver both phosphorus and nitrogen to the lake. Further research is needed to explore the role of these other potential triggers and to establish the relative importance of wind-driven partial mixing in promoting blooms.

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Table 1. Total Phosphorus and soluble reactive Phosphorus at the surface (0-3 m and off the bottom (~1 m above) for sampling dates in 2015 from analyses by Ted Lewis and his lab in SUNY Brockport. Data are reported in micrograms per liter (µg/L). Note the gradual increase in P at near the bottom until mixing by October 2. Increases in soluble reactive phosphorus near the surface on 16 June, 7 July, 28 July, 2 Sep and 2 Oct took place after days with high winds.

Total P Bottom	16-Jun	30-Jun	7-Jul	21-Jul	28-Jul	4-Aug	18-Aug	2-Sep	16-Sep	2-Oct
Station 1	14.9	21.7	32.6	18.2	20.2	24.2	24.2	22.6	20.8	29.9
Station 2	14.5	39.7	14.9	41.2	25.1	24.3	21.1	24.2	22.1	31.8
Station 3	19.0	9.9	14.2	26.1	24.2	42.6	45.8	102.1	57.4	36.7
Station 4	11.5	44.2	14.5	15.9	76.3	69.0	280.4	39.4	77.2	31.9
Station 5	11.1	12.3	24.7	26.3	35.9	48.3	96.3	174.5	159.0	27.0
Mean	14.18	26.55	25.58	17.07	25.54	36.32	41.67	93.56	72.54	31.86
St. Dev.	3.17	15.67	15.67	5.09	9.90	23.09	18.70	108.72	65.60	3.96
Total P Surface	16-Jun	30-Jun	7-Jul	21-Jul	28-Jul	4-Aug	18-Aug	2-Sep	16-Sep	2-Oct
Station 1	16.3	24.5	29.6	18.9	21.8	18.6	21.1	18.6	21.0	32.3
Station 2	25.3	21.3	22.8	23.8	22.1	22.2	18.4	22.2	21.1	30.4
Station 3	24.4	20.0	25.9	23.3	18.7	19.4	23.2	19.4	22.2	27.5
Station 4	29.8	18.9	24.7	24.7	17.5	21.4	21.9	21.4	20.2	26.2
Station 5	30.7	25.8	40.7	25.9	20.5	24.8	17.5	24.8	18.1	27.6
Mean	25.30	22.07	28.73	23.33	20.11	21.29	20.43	21.29	20.53	28.79
St. Dev.	5.72	2.94	7.12	2.66	1.98	2.46	2.41	2.46	1.54	2.45
Soluble P Surface	16-Jun	30-Jun	7-Jul	21-Jul	28-Jul	4-Aug	18-Aug	2-Sep	16-Sep	2-Oct
Station 1	5.0	1.3	12.1	2.4	6.5	0	0	1	0	4.8
Station 2	2.1	0.0	10.5	1.0	7.1	0	0	3.2	1.2	3.9
Station 3	3.5	0.0	9.1	1.0	2.8	0	0	1	0	1.9
Station 4	6.8	0.0	12.8	1.0	5.7	0	0	1	0	6.1
Station 5	2.7	0.0	0.0	1.0	2.0	0.0	0	1	0	1.7
Mean	4.02	0.26	8.92	1.29	4.83	0.00	0.00	1.44	0.24	3.68
St. Dev.	1.90	0.58	5.19	0.64	2.29	0.00	0.00	0.98	0.54	1.89
Soluble P Bottom	16-Jun	30-Jun	7-Jul	21-Jul	28-Jul	4-Aug	18-Aug	2-Sep	16-Sep	2-Oct
Station 1	5.2	0	1.9	1.0	3.4	0	0	6.4	0	3.1
Station 2	2.0	0	0.0	1.5	12.2	0	0	9.1	0	7.2
Station 3	2.9	0	0.0	1.0	3.6	23.4	13.6	62.3	36.6	2.7
Station 4	3.0	0	3.0	1.0	30.9	22.3	65.2	1	39.6	0.9
Station 5	4.8	0	2.3	1.0	3.4	31.0	24.8	85.9	129.6	0.6
Mean	3.58	0.00	1.43	1.10	10.70	15.34	20.72	32.94	41.16	2.90
St. Dev.	1.35	0.00	1.36	0.23	11.89	14.40	26.95	38.60	52.99	2.64

Table 2. Representative water clarity measurements: Turbidity (NTU), Chlorophyll a (ug/L) and Secchi depth (m), for each of the five stations throughout the sampling period.

Date	Depth	Average Turbidity (NTU)	Avg Chl *a* (µg/L)	Avg. Secchi Depth (m)
6/16/15	1	N/D	2.39	0.93
	3	N/D	3.10	
	6	N/D	2.42	
6/24/15	1	2.84	--	1.5
	3	3.12	--	
	6	2.97	--	
6/30/15	1	3.75	6.93	1.5
	3	3.57	3.73	
	6	3.50	8.95	
7/7/15	1	5.04	9.56	1.4
	3	5.18	12.33	
	6	5.89	18.88	
7/15/15	1	6.96	22.37	1.2
	3	11.90	21.73	
	6	7.39	18.58	
7/22/15	1	6.44	11.43	0.7
	3	6.08	17.69	
	6	3.80	13.85	
7/28/15	1	4.88	7.98	1.2
	3	6.01	13.03	
	6	4.84	11.85	
8/4/15	1	1.46	6.82	2.6
	3	1.47	8.20	
	6	1.71	6.05	
8/11/15	1	1.28	--	2.9
	3	1.19	--	
	6	1.22	--	
8/19/15	1	1.84	6.40	2.6
	3	2.09	5.74	
	6	2.13	3.12	
8/25/15	1	1.50	--	2.5
	3	2.08	--	
	6	1.96	--	
9/2/15	1	1.15	8.93	2.5
	3	1.20	7.51	
	6	1.20	9.22	
9/9/15	1	1.31	--	2.3
	3	1.54	--	
	6	1.45	--	
9/16/15	1	1.44	9.06	2.5
	3	1.67	11.97	
	6	1.45	9.93	
9/24/15	1	1.62	--	2.6
	3	1.90	--	
	6	1.45	--	
10/2/15	1	1.97	12.17	2
	3	1.90	11.4	
	6	2.00	12.2	
10/19/15	1	1.41	--	1,7
	3	1.43	--	
	6	1.3	--	

Table 3. Abundance of cyanobacteria colonies in surface skim and in grab samples (0.3 m depth). Peaks in colony abundance are highlighted in boldface font.

Collection Date	Skim Colonies per mL	Grab Colonies per mL
16-Jun	0.1	
23-Jun	0.7	1.0
30-Jun	3.5	1.0
7-Jul	30.0	19.7
15-Jul	92.0	47.0
21-Jul	**133.7**	**70.0**
27-Jul	40.8	54.0
4-Aug	5.8	5.5
18-Aug	23.3	26.3
25-Aug	20.6	24.4
2-Sep	31.0	26.3
8-Sep	70.0	32.0
16-Sep	116.0	86.7
17-Sep	**128.0**	59.0
24-Sep	**210.0**	**116.7**
2-Oct	49.0	38
8-Oct	**139.5**	**129.5**
20-Oct	10.5	

Table 4. Microcystin and anatoxin concentrations in skim samples taken at sampling stations. These collections were made only at times when cyanobacteria colonies were visible or when the color of the water indicated there was a bloom of single cell cyanobacteria (blue-green color). ND: not detectable.

Date	Station	Microcystin (µg/L)	Anatoxin (µg/L)
15-Jul	1	N.D.	N.D.
	2	0.000143556	N.D.
	3	N.D.	N.D.
	4	N.D.	N.D.
	5	N.D.	N.D.
22-Jul	1	0.000163441	3.128
	2	N.D.	3.273
	3	N.D.	N.D.
	4	N.D.	N.D.
	5	N.D.	4.852
4-Aug	1	N.D.	N.D.
	2	N.D.	N.D.
	3	N.D.	N.D.
	4	N.D.	N.D.
	5	N.D.	N.D.
25-Aug	1	N.D.	N.D.
	2	N.D.	N.D.
	3	N.D.	N.D.
	4	0.000116504	N.D.
	5	N.D.	N.D.
2-Sep	1	N.D.	N.D.
	2	N.D.	N.D.
	3	N.D.	N.D.
	4	N.D.	N.D.
	5	N.D.	N.D.
16-Sep	1	N.D.	--
	2	N.D.	--
	3	N.D.	--
	4	N.D.	--
	5	N.D.	--
23-Sep	1	N.D.	N.D
	2	N.D.	N.D.
	3	N.D.	N.D.
	4	N.D.	N.D.
	5	N.D.	N.D.
	5	N.D.	--

FIGURES

Figure 1. Maximum sustained wind velocities in miles per hour for Dansville Airport. The horizontal dashed line in each plot is the 15 mph wind threshold. Only a subset of high winds blew along the long fetch of the lake, which we defined as any winds coming from the northern or southern quarters of the lake.

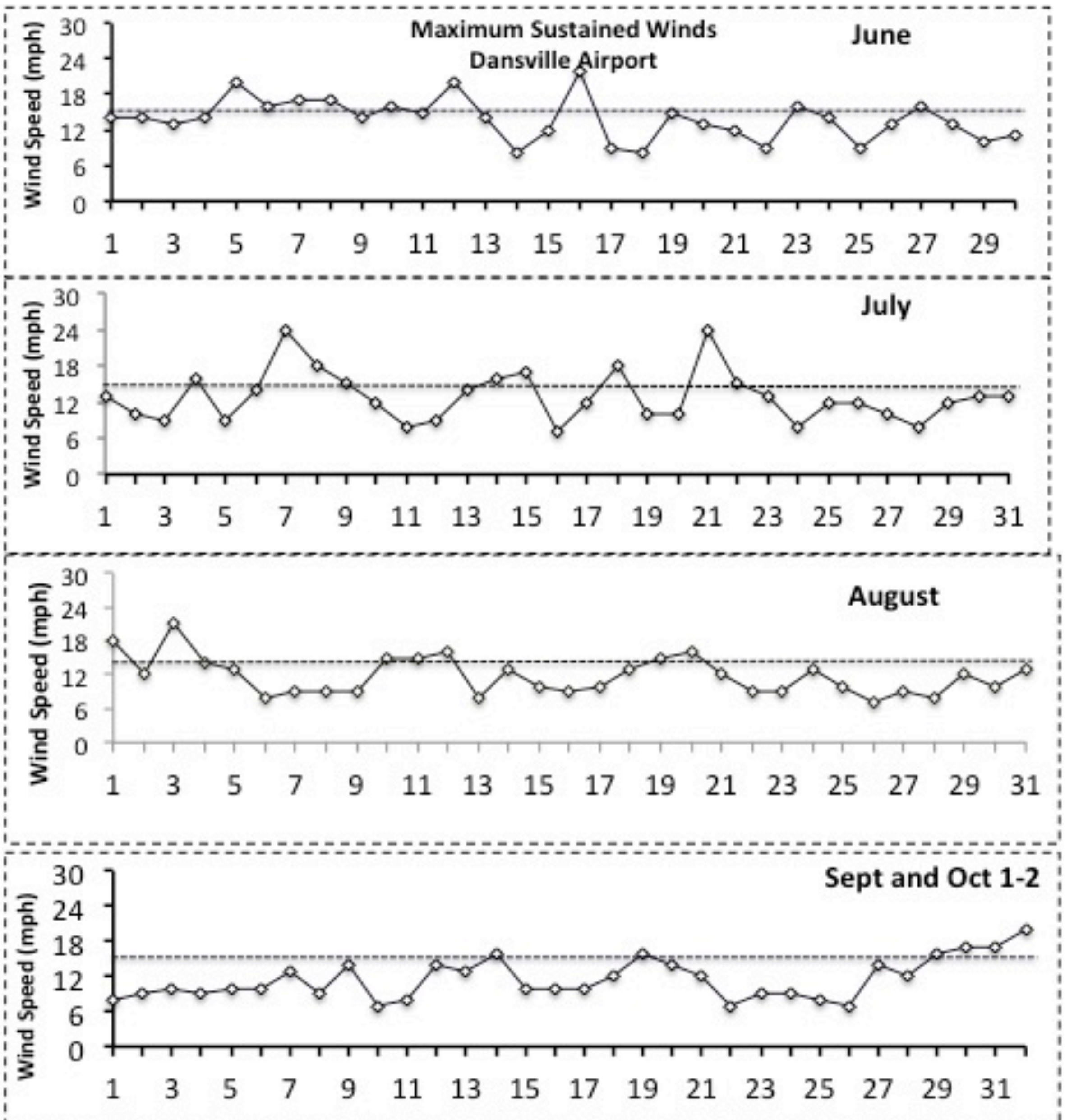


Figure 2. Local wind data in Conesus Lake gathered by a Weather Underground weather station named Frosty's on the Lake on West Lake road, Sleggs Landing. This station was located at the end of a dock along the north west side and is probably the most representiative weather station for local winds. The patterns matched those of the Dansville airport rather loosely but wind speeds were generally lower.

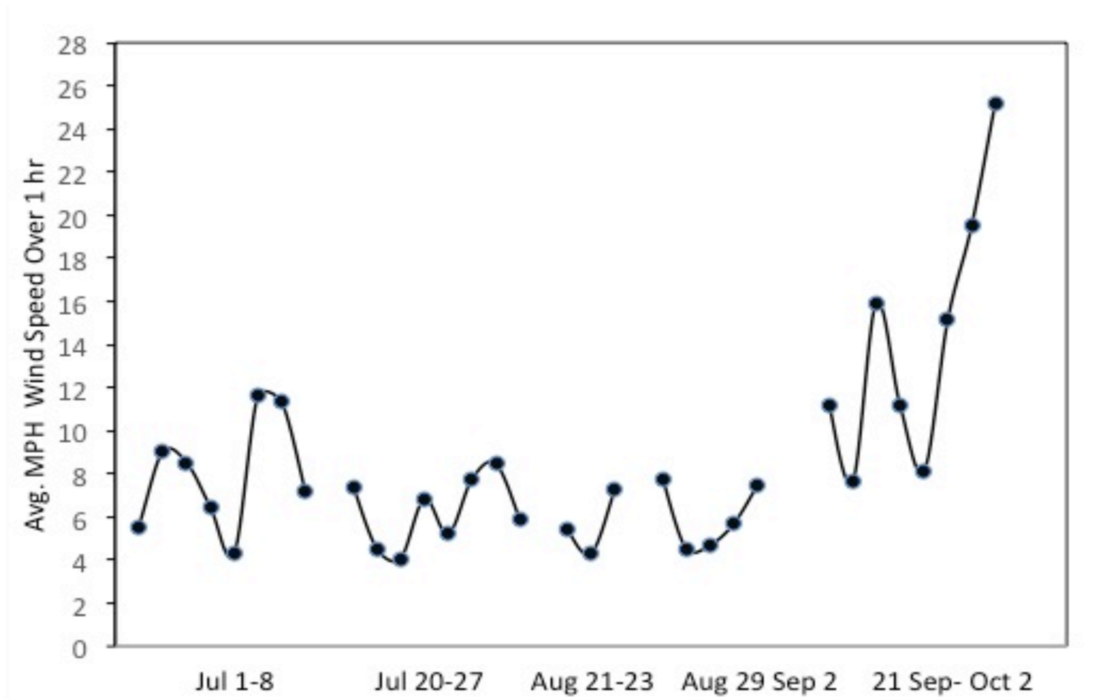


Figure 3. Map of Conesus Lake showing the five stations in the North Basin that were sampled weekly from June 16 to October 20, 2015.

Conesus Lake

Station #	Depth (m)	Land mark
1	9	**Wilkins Creek** (stratifies ~2m above bottom) 42°49'29.49 N , 77°42'12.33 W
2	9	**Stella-Maris West** (stratifies ~ 2 m above bottom) 42°48'28.53 N , 77°42'51.72 W
3	9	**Stella-Maris Mid-Lake** (stratifies ~2 m above bottom) 42°48'18.89 N , 77°42'33.32 W
4	13	**Stella- Maris East** (stratifies ~ 6 m above bottom) 42°48'28.73 N, 77°42'12.39 W
5	13	**Old Orchard Point** (stratifies ~ 6 m above bottom) 42°47'25.49 N, 77°42'55.53 W

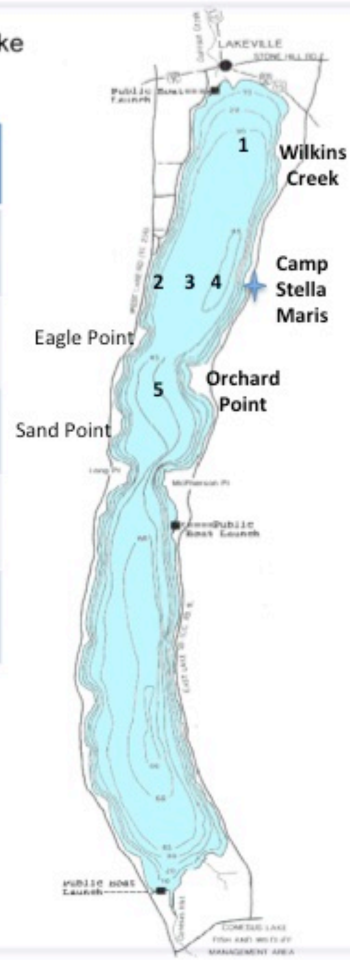


Figure 4. Representative profiles of temperature, showing times when partial water column mixing may have occurred by July 15, Sep 15, 2 Oct 2 and finally at turnover on October 19.

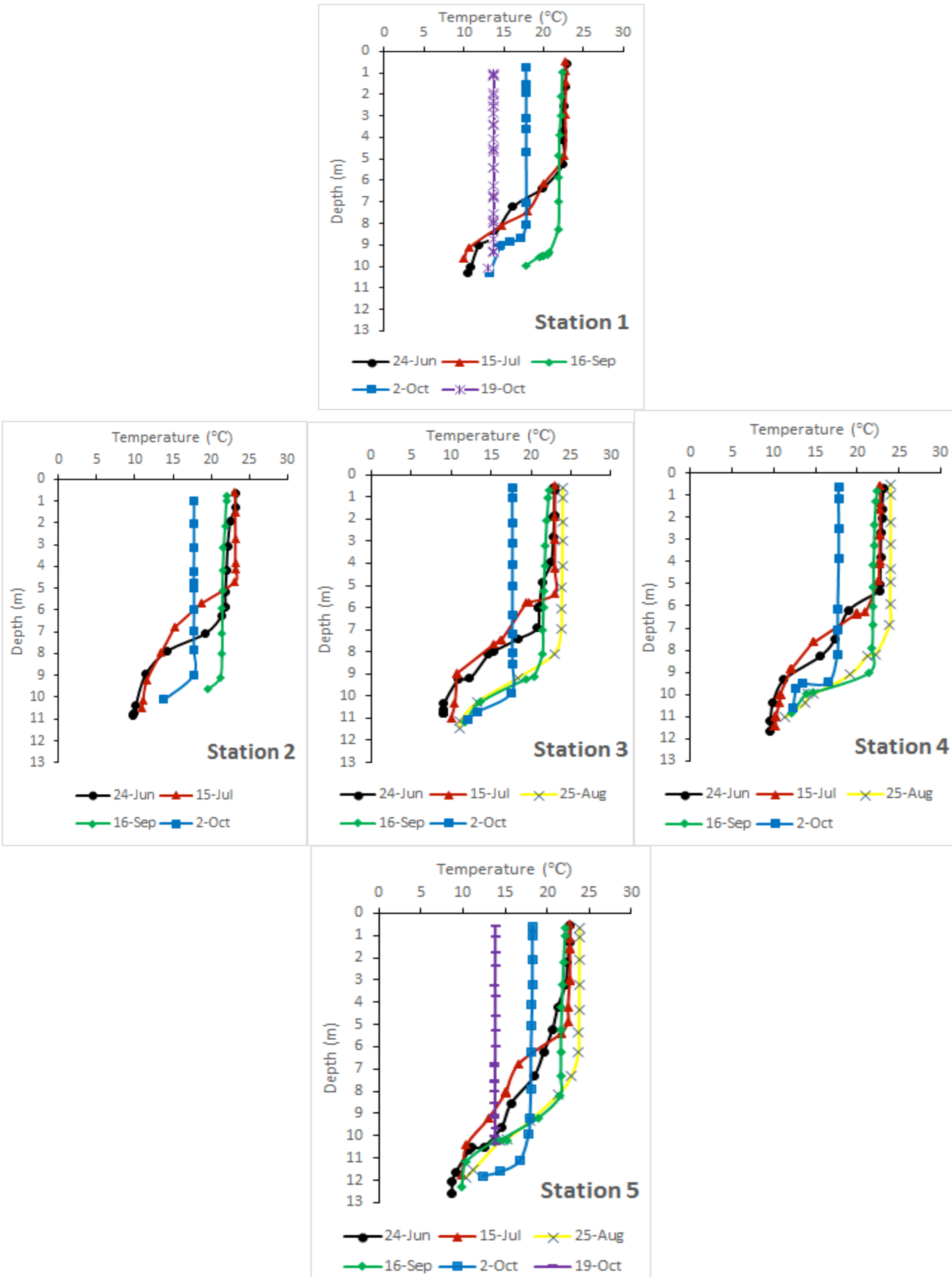


Figure 5. Oxygen profiles showing changes in stratification as described in figure 4. The deepening of the oxygen transition zone is more obvious in the oxygen profiles in than the temperature profiles.

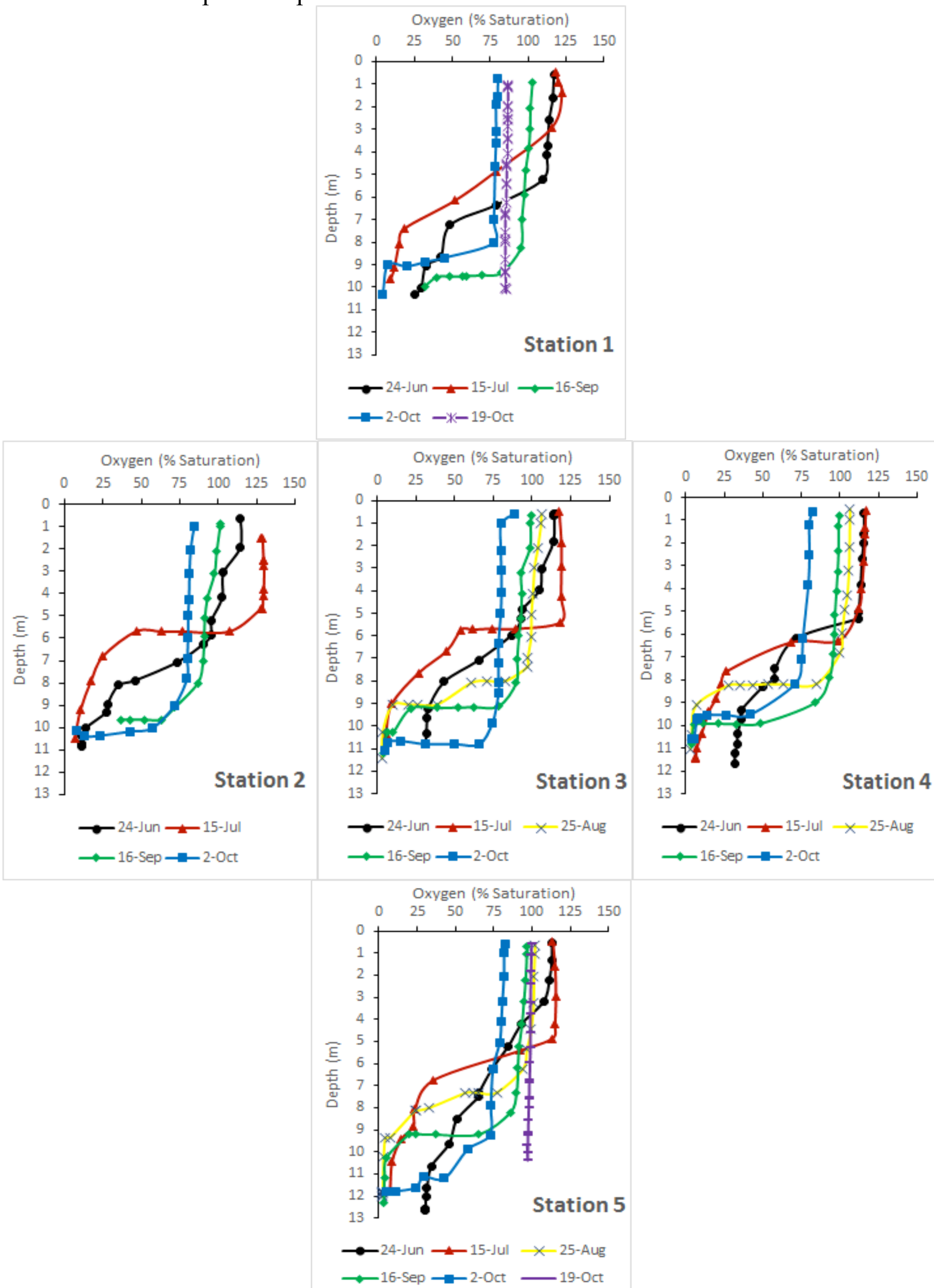


Figure 6. *In vivo* chlorophyll *a* profiles as millivolts for the same dates as in Figures 4 and 5. The massive mid-July basin-wide bloom of single cell and colonial cyanobacteria is shown by the line with red triangles.

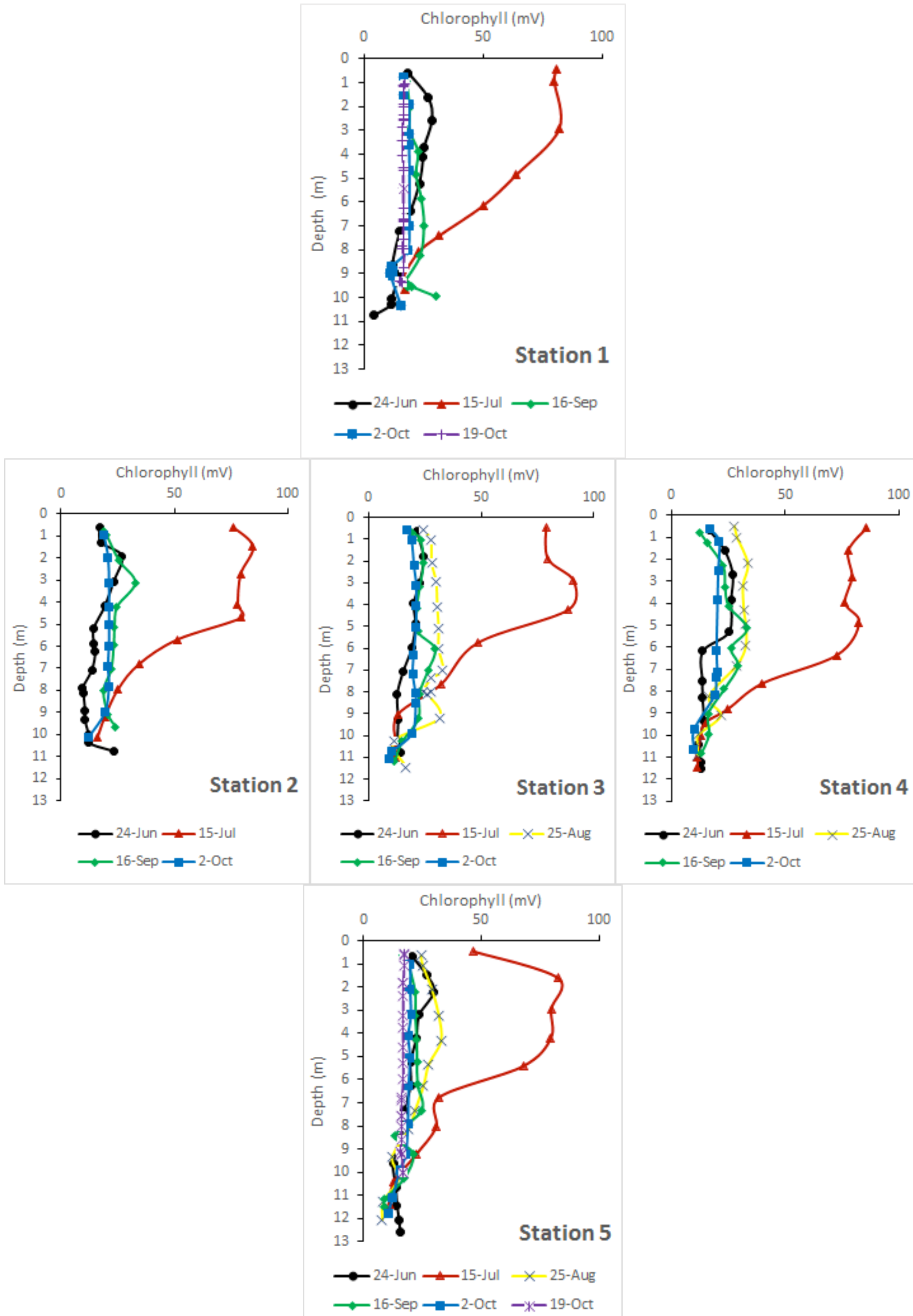


Figure 7. These Boxplots show the concentration of soluble reactive phosphorus at the surface (0-2 m integrated; top graph) and near the bottom for all five stations over the sampling season. The horizontal line across the box plot is the median, the box itself delineates the middle quartile and the whiskers are the minimum and maximum values not including outliers (circles).

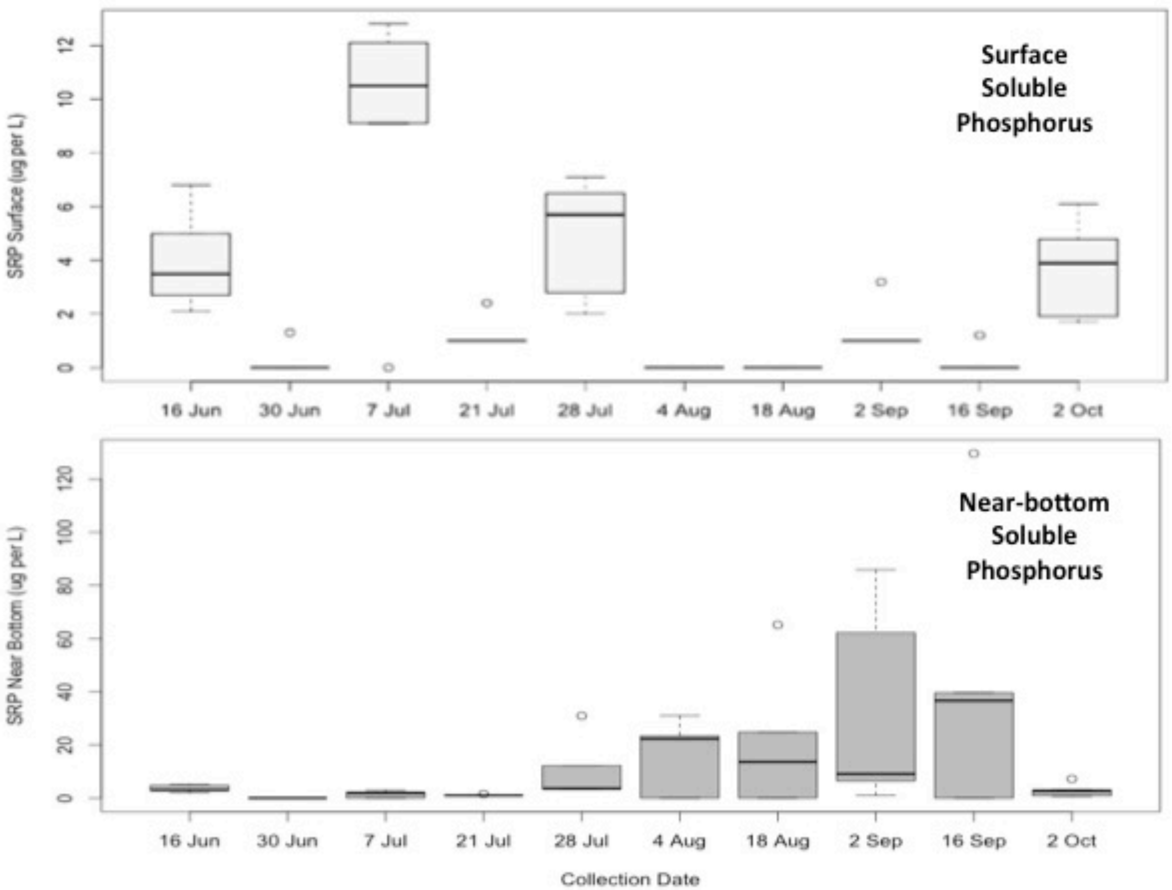
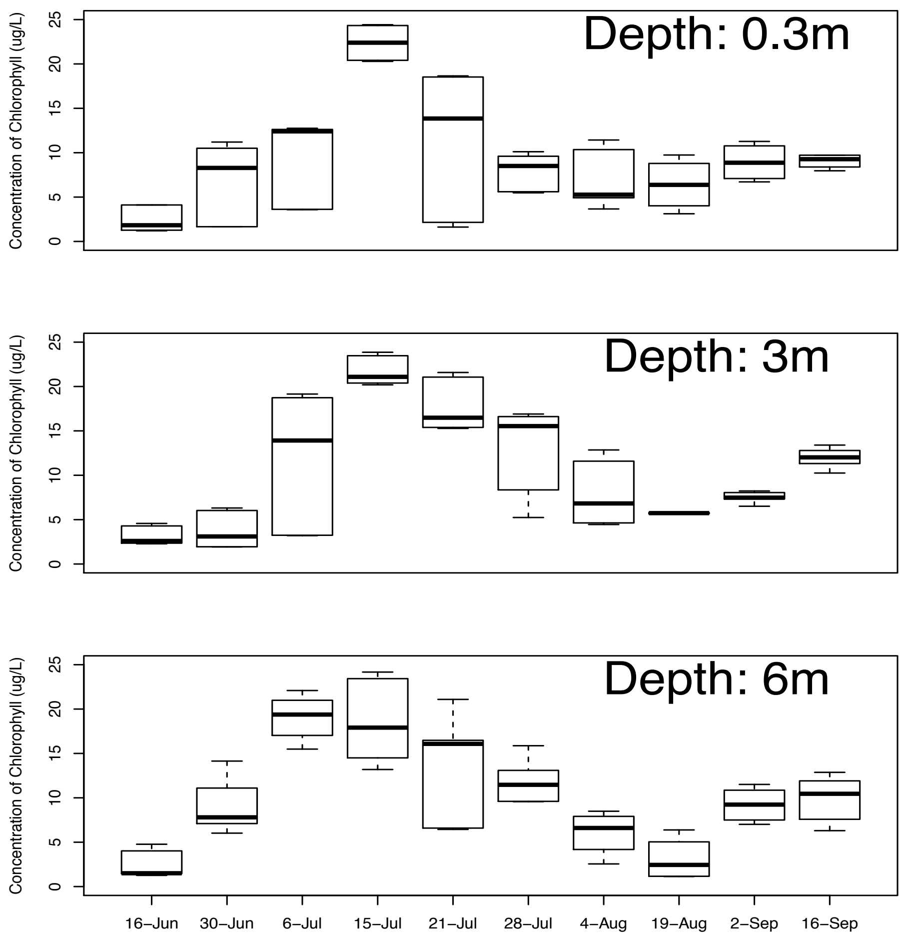


Figure 8. Box plots of Chlorophyll a concentrations in micrograms per liter for samples taken at different depths (A) and for all data combined (B). See explanation of boxplots in figure 7.

A.



B.

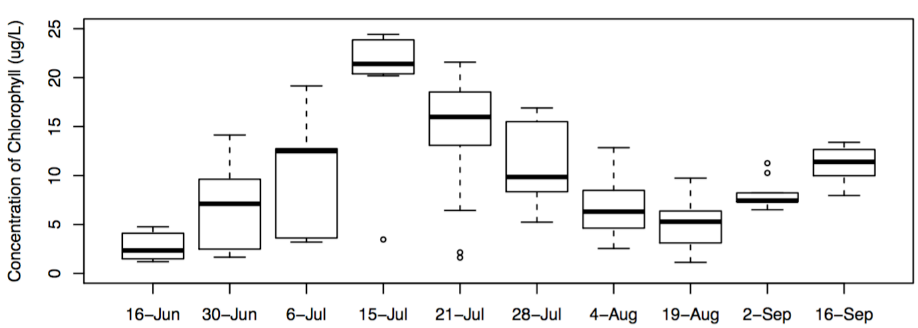
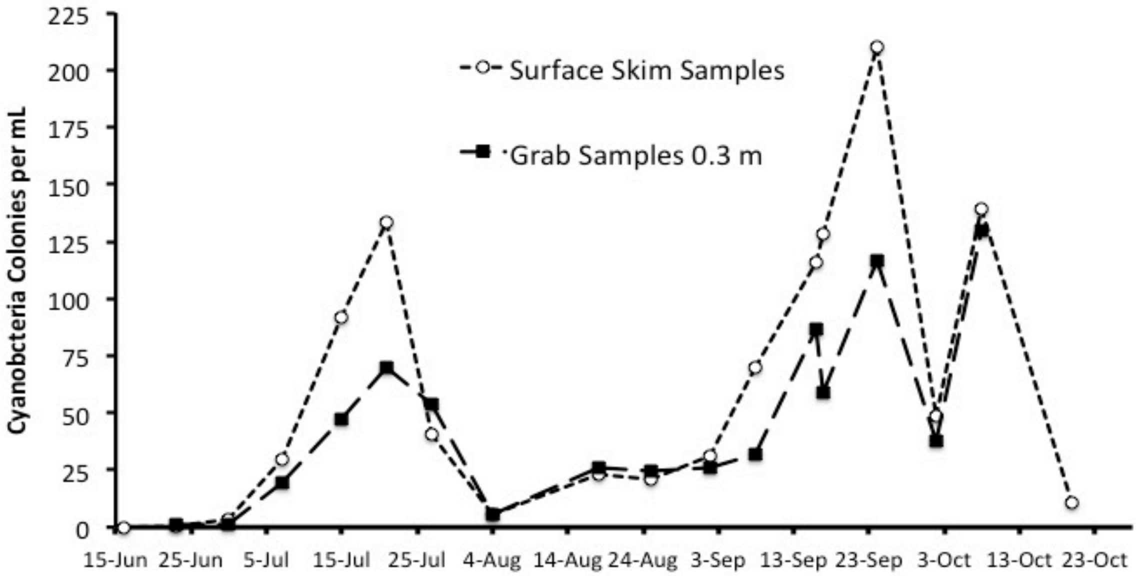


Figure 9. Concentrations of cyanobacteria colonies (colonies/mL) collected in skim samples and in samples taken from a depth of 0.3 m. Major blooms in mid July, late September and early October are evident.



Appendix I:
Tables of Raw Profile Data for June 16 to October 19, 2015

June 16, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR(uE/s /m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 6/16/15	0	23.21	97	442	521	123.1	10.51	24
	1	23.02	96	426	392	123.6	10.59	29.6
	2	22.87	97	427	310	123.4	10.57	29.8
	3	22.64	95	428	148	123	10.61	25.2
	4	20.39	102	447	90	111.5	9.68	21.2
	5	18.77	108	440	19	93.8	8.73	14.4
	6	17.88	106	435	3	91.7	8.54	13.9
	7	17.41	111	441	1	79.8	7.53	12.9
	8	17.22	111	441	1	76.5	7.09	12.4
	9	15	118	442	1	63.5	6.39	11.6
	10	12.56	118	447	0	56	5.95	12.2

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR(uE /s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
St 2 6/16/15	0	23.02	102	427	461	121.8	10.49	18.6
	1	22.73	96	425	206	122	10.51	30.4
	2	22.17	95	428	189	122.1	10.65	39.7
	3	22.09	98	428	101	120.7	10.52	41.5
	4	21.69	101	430	16	114.5	10.06	32.3
	5	20.53	105	436	11	109.2	9.81	19.6
	6	18.89	109	441	5	94.2	8.75	11.3
	7	15.37	116	442	1	75	7.49	11
	8	14.78	120	437	1	63.5	6.56	10.9
	9	12.29	124	447	0	41.6	6.21	12.3
	10	10.79	131	456	0	30.9	3.42	19.1

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 6/16/2015	0	22.6	130	431	1306	118.5	10.3	17.5
	1	22.07	136	428	493	118.1	10.27	19.8
	2	21.98	143	428	300	118.6	10.35	36
	3	21.66	145	429	129	117.9	10.37	35.7
	4	20.99	145	434	28	114.7	10.21	29.7
	5	20.1	148	439	15	113.6	10.29	20.4
	6	19.42	153	439	5	110.6	10.16	19
	7	18.12	161	440	2	93.5	8.79	12.5
	8	16.43	163	436	11	87.4	8.25	11.8
	9	16.28	169	438	1	68.7	6.73	10.8
	10	13.39	180	439	1	60	6.26	11.8
	11	9.41	193	451	0	36.5	4.17	14

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 6/16/2015	0	22.93	100	427	405	123.4	10.58	34.2
	1	22.98	101	428	398	123.6	10.6	32.4
	2	22.59	100	427	207	122.9	10.61	39.8
	3	21.9	103	428	68	121.4	10.45	31.5
	4	21.87	107	437	20	117.1	10.25	19.7
	5	19.94	105	438	10	114	10.36	16.2
	6	19.21	111	441	7	99.1	9.15	17.1
	7	18.66	116	442	3	86.2	8.04	14.4
	8	17.88	121	441	1	81.7	7.74	13.2
	9	17.81	120	438	1	78.9	7.49	11.4
	10	14.06	128	442	0	61.4	6.31	10.7
	11	9.27	139	448	0	33.2	3.8	17.3

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 6/16/2015	0	22.64	166	425	902	121.7	10.5	37
	1	22.63	169	426	414	115.9	10.02	40.9
	2	22.32	167	431	141	112.8	9.93	30.7
	3	20.36	180	428	53	111.3	9.77	20.7
	4	19.49	183	435	16	105	9.63	16.7
	5	19.39	195	436	4	96.8	8.9	16.4
	6	18.79	206	438	1	92	8.56	15.9
	7	17.14	213	438	0	82.7	7.96	14.4
	8	16.14	238	440	0	72	7.08	11.5
	9	13.74	247	443	0	67.9	6.88	11.1
	10	ND	ND	ND	ND	ND	ND	ND
	11	ND	ND	ND	ND	ND	ND	ND
	12	8.77	300	449	0	38.9	4.51	13

June 24, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 6/24/2015	0	22.89	107	454	1998	116.8	10.02	18.9
	1	22.87	106	454	620	116.6	10.03	26.6
	2	22.51	106	454	340	113.9	9.85	28.6
	3	22.47	107	454	46	112.6	9.82	27.7
	4	22.46	107	454	27	112.2	9.71	24.9
	5	22.42	106	455	13	109.6	9.49	23.3
	6	20.4	121	462	7	78.9	7.18	19.6
	7	16.11	134	471	3	48.5	4.79	15.2
	8	13.71	137	473	2	42.3	4.41	11.7
	9	11.88	140	478	1	32.5	3.5	14.3
	10	10.87	141	478	1	29.4	3.24	11.6
	11	10.49	142	481	1	25.5	0.51	4.1

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 6/24/2015	0	23.16	120	452	2310	114.4	9.77	16.9
	1	23.16	121	453	1068	114.3	9.76	17.7
	2	22.52	123	453	447	114.4	9.89	26.9
	3	22.17	124	454	284	103.5	9	23.2
	4	22.03	124	454	130	102.6	8.96	19.3
	5	21.86	125	455	11	95.7	8.38	14.4
	6	21.44	127	456	5	90.3	7.97	15.1
	7	19.27	136	462	4	73.2	6.75	13.6
	8	13.67	151	473	3	46	3.56	9.8
	9	11.43	154	479	4	27.9	3.04	10.6
	10	10.38	157	485	4	13.9	1.56	12.1
	11	9.81	157	474	4	10.9	1.24	4.2

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 6/24/2015	0	22.94	106	453	2846	114.4	9.82	19.2
	1	23	106	453	840	114.3	9.81	20.6
	2	22.94	107	453	470	113.8	9.76	24.3
	3	22.65	108	453	291	106.6	9.19	22.6
	4	22.52	107	453	40	105	9.07	20
	5	21.47	114	457	21	93.3	8.23	20.7
	6	20.95	118	459	17	86.5	7.71	19.2
	7	18.41	128	465	8	65.5	6.14	15.3
	8	14.65	137	471	3	43.1	4.37	12.6
	9	10.87	141	477	1	32.5	3.59	13.1
	10	9.1	143	476	3	31.6	3.64	12.8
	11	8.98	143	477	3	31.1	3.62	13.6

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 6/24/2015	0	23.17	110	454	2105	115.7	9.88	16.9
	1	23.13	110	454	1837	115.7	9.89	16.6
	2	22.96	110	454	558	115.3	9.89	23.5
	3	22.85	110	453	344	114.3	9.82	26.9
	4	22.75	110	454	116	113.5	9.76	26.2
	5	22.75	109	453	35	112.2	9.66	25.4
	6	19.02	131	464	17	71.6	6.66	13.7
	7	19	136	467	6	57.9	5.56	13.6
	8	17.34	139	471	1	50.4	5.05	14
	9	11.23	144	476	1	36.1	3.95	13.7
	10	9.86	145	477	3	33.4	3.78	12
	11	9.59	146	477	4	31.9	3.64	12.9
	12	9.54	146	477	3	31.6	3.63	13.1

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 6/24/2015	0	22.7	152	454	2922	113	9.73	22
	1	22.63	150	453	359	112.9	9.74	25.7
	2	22.41	151	454	188	111.3	9.64	29.9
	3	22.16	152	453	70	107.5	9.35	23.7
	4	21.25	156	456	31	93.1	8.25	22.4
	5	20.6	159	458	15	84.3	7.57	20
	6	19.57	165	461	19	73.8	6.76	20
	7	18.39	169	464	1	65.2	6.11	17.3
	8	15.7	173	469	1	50.9	5.05	15.9
	9	14.55	174	471	3	45.9	4.67	12.6
	10	10.51	176	480	3	34.2	3.79	13.7
	11	9.11	177	476	2	31.4	3.61	14
	12	8.72	177	477	1	30.7	3.57	15.1

June 30, 2015

Station & Date	Depth (m)	(C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 6/30/2015	0	21.64	154	410	2213	113	9.94	11.43
	1	21.6	152	410	1238	113.1	9.95	15.46
	2	21.61	152	410	747	113.2	9.96	15.34
	3	21.57	150	410	431	113.2	9.97	17.49
	4	21.55	150	410	160	112.9	9.95	17.76
	5	21.49	149	410	69	112.6	9.93	18.69
	6	21.46	148	410	28	111.4	9.83	20.05
	7	21.45	148	410	7	110	9.78	20.28
	8	21.43	147	410	6	110	9.71	21.09
	9	17.52	169	422	1	40.4	3.86	12.79
	10	10.63	177	440	1	32.9	3.39	8.55
	11	10.75	178	436	1	18	2	9.75

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 6/30/2015	0	21.43	194	410	307	110.4	9.75	23.8
	1	21.43	190	410	319	110	9.72	23.8
	2	21.42	189	410	85	109.8	9.7	22.9
	3	21.37	187	410	58	108.3	9.58	24.3
	4	21.11	186	411	34	101.7	9.05	27.6
	5	20.63	189	416	13	88.1	7.91	24.2
	6	20.49	194	417	7	73	6.57	20.4
	7	19.38	203	422	5	55.8	5.13	17.6
	8	16.43	206	428	0	36.9	3.6	12.6
	9	11.09	212	442	1	9	0.99	13.8
	10	10.1	182	443	1	5	0.57	13.8
	11	10.09	194	443	2		0.57	13.8

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 6/30/2015	0	21.63	150	412	1746	108.6	9.55	11.25
	1	21.63	150	412	1099	108.8	9.57	11.27
	2	21.51	148	411	569	108.9	9.6	15.96
	3	21.43	148	411	246	108.5	9.58	16.49
	4	21.44	148	410	83	108.1	9.54	16.56
	5	21.34	146	410	36	106.9	9.45	17.82
	6	21.34	146	410	13	106.6	9.43	18.17
	7	20.94	149	413	17	88.2	7.86	13.98
	8	18.64	165	423	4	49.1	4.58	8.2
	9	15.14	168	430	2	37.2	3.73	6.62
	10	11.05	171	435	0	25.7	2.83	7.86
	11	9.91	175	440	2	11.1	1.25	7.92

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 6/30/2015	0	21.84	143	410	1319	112.3	9.84	13.18
	1	21.76	142	410	750	113	9.91	13.94
	2	21.7	140	410	452	113.1	9.94	16.67
	3	21.69	141	409	223	113.2	9.94	16.72
	4	21.62	140	410	203	113.1	9.95	17.5
	5	21.56	139	410	55	112.9	9.94	20.61
	6	21.56	139	410	25	112.5	9.91	19.98
	7	21.53	138	410	1	112	9.87	20.13
	8	16.59	161	426	6	46.4	4.25	10.14
	9	13.27	165	433	3	31.2	3.26	6.53
	10	10.1	169	439	4	13.9	1.97	10.41
	11	9.58	149	441	4	7.7	0.88	15.74

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 6/30/2015	0	21.53	160	411	399	108.6	9.57	25.4
	1	21.51	160	411	238	108.5	9.56	25.6
	2	21.51	159	411	190	108.3	9.54	25.8
	3	21.36	158	411	87	104.1	9.2	27.2
	4	21.37	158	411	47	102.9	9.1	26.3
	5	20.98	158	413	16	94.1	8.38	24.1
	6	20.05	169	420	6	68.8	6.24	18.2
	7	19.87	174	420	2	60.1	5.47	15.8
	8	18.67	178	409	2	50	4.67	13.3
	9	15.48	181	431	1	45.2	3.5	10.3
	10	11.49	183	434	3	30.1	3.28	10.6
	11	9.56	186	438	2	16	1.82	12.2
	12	8.77	133	438	7	16.1	1.87	12.6

July 7, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 7/7/2015	0	24.21	81	418	317	123.9	10.38	23.2
	1	24.17	79	418	201	123.9	10.37	29.3
	2	24.12	78	418	143	123	10.32	31.6
	3	24.12	79	418	97	122.9	10.31	31.8
	4	24.12	77	418	68	122.4	10.26	23.7
	5	24.08	76	417	42	121.7	10.22	33.1
	6	23.96	74	418	26	121.3	10.21	35.2
	7	20.6	83	413	11	54.7	5.77	17.6
	8	15.76	109	438	5	25	2.47	12.6
	9	15.03	110	432	2	25.2	2.53	12.4
	10	10.72	116	448	1	9.8	1.08	10.7

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 7/7/2015	0	ND	ND	ND	ND	ND	ND	ND
	1	23.82	64	418	556	121.5	10.25	23.1
	2	23.67	62	418	281	121.2	10.25	32.9
	3	23.3	62	418	235	120.1	10.23	34.8
	4	23.08	63	418	90	115.3	9.86	38.9
	5	22.34	67	415	35	100.3	8.7	41.1
	6	21.22	71	423	23	85.7	7.6	37.1
	7	20.24	81	427	13	61.2	5.53	35.1
	8	17.89	89	431	7	40.1	3.8	17.2
	9	16	93	436	3	26.9	2.66	13.9
	10	12.48	96	443	2	13.5	1.44	10.8
	11	10.25	93	450	1	3.9	0.44	11

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 7/7/2015	0	24.03	71	418	1094	124.4	10.46	21.6
	1	24	69	418	436	124.2	10.44	24.8
	2	23.78	68	418	188	124	10.47	33.4
	3	23.41	67	418	125	119.4	10.15	35.8
	4	23.34	67	419	41	112	9.54	35.5
	5	23.34	67	419	42	112	9.54	35.2
	6	22.42	68	420	26	103	8.92	43.1
	7	17.79	91	431	9	40.3	3.83	16.9
	8	18.05	94	430	7	37.3	3.52	17.1
	9	13.58	99	438	1	20.9	2.17	11.1
	10	11.28	101	445	1	17.5	1.91	10
	11	10.04	90	449	1	14.6	1.64	10

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 7/7/2015	0	ND	ND	ND	ND	ND	ND	ND
	1	23.92	66	418	564	123.9	10.43	27.2
	2	23.88	64	418	456	123.3	10.39	32.4
	3	23.87	63	418	217	123	10.36	33.2
	4	23.88	62	418	112	123.1	10.37	35.5
	5	23.84	61	418	41	122.6	10.34	38.4
	6	23.83	60	418	21	122.2	10.31	36
	7	19.99	82	432	12	48.3	4.39	19.4
	8	15.23	94	434	5	26	2.61	11.5
	9	12.39	96	439	1	23.7	2.53	9.8
	10	10.83	98	445	1	15.3	1.7	10.1
	11	10.06	99	447	1	10.2	1.15	10.2

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 7/7/2015	0	23.64	136	417	308	122	10.33	26.3
	2	23.58	132	417	150	121.7	10.32	31.6
	3	23.41	131	417	90	120.9	10.28	35.5
	4	23.27	129	418	54	118.5	10.1	39
	5	23.02	128	421	30	112.5	9.64	42.3
	6	21.87	132	421	15	93.3	8.17	37.9
	7	21.03	134	423	9	81.3	7.24	28.2
	8	15.85	154	435	4	28.2	2.79	11.6
	9	11.82	156	443	2	18.3	1.98	9.7
	10	9.66	158	446	1	12	1.36	9.5
	11	9.16	157	445	0	12.6	1.45	9.5
	12	9.09	154	431	0	12.6	1.45	10.1

July 15, 2015

Station & Date	Depth (m)	Temp (C)	pH	ORP (mV)	SpCond (uS/cm)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 7/15/2015	0	23.13	8.17	167	406	122.5	10.47	75.9
	1	23.16	8.18	165	406	128.7	11	84.6
	2	23.19	8.16	164	406	129.8	11.09	83.1
	3	23.18	8.16	164	406	129.9	11.09	79.1
	4	23.15	8.14	164	407	129.3	11.05	77.9
	5	23.13	8.11	164	408	127.6	10.9	79.5
	6	18.68	7.58	186	433	46.6	4.35	51.3
	7	15.18	7.35	191	439	25	2.51	34.4
	8	13.49	7.3	194	442	17	1.77	25.2
	9	11.59	7.27	197	443	10.3	1.12	19.3
	10	11.06	7.23	202	447	6.9	0.76	16
	11	10.95	7.23	202	447	6.6	0.72	46.7

Station & Date	Depth (m)	Temp (C)	pH	ORP (mV)	SpCond (uS/cm)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 7/15/2015	0	22.93	8.28	134	408	117.6	10.09	78.8
	2	22.94	8.31	135	408	118.9	10.2	79.7
	3	22.95	8.32	135	409	119	10.2	91.1
	4	22.96	8.3	135	409	118.7	10.18	88.7
	5	22.95	8.29	136	409	118.6	10.18	87.2
	6	19.46	7.87	156	430	50.6	4.64	48.4
	7	19.24	7.82	158	422	44.9	4.14	44.2
	8	15.38	7.64	165	437	26.5	2.65	32.1
	9	10.7	7.54	170	444	9.3	1.03	13
	10	10.45	7.51	173	446	5.6	0.63	11.9
	11	9.96	7.42	183	451	4.5	0.5	12.2

Station & Date	Depth (m)	Temp (C)	pH	ORP (mV)	SpCond (uS/cm)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 7/15/2015	0	22.75	8.18	157	410	116.7	10.04	85.9
	1	22.75	8.18	157	410	116.6	10.04	83.3
	2	22.75	8.18	157	410	116.5	10.03	77.8
	3	22.68	8.15	157	411	115.6	9.97	79.4
	4	22.64	8.12	156	411	114.1	9.84	76.4
	5	22.54	8.09	157	412	112.2	9.7	82.6
	6	19.88	7.76	170	426	68	6.19	72.7
	7	19.72	7.71	174	416	66.4	6.07	66.3
	8	14.65	7.48	181	439	22.8	2.31	37.3
	9	12.09	7.41	184	443	15.3	1.64	24.6
	10	10.76	7.38	186	442	10.8	1.19	12.8
	11	10.21	7.34	192	447	7.1	0.79	11.5

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 7/15/2015	0	22.64	154	411	113.4	9.78	46.7
	1	22.66	153	410	114	9.83	78
	2	22.68	153	410	115	9.91	82.5
	3	22.68	153	410	115.5	9.95	79.7
	4	22.45	154	413	114.9	9.95	79.6
	5	21.71	161	418	92.4	8.11	67.9
	7	16.64	176	435	35.8	3.49	32.2
	8	15.08	179	440	23.6	2.38	30.8
	9	12.97	182	442	14.9	1.57	22.2
	10	10.42	185	445	8.7	0.97	12.8
	11	9.89	186	445	7.9	0.89	11
	12	9.9	186	445	7.3	0.82	12

July 22, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 7/22/2015	0	24.37	134	401	334	120.5	10.06	22.7
	1	24.37	133	401	341	120.8	10.08	23.6
	2	24.33	134	401	105	120.9	10.11	29.2
	3	24.28	134	400	32	120.1	10.05	29.6
	4	22.25	145	412	10	90.4	7.86	30.1
	5	22.06	149	414	11	73.9	6.45	33.5
	6	21.66	151	415	1	66.8	5.87	27.9
	7	20.79	156	420	2	50.3	4.5	30.8
	8	20.13	157	423	1	39.2	3.55	26.5
	10	13.56	-10	449	3	3	0.32	10.5

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 7/22/2015	0	24.5	151	400	483	121.9	10.15	34.3
	1	24.5	151	400	483	121.9	10.15	34.3
	2	24.2	152	401	221	120.1	10.06	41.6
	3	24.11	153	402	85	115.3	9.67	37.7
	4	23.6	160	410	37	87.8	7.43	36
	5	22.94	160	409	11	88.6	7.6	36.1
	6	21.93	165	412	2	73.3	6.41	32.4
	7	21.9	165	412	1	73.4	6.42	31.5
	8	19.38	179	429	5	23.7	2.18	20.8
	9	16.62	181	442	4	7.6	0.74	23.9
	10	12.71	73	450	4	2.6	0.27	21.7

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 7/22/2015	0	24.32	164	401	350	119.8	10.01	28.2
	1	24.32	164	401	376	119.9	10.02	28.8
	2	24.28	164	402	225	119.6	10	36.9
	3	24.25	163	402	80	118.6	9.93	39.5
	4	24.12	164	402	35	114.7	9.62	40.5
	5	22.41	176	412	12	78.7	6.82	33.9
	6	22.39	175	412	8	78.5	6.8	33.5
	7	21.57	180	415	2	65.4	5.76	32
	8	19.82	185	426	1	35.4	3.23	26.1
	9	16.13	189	442	1	11.2	1.1	23.3
	10	11.7	194	447	1	3.6	0.39	19
	11	10.35	133	451	2	2.8	0.31	18.8

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 7/22/2015	0	24.32	139	401	213	120	10.03	30.4
	1	24.32	139	401	265	120	10.03	30.4
	2	24.3	139	401	142	119.2	9.97	33.8
	3	24.29	138	401	107	118.9	9.95	34.2
	4	24.27	138	401	32	117.7	9.84	35.5
	5	23.46	144	407	13	94.8	8.05	33.4
	7	21.75	156	416	1	65.2	5.72	31
	8	20.05	162	424	2	40.7	3.69	27.3
	9	19.83	164	421	2	40.6	3.7	20.5
	10	13.2	171	446	2	4.8	0.5	16.9
	11	10.68	95	450	2	5.1	0.57	17.9

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 7/22/2015	0	24.2	199	401	265	121.4	10.17	30.9
	1	24.19	199	401	202	121.6	10.19	30.9
	2	24.12	199	401	226	121.3	10.18	36.7
	3	23.97	195	401	153	118.5	9.97	34
	4	22.33	207	413	43	84.9	7.37	30.5
	5	22.32	204	413	15	80.6	7	33.7
	6	21.76	206	415	4	70.4	6.18	33.4
	7	20.07	211	424	2	39.7	3.6	24.7
	8	19.05	210	429	2	33	3.06	23.9
	9	14.84	213	444	1	10.6	1.07	17.6
	10	14.18	213	444	1	9.5	0.97	17.9
	11	12.75	214	446	2	6.5	0.69	16.5
	12	9.64	12	447	2	2.5	0.29	

July 28, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 7/28/2015	1	26.38	102	397	1292	142.3	11.46	16.1
	2	25.78	103	396	696	143.2	11.66	31.8
	3	25.63	103	397	639	137.2	11.19	36.3
	4	25.32	104	397	128	137.6	11.29	38.7
	5	25.33	105	397	117	137.2	11.26	44.3
	6	25.07	107	397	44	131.9	10.87	50.3
	7	22.82	128	409	12	60.9	5.24	27.8
	8	20.5	136	426	10	12	1.08	36.9
	9	14.07	143	448	4	3.4	0.35	16.9
	10	12.82	146	452	2	2.8	0.29	13.1

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 7/28/2015	1	26	105	396	238	136.3	11.05	20
	2	25.84	106	392	175	136.5	11.09	29
	3	24.87	106	396	150	135.9	11.25	45.3
	4	23.85	112	399	84	116.9	9.86	37.5
	5	23.9	113	399	60	117.7	9.91	39.8
	6	23.52	120	402	33	96.1	8.15	30
	7	21.32	138	421	16	22.9	2.03	19.3
	9	15.35	-20	448	5	3.6	0.36	12.9
	10	13.68	-72	452	3	2.9	0.31	14

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 7/28/2015	0	25.67	136	400	158	130.4	0.34	19.8
	1	25.58	136	399	110	131.3	10.72	21.8
	2	25.07	136	398	124	131.9	10.87	37.4
	3	24.95	136	398	136	129	10.66	37.4
	4	24.12	139	400	79	117.9	9.89	65.6
	5	23.37	146	403	35	101.3	8.62	40.4
	6	23.43	148	402	36	91.7	7.79	38.6
	7	21.94	162	415	15	36.5	3.19	40
	8	20.11	165	428	7	29.8	2.7	35.1
	9	17.4	169	440	4	3.7	0.35	16.7
	10	11.74	158	450	2	3.9	0.42	15.6
	11	11.64	65	441	1	2.6	0.28	14.9

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 7/28/2015	1	25.26	157	398	1429	135.9	11.16	23.6
	2	25.15	158	398	524	135.3	11.13	43.9
	3	25.13	158	398	509	133.9	11.03	40.7
	4	24.73	159	399	136	124.5	10.33	63.6
	5	24.66	160	399	59	123.1	10.22	57.2
	6	24.66	160	399	35	122.9	10.21	56
	7	22.14	182	414	15	44.3	3.85	31.4
	8	19.66	187	430	7	3.4	0.31	37.6
	9	14.99	192	436	3	3.2	0.32	12.8
	10	13.06	190	449	3	2.7	0.28	13
	11	10.46	-18	453	1	2.4	0.27	16

Station & Date	Depth (m)	Temp (C)	pH	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 7/28/2015	0	25.37	8.07	178	399	202	128.3	10.52	27.5
	1	25.44	8.07	177	399	179	128.8	10.54	26.3
	2	24.7	8.03	179	400	161	123.4	10.24	38.7
	3	24.44	8.03	178	400	127	121.3	10.12	51
	4	24.27	7.99	179	401	68	116.7	9.76	50.4
	5	24.03	7.98	180	400	55	113.2	9.47	50.9
	6	23.41	7.88	186	404	35	98.6	8.38	41
	7	19.84	7.48	202	430	15	7.8	0.71	32
	8	18.03	7.38	203	437	7	3.9	0.36	16.3
	9	15.01	7.33	205	444	3	4	0.4	15.3
	10	14.58	7.25	205	442	3	3.1	0.31	14.8
	11	10.53	7.06	203	447	1	2.9	0.33	13.9
	12	9.88	6.93	173	449	1	2.6	0.29	11.4

August 4, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 8/4/2015	0	24.93	89	399	519	99.8	8.25	13.6
	1	24.94	87	400	204	99.9	8.25	13.5
	2	24.92	87	399	112	99.8	8.24	15.1
	4	24.9	87	399	87	98.8	8.17	14.4
	5	24.91	87	399	60	98.8	8.17	14.3
	6	24.85	86	398	56	98.6	8.16	13.7
	7	23.18	99	410	52	51	4.36	14.6
	8	19.27	110	436	34	4.8	0.45	11.4
	9	15.1	83	449	22	3.2	0.32	9.1
	10	12.07	14	451	14	3.3	0.36	

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 8/4/2015	0	24.87	126	400	112	98.8	8.18	18.5
	1	24.88	124	399	79	98.3	8.13	17.9
	2	24.9	122	399	144	98.2	8.12	17.5
	3	24.86	121	399	102	97.7	8.09	19
	4	24.83	121	400	83	94.7	7.84	15.5
	5	24.83	121	400	70	94.9	7.86	14.8
	6	24.61	122	400	46	87.3	7.26	13.6
	7	19.06	141	437	78	5.5	0.51	22.8
	8	18.96	138	431	37	4.8	0.45	15
	9	14.24	-78	454	19	3.3	0.33	11
	10	12.03	-108	461	5	2.8	0.3	4.8

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 8/4/2015	0	24.71	142	401	420	97.6	8.1	20.5
	1	24.71	138	401	347	96.3	7.99	21.3
	2	24.71	135	401	189	96.1	7.98	21.7
	3	24.7	136	401	90	96	7.97	21.9
	4	24.67	135	401	63	93.7	7.78	22.6
	6	24.05	142	407	26	67.7	5.69	19.5
	7	21.03	149	423	13	44.2	3.93	20
	8	19.23	157	433	10	3.9	0.36	16.8
	9	13.89	102	448	5	3.1	0.32	11.7
	10	11.6	23	450	2	2.8	0.3	10.4

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 8/4/2015	0	24.75	191	401	534	98.6	8.17	18
	1	24.76	189	400	255	97.6	8.09	18.7
	2	24.77	185	400	185	97.7	8.1	18.2
	3	24.77	183	401	108	97.4	8.08	19.1
	4	24.77	183	400	74	97.4	8.08	18.8
	5	24.76	180	401	60	97	8.05	23
	6	24.68	180	401	30	93.7	7.78	18.6
	7	24.67	181	402	22	92.6	7.69	18.5
	8	19.29	172	433	11	5.2	0.48	14.4
	9	14.83	131	447	6	3.4	0.35	13.4
	10	12.01	96	443	4	3.7	0.4	12.4
	11	10.92	10	452	3	3.1	0.34	9.6

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 8/4/2015	0	24.67	176	402	213	95.2	7.91	18.3
	1	24.64	176	402	82	94.8	7.88	18.9
	2	24.57	175	402	98	93.2	7.75	19.5
	4	24.54	174	402	52	92.8	7.72	22.2
	5	24.51	174	402	28	92.3	7.69	24.7
	6	24.51	177	402	22	92.4	7.7	25.1
	7	21.06	195	425	10	4.1	0.36	23.1
	8	18.24	194	437	5	3.2	0.3	16.1
	9	18.23	194	436	2	3.1	0.29	15.9
	10	12.76	161	449	1	2.6	0.28	12.4
	11	12.62	157	446	0	2.6	0.28	12.5
	12	9.73	38	450	1	2.5	0.28	9.8

August 11, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 8/11/2015	0	24.1	114	402	131	100	8.39	11.8
	1	24.13	112	402	193	99.9	8.38	11.8
	2	24.06	110	402	201	99.1	8.32	15.7
	3	24.07	109	402	179	99	8.31	15.5
	4	24	108	402	142	97	8.15	15.1
	5	24.01	108	402	118	96.9	8.14	15.2
	6	23.88	107	403	73	94.1	7.93	13.4
	7	23.81	107	403	75	91.9	7.76	13.9
	9	19.23	21	434	32	5.6	0.51	10.4
	10	13.21	-30	450	10	3.2	0.33	13.3

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 8/11/2015	0	24.07	119	402	617	97.9	8.22	13
	1	24.01	116	402	218	94.9	7.98	14.3
	2	23.79	115	401	242	92.1	7.77	15.6
	4	23.72	113	402	104	93.2	7.88	17.9
	5	23.69	113	402	61	93	7.87	16.2
	6	23.69	113	403	48	90.1	7.62	16.4
	7	22.99	119	410	45	65	5.57	12.2
	9	15.65	-49	448	20	5.9	0.59	8.6
	10	13.78	-103	453	8	3	0.31	9.1

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 8/11/2015	0	23.84	122	404	270	94.6	7.98	15.1
	1	23.85	119	404	183	94.3	7.95	15.2
	2	23.85	115	404	106	93.6	7.89	15.9
	3	23.81	113	404	94	92.8	7.83	16.1
	4	23.76	113	403	52	91.7	7.75	17.4
	5	23.69	113	403	41	91.1	7.7	16
	6	23.69	112	403	34	89.9	7.6	14.9
	7	22.88	124	411	61	43.6	3.74	13.3
	8	17.1	118	440	35	25.6	2.46	11.9
	9	15.85	13	446	32	3.3	0.32	8.7
	10	15.58	14	435	25	3.2	0.32	8.5

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 8/11/2015	0	23.95	134	403	494	96.7	8.14	12.4
	1	23.95	131	403	245	95.3	8.02	12.1
	2	23.92	127	403	149	94.8	7.99	14.3
	3	23.91	127	403	87	94.8	7.98	14.2
	4	23.8	124	404	59	91.6	7.73	14.1
	5	23.79	123	403	28	92.1	7.77	14.6
	6	23.79	123	403	19	92.2	7.79	14.8
	7	23.7	124	406	11	84.7	7.16	13
	8	17.2	-38	442	2	4.2	0.4	9.6
	10	12.23	-59	454	1	4.1	0.44	5.5

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 8/11/2015	0	24.04	197	405	628	95.5	8.02	12.6
	1	24.04	196	405	566	95.6	8.03	13.3
	2	24.03	194	405	304	95.3	8.01	13.6
	4	24.03	194	405	122	95	7.98	13.3
	5	24	192	404	87	92.5	7.78	13.4
	7	22.19	206	417	30	17.9	1.56	13.5
	8	22.24	204	417	21	17.8	1.55	13.1
	9	13.57	-16	450	15	3	0.31	8.3
	10	12.61	-29	437	9	3	0.32	8.3
	11	10.63	-92	453	10	2.5	0.28	7.6
	12	10.28	-95	453	7	2.4	0.27	7.6

August 19, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 8/19/2015	0	25.77	72	406	302	119.9	9.76	14.8
	1	25.77	74	406	135	120	9.76	14.8
	2	25.64	74	406	264	119.6	9.75	17.3
	3	25.63	75	406	296	119.4	9.74	16.4
	4	25.63	76	405	80	119.3	9.73	17.2
	5	25.63	76	405	72	119.2	9.72	18.4
	6	25.58	77	405	88	118.1	9.64	18.4
	7	25.45	78	405	19	114.6	9.38	17
	8	20.29	10	426	12	13.5	1.22	16.3
	9	15.73	-22	444	10	3.9	0.39	10.1
	10	12.51	-102	457	19	3	0.32	12.4

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 8/19/2015	0	25.39	66	406	515	117.6	9.63	15.7
	1	25.41	68	405	347	117.6	9.63	16.3
	2	25.3	69	405	248	115.8	9.51	18
	3	25.17	71	406	293	113.2	9.31	17.5
	4	24.98	73	406	254	113.5	9.37	17.6
	5	24.84	74	406	188	110.5	9.15	15.2
	6	23.5	80	411	122	88.5	7.51	15
	7	23.08	87	413	108	62.1	5.31	14.3
	8	21.08	94	421	63	22.9	2.03	16.2
	9	16.4	-49	442	35	4.3	0.42	10.6
	10	13.28	-97	455	28	3.8	0.4	10.7

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 8/19/2015	0	25.15	82	405	458	118.2	9.73	16.1
	1	25.13	82	405	224	118	9.72	18.2
	2	25.1	83	405	178	117.5	9.68	20
	3	25.08	83	405	124	117.2	9.66	19.6
	4	25.06	85	405	210	117.3	9.67	19.7
	5	25.03	85	405	156	116.6	9.62	20
	6	25	86	405	106	115.6	9.54	22.3
	7	23.47	97	410	75	78.8	6.7	18
	8	22.07	108	414	51	44.6	3.89	17.3
	9	16.95	1	441	35	5.8	0.56	11.4
	10	14.57	-28	448	24	3.3	0.34	11.1

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 8/19/2015	0	25.33	72	405	1731	116	9.51	13.9
	1	25.26	74	406	467	115.5	9.49	15.2
	2	25.28	75	406	814	115.4	9.48	14.9
	3	25.04	76	406	279	114.6	9.45	14.9
	4	25.03	77	406	95	111.6	9.2	15.3
	5	25.04	78	406	73	111.2	9.17	16.1
	6	25.04	79	406	94	111.2	9.18	16.2
	7	25.01	79	406	48	111	9.16	14.7
	8	20.28	100	426	50	14.8	1.33	14.9
	9	16.39	-34	445	51	4.1	0.4	9.7
	10	13.69	-79	450	34	2.8	0.29	9.3
	11	10.8	-150	461	18	2.7	0.3	13.3
	12	10.7	-159	462	13	2.6	0.29	13.6

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 8/19/2015	0	25.05	142	407	292	113.9	9.39	15.5
	1	25.04	141	407	173	114.1	9.41	16.6
	2	24.91	141	407	165	113.3	9.37	18.8
	3	24.84	140	407	343	112.1	9.28	18.4
	4	24.8	140	406	192	110.5	9.15	18.1
	5	24.78	139	407	141	108.7	9.01	17.6
	6	24.71	140	406	104	106.4	8.83	16.2
	7	23.45	147	408	65	79	6.71	16.3
	8	21.44	158	419	48	28	2.47	16.1
	9	16.34	15	445	26	5.7	0.56	12.2
	10	13.05	-44	450	19	3.4	0.36	9.1
	11	11.04	-89	453	12	3.1	0.34	8.5
	12	10.79	-119	454	7	2.7	0.3	8.1

August 25, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 8/25/2015	0	23.95	140	406	448	106	8.92	24.1
	1	23.96	138	405	223	105.8	8.9	27.6
	2	23.95	137	406	166	103.7	8.73	28
	3	23.94	136	406	102	101.6	8.55	30
	4	23.92	135	406	64	100.6	8.47	30.5
	5	23.87	134	406	37	99.5	8.39	31.1
	6	23.84	133	407	19	99.4	8.39	31.1
	7	23.77	133	407	7	97.2	8.21	33
	8	22.89	143	413	3	60.5	5.2	26.3
	9	18.47	157	433	7	7.2	0.67	33.3
	10	13.31	-12	449	10	3.5	0.37	11.2
	11	11.1	-78	454	12	3	0.33	9.5

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 8/25/2015	0	24	112	405	239	106.6	8.97	27.7
	1	24	109	405	120	106.5	8.95	28.8
	2	23.99	107	405	84	106.2	8.93	34.2
	3	23.99	105	406	55	105.9	8.91	31.4
	4	23.98	104	406	28	104.8	8.81	31.8
	5	23.97	103	405	18	103.2	8.68	32.6
	6	23.94	102	405	7	101.4	8.53	32.7
	7	23.91	102	405	2	100.1	8.43	28.6
	8	21.23	119	420	5	27.8	2.46	16.4
	9	19.16	125	432	8	6.4	0.59	21.6
	10	14.15	34	449	10	3.9	0.4	11.8
	11	11.33	-72	454	13	3.1	0.34	16

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 8/25/2015	0	23.83	164	407	238	102	8.6	24.4
	1	23.84	164	407	183	101.8	8.58	25.1
	2	23.83	162	407	123	101.2	8.54	29
	3	23.83	161	407	69	101	8.52	32
	4	23.81	160	408	33	99.6	8.4	32.9
	5	23.76	159	408	17	96.7	8.17	27.7
	6	23.74	158	408	7	94	7.95	25.5
	7	22.86	170	414	1	56.5	4.85	21.9
	8	21.38	177	422	5	23.8	2.1	19.2
	9	17.86	187	439	10	4.3	0.41	12.2
	10	14.37	115	446	11	3.1	0.32	15
	11	11.16	-17	452	12	2.9	0.31	8.5
	12	10.26	-72	453	11	2.6	0.29	8

September 2, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 9/2/2015	1	24.74	190	437	156	117.5	9.74	18.3
	2	24.72	187	437	209	118	9.79	18.5
	3	24.16	184	438	137	115.1	9.65	27.2
	4	24.16	184	438	66	114.9	9.63	23.5
	5	23.98	182	439	56	112.7	9.48	27.8
	6	23.85	180	439	28	111.1	9.37	27.9
	7	23.42	179	439	11	97.3	8.27	21.7
	8	22.21	190	446	3	41.9	3.64	20.1
	9	14.12	-33	485	6	6.1	0.62	10.5
	10	13.05	-78	494	11	4.6	0.49	16.2

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 9/2/2015	0	24.53	184	438	219	117.3	9.76	17.1
	1	24.2	178	438	164	116.7	9.78	20.5
	2	23.93	176	438	91	114.2	9.61	24.4
	3	23.81	173	439	70	107.9	9.1	22.5
	4	23.52	170	439	53	102.2	8.67	20.6
	5	23.42	169	439	31	101.3	8.61	19.3
	6	23.33	167	439	15	101.9	8.68	19
	7	23.1	168	441	5	84.9	7.26	13.4
	8	21.07	164	451	4	23.8	2.12	17.3
	9	16.93	28	477	11	4.9	0.47	16.6

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 9/2/2015	0	25.9	200	441	666	104	8.46	11.3
	1	24.74	188	441	94	3.7	0.3	16
	2	24.15	184	440	101	115	9.64	21.4
	3	23.86	181	440	115	114.4	9.64	23.5
	4	23.71	177	440	119	110.1	9.3	26
	5	23.64	175	440	89	106.5	9.01	25.5
	6	22.95	175	439	51	95.8	8.22	18.7
	7	22.67	173	439	29	86.5	7.46	17
	8	21.44	180	446	13	57.9	5.11	15.6
	9	17.68	188	472	2	8.1	0.77	19.5
	10	13.17	40	486	10	4	0.42	11.9
	11	10.9	-82	499	17	3.3	0.36	11

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 9/2/2015	1	25.41	178	441	112	114.5	9.38	14.9
	2	24.77	169	439	90	126.6	10.49	19
	3	23.91	167	439	96	110.6	9.31	21.1
	4	23.83	165	440	95	111.5	9.4	24.3
	5	23.74	162	440	65	109.3	9.23	26.5
	6	23.36	162	441	38	98.8	8.41	19.6
	7	21.98	169	442	19	64.2	5.61	14.8
	8	21.04	173	449	5	40.9	3.64	13.4
	9	19.7	171	458	3	15.9	1.45	12
	10	18.2	-97	464	14	8.8	0.83	27.3

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 9/2/2015	0	24.94	169	440	407	113.8	9.4	14.4
	1	24.76	168	441	242	113.7	9.42	16.8
	2	24.11	166	441	145	111.9	9.39	19.8
	3	23.9	164	441	138	111.2	9.37	21.2
	4	23.54	163	440	122	107.9	9.15	26.4
	5	23.2	162	440	91	104.6	8.93	24
	6	22.93	161	439	56	92.4	7.93	22.2
	7	22.31	165	440	29	74.8	6.49	17.5
	8	21.26	172	449	15	39.5	3.5	16.6
	9	17.95	177	469	5	6.2	0.59	15.1
	10	14.34	120	484	9	3.6	0.36	14.5
	11	11.9	-38	488	14	3	0.32	10
	12	10.73	-77	491	17	2.8	0.31	11.7

September 8, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 9/8/2015	0	25.92	76	440	266	146.3	11.87	11.7
	1	25.9	75	440	137	147.6	11.99	11.8
	2	25.71	72	440	993	148.3	12.08	14.4
	3	25.3	71	440	488	145.6	11.95	20.1
	5	25.22	70	440	219	144.9	11.91	19.6
	6	25	70	440	102	143.2	11.81	20.2
	8	20.53	87	454	26	25.1	2.25	13.1
	9	15.04	-117	495	22	5.4	0.54	3.3

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 9/8/2015	0	26.09	83	440	625	137	11.08	12.6
	1	25.8	77	441	918	146	11.88	12.8
	2	25.24	75	440	467	148.5	12.2	21.1
	3	25.14	74	440	95	148	12.18	22.8
	5	25.04	72	440	8	145.9	12.03	24.4
	7	23.8	76	443	12	111.4	9.4	15.6
	8	19.64	88	460	18	15.5	1.42	15.8
	9	19.22	94	463	16	5.1	0.47	13.2

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chl a (mV)
St 3 9/8/2015	0	25.71	92	441	831	148.2	12.07	13.9
	1	25.49	89	442	173	148.4	12.14	17.5
	2	25.48	89	441	161	148.3	12.13	17.7
	3	25.24	88	440	124	146.9	12.07	21.2
	4	25.08	87	441	161	143.7	11.84	22.4
	5	25.06	86	442	135	140	11.54	21
	6	25.06	87	442	96	139.6	11.51	20.9
	7	23.82	91	439	33	126.7	10.69	17
	8	21.48	100	449	28	47.1	4.15	14.5
	9	18.39	105	466	4	12.7	1.19	14.2
	10	12.57	14	489	17	8.7	0.93	13.4
	11	11.55	-113	497	24	4.4	0.48	12

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
St 5 9/8/2015	1	25.85	128	442	256	147.3	11.96	12.5
	2	25.12	126	441	174	148.4	12.22	19.4
	4	24.96	125	441	262	144.3	11.92	23.9
	5	24.65	127	442	145	137.8	11.44	19.8
	6	23.18	134	444	72	97.9	8.36	16.2
	7	23.16	135	442	34	97.7	8.34	15.9
	8	21.6	142	449	28	54.2	4.77	15.5
	9	17.8	148	469	13	8.7	0.83	13.7
	10	14.12	124	483	12	5.2	0.54	12.6
	11	11.32	-19	489	18	4.6	0.5	11.7
	12	10.61	-97	490	20	3.8	0.42	9.8

September 16, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 9/16/2015	1	22.36	148	440	1427	102.8	8.92	17.9
	2	22.25	145	440	91	101.5	8.82	19.2
	3	22.16	143	440	249	101.2	8.81	19.1
	4	21.98	143	440	260	100.4	8.77	22.7
	5	21.96	142	440	160	98.2	8.58	21.9
	6	21.96	141	440	88	97.4	8.51	24.2
	7	21.94	140	441	43	95.8	8.37	25.2
	8	21.81	139	440	18	95.1	8.33	23.6
	9	19.45	149	455	1	39.6	3.62	20.2
	10	19.25	-20	456	1	31.9	2.94	30.2

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 9/16/2015	0	22.18	147	440	49	101.8	8.86	17.6
	1	21.99	142	439	52	101.2	8.84	20.1
	2	21.82	139	439	91	99	8.67	25.6
	3	21.65	137	439	250	97.5	8.57	32.7
	4	21.53	136	440	169	92.9	8.19	24.7
	5	21.49	135	440	95	91.3	8.05	23.6
	6	21.48	134	440	54	90.8	8.01	23.2
	7	21.47	132	440	23	90	7.94	22.1
	8	21.44	131	440	8	86.7	7.66	18.7
	9	21.18	135	442	5	71.7	6.36	20.8
	10	19.54	86	452	11	36.3	3.32	24.1

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 9/16/2015	0	22.4	148	441	192	100.1	8.68	16.1
	1	22.18	144	441	82	99.1	8.62	23
	2	21.96	144	441	60	98.7	8.62	24.3
	3	21.81	141	441	67	93.1	8.16	22.7
	4	21.69	139	440	93	93.3	8.2	21.4
	5	21.59	138	440	81	92.8	8.17	21.8
	6	21.54	137	440	53	91.5	8.07	29.5
	7	21.49	137	440	25	90.4	7.97	26.4
	8	21.42	136	440	9	89.8	7.93	22.5
	9	19.42	147	460	1	21.6	1.98	22.1
	10	13.64	-46	484	10	6.2	0.64	14.9
	11	11.78	-78	492	15	3.7	0.4	11.5

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 9/16/2015	0	22.46	143	442	1539	99.7	8.63	12.7
	1	22.24	138	441	137	99.1	8.61	15.8
	2	22.08	137	441	76	99.1	8.64	22.7
	3	22.03	134	441	104	98.5	8.59	23.5
	4	21.96	133	441	166	97.7	8.54	25.2
	5	21.93	132	441	99	96.8	8.46	33.2
	6	21.89	131	441	53	96.4	8.43	26.2
	7	21.85	130	441	33	95.7	8.38	29.2
	8	21.81	128	441	14	93.3	8.18	23.2
	9	21.41	130	443	2	75.5	6.67	16.1
	10	13.85	-9	485	5	5.3	0.54	16.5
	11	12.21	-63	492	14	4	0.43	13

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 9/16/2015	0	22.15	176	441	132	96.7	8.42	16.7
	1	22.09	173	441	90	96.6	8.42	19
	2	21.95	172	441	71	95.8	8.37	21.9
	3	21.83	170	440	94	94.6	8.29	22
	4	21.73	170	440	116	93.4	8.2	22.6
	5	21.63	169	440	78	91.5	8.05	22.7
	6	21.62	168	440	43	90.7	7.98	23
	7	21.6	167	440	18	89.9	7.91	24.8
	8	21.5	168	440	7	85.6	7.55	21.2
	9	18.89	181	461	1	19.8	1.84	21.1
	10	13.74	12	486	11	5.2	0.54	17.3
	11	10.36	-67	489	15	3.7	0.41	8.9
	12	9.86	-89	492	17	3.1	0.35	9

September 23, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 9/23/2015	0	22.85	27	400	1506	108.4	9.31	13.6
	1	22.85	27	400	911	108.6	9.33	14.1
	2	22.27	30	400	568	112	9.73	21.8
	3	21.23	35	400	220	104.8	9.29	29.8
	5	21.11	39	400	50	95.6	8.49	30.7
	6	21.11	40	400	20	95.3	8.47	30.5
	7	21	41	400	5	96.4	8.58	22.5
	8	20.89	45	400	23	89.6	8	17.5
	9	19.98	55	400	26	50.9	4.62	14.5
	10	18.16	66	400	31	11.6	1.09	16.9

Station & Date	Depth (m)	Temp (C)	ORP (mV)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 9/23/2015	0	22.52	62	1458	108.7	9.41	14
	1	22.45	62	1042	110.7	9.58	13.9
	2	21.48	61	134	110.2	9.72	29.1
	3	21.27	62	39	109.8	9.73	31.4
	4	21.17	62	24	108.4	9.62	40.2
	5	21.11	63	9	103.6	9.21	37.8
	6	21.11	64	7	99.6	8.84	34.4
	7	21.08	64	14	97.5	8.67	7
	8	21.07	65	24	96.7	8.6	24
	9	20.4	72	31	68.5	6.17	17.3
	10	15.91	89	34	5.9	0.58	15.1
	11	12.95	13	40	4.4	0.46	14.6
	12	11.34	-80	41	4	0.43	10.4

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/ m^2)	LDO% (Sat)	LDO (mg/L)	Chloro-phyll (mV)
Station 5 9/23/2015	1	22.11	113	0.4	1421	104.1	9.07	13.7
	2	21.3	112	0.4	745	103.1	9.12	21.4
	3	21.14	112	0.4	278	101.1	8.98	33.1
	4	21.13	111	0.4	149	101	8.97	30.5
	5	21.08	111	0.4	88	98.8	8.78	33
	6	21.04	111	0.4	31	96.6	8.6	29.4
	7	21	112	0.4	5	91.6	8.15	20.9
	8	20.66	120	0.4	13	71.9	6.45	17.5
	9	20.57	122	0.4	21	70.5	6.33	16.8
	10	16.3	138	0.4	26	7.6	0.74	16.8
	11	14.03	79	0.5	30	4.9	0.51	13.7
	12	13.45	-3	0.5	30	3.7	0.38	12.7
	13	11.05	-89	0.5	30	3.2	0.35	10

October 2, 2015

Station & Date	Depth (m)	Tem (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 10/2/2015	0	17.78	87	413	846	83.9	7.97	15.7
	1	17.79	85	412	684	80.1	7.61	16.8
	2	17.81	83	412	327	78.7	7.47	18.7
	3	17.8	83	413	119	78.9	7.49	19.1
	4	17.81	81	413	90	78.8	7.48	19
	5	17.82	80	413	48	78.2	7.42	19.1
	7	17.83	79	412	13	77.4	7.34	19.1
	8	17.81	79	412	8	76.7	7.28	18.4
	9	14.58	79	443	3	7.5	0.76	11
	10	13.23	-77	474	8	4.1	0.43	15.4

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 2 10/2/2015	0	ND	ND	ND	ND	ND	ND	ND
	1	17.75	62	411	510	84.3	8.02	18.9
	2	17.74	61	411	250	82.1	7.8	20.8
	3	17.75	61	411	118	81.3	7.73	21.1
	4	17.73	61	411	55	80.9	7.69	21.2
	5	17.74	61	411	38	80.4	7.64	21.2
	6	17.75	61	411	23	80.3	7.64	21.1
	7	17.72	61	411	15	79.9	7.6	20.7
	8	17.73	62	411	9	79.6	7.56	21.1
	9	17.7	62	411	7	78.4	7.46	21
	10	14.74	-110	438	5	57.1	5.79	15.9

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 3 10/2/2015	0	17.61	85	411	352	94	8.96	16
	1	17.64	86	411	371	80	7.62	19
	2	17.65	86	411	161	79.8	7.6	20.1
	3	17.66	85	411	85	80.1	7.63	21.1
	4	17.65	85	411	47	80.2	7.64	21.1
	5	17.65	85	411	25	79.7	7.59	21
	6	17.65	85	411	9	78.3	7.45	19.9
	7	17.64	85	411	4	78.3	7.45	19.6
	8	17.64	84	411	1	78.2	7.45	20.7
	10	17.51	86	414	3	74.3	7.1	19.4
	11	12.06	-74	450	11	4.7	0.51	8.9

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 4 10/2/2015	0	17.75	71	412	397	82	7.8	16.8
	1	17.75	71	412	261	80.1	7.61	20.9
	2	17.76	71	411	121	80.2	7.62	20.8
	4	17.77	70	412	44	79.1	7.52	20.1
	5	17.75	70	411	34	78	7.41	20.2
	6	17.65	71	413	18	76	7.24	19.8
	7	17.64	71	413	10	73.2	6.97	19.5
	8	17.6	72	413	7	70.8	6.75	18.8
	9	12.91	-2	448	3	26.5	2.8	11.2
	10	12.69	-56	449	1	6.9	0.73	10
	11	12.29	-74	450	4	4.2	0.45	9.6

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 10/2/2015	0	18.21	175	411	392	83.7	7.88	17.1
	1	18.23	173	411	206	81.7	7.69	19.8
	2	18.23	172	411	103	81.6	7.68	19.8
	3	18.22	171	411	44	80.6	7.58	20.1
	4	18.19	170	412	22	79.9	7.53	19
	5	18.14	169	412	7	78.9	7.44	19.7
	6	18.06	168	413	4	74.4	7.03	19.2
	7	18.06	170	413	7	76.8	7.25	18.8
	8	18.04	168	414	11	73.1	6.91	18.8
	9	17.93	169	417	12	72.5	6.86	17.9
	10	17.79	171	419	13	57.8	5.49	15.4
	11	16.73	175	428	15	29.1	2.82	12.2
	12	12.36	-65	450	17	5	0.53	10.3

October 8, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 10/8/2015	0	17.79	160	425	829	99.9	9.49	18.7
	1	17.22	161	426	517	96.5	9.28	25.2
	2	17.33	159	425	305	104.6	10.03	27.3
	3	17.06	159	424	142	105	10.13	33.3
	4	17.07	159	425	77	104.7	10.09	31
	5	16.87	161	426	23	98.3	9.52	30
	6	16.77	164	428	7	86.1	8.35	22.7
	7	16.78	164	427	3	83.7	8.12	23.6
	8	16.52	165	427	1	80.8	7.88	17.3
	9	16.4	165	428	5	74.4	7.27	15
	10	16.14	166	429	5	72.9	7.17	15.6
	11	15.38	169	435	7	51.7	5.16	13
	12	12.17	-62	468	9	4.5	0.48	11.8

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 5 10/8/2015	0	17.79	160	425	829	99.9	9.49	18.7
	1	17.22	161	426	517	96.5	9.28	25.2
	2	17.33	159	425	305	104.6	10.03	27.3
	3	17.06	159	424	142	105	10.13	33.3
	4	17.07	159	425	77	104.7	10.09	31
	5	16.87	161	426	23	98.3	9.52	30
	6	16.77	164	428	7	86.1	8.35	22.7
	7	16.78	164	427	3	83.7	8.12	23.6
	8	16.52	165	427	1	80.8	7.88	17.3
	9	16.4	165	428	5	74.4	7.27	15
	10	16.14	166	429	5	72.9	7.17	15.6
	11	15.38	169	435	7	51.7	5.16	13
	12	12.17	-62	468	9	4.5	0.48	11.8

October 19, 2015

Station & Date	Depth (m)	Temp (C)	ORP (mV)	SpCond (uS/cm)	PAR (uE/s/m^2)	LDO% (Sat)	LDO (mg/L)	Chlorophyll (mV)
Station 1 10/19/15	0	13.81	93	429	251	99.7	10.3	17.3
	1	13.81	93	429	127	99.5	10.28	17.2
	2	13.81	93	429	73	99.2	10.25	17
	3	13.8	92	429	18	99	10.23	16.9
	4	13.81	92	429	8	98.9	10.22	16.7
	5	13.81	92	429	2	98.9	10.22	16.9
	6	13.81	92	429	3	98.6	10.19	16.9
	7	13.8	92	429	4	98.2	10.15	16.2
	8	13.8	92	429	5	97.8	10.11	16
	9	13.8	91	429	6	97.3	10.06	16.4
	10	13.8	91	429	6	97.2	10.04	16.6
Station & Date	**Depth (m)**	**Temperature (C)**	**ORP (mV)**	**SpCond (uS/cm)**	**PAR (uE/s/m^2)**	**LDO% (Sat)**	**LDO (mg/L)**	**Chlorophyll (mV)**
St 5 10/19/15	1	13.8	37	428	243	86.9	8.98	17
	2	13.8	37	428	113	86.6	8.95	16.7
	3	13.8	38	428	57	86.4	8.93	16.4
	4	13.79	38	428	20	86.2	8.91	16.4
	5	13.79	39	428	6	85.8	8.87	16.5
	6	13.79	39	428	1	85.5	8.84	16.6
	7	13.79	39	428	0	85	8.79	16.6
	8	13.79	40	428	2	84.9	8.78	16.9
	9	13.71	40	429	3	84.7	8.77	15
	10	13.03	40	427	4	84.7	8.91	11.5

Appendix II. Nutrient concentrations integrated from surface waters (1-3 m) and from approximately 1 m off the bottom. Data are in micrograms per liter of total phosphorus (TP) and soluble reactive phosphorus (SRP), and milligrams per liter of Nitrate, and total Nitrogen (TN).

Station Designation	Date	TP (µg P/L)	Nitrate (mg N/L)	SRP (µg P/L)	TN (mg N/L)
ST 1 Surface	6/16/15	16.3	< 0.02	5.0	< 0.02
St. 2	6/16/15	25.3	< 0.02	2.1	< 0.02
St. 3	6/16/15	24.4	< 0.02	3.5	< 0.02
St. 4	6/16/15	29.8	< 0.02	6.8	< 0.02
St. 5	6/16/15	30.7	< 0.02	2.7	< 0.02
St1 bottom	6/16/15	14.9	< 0.02	5.2	< 0.02
St 2 B	6/16/15	14.5	< 0.02	2.0	< 0.02
St 3 B	6/16/15	19.0	< 0.02	2.9	< 0.02
St 4 B	6/16/15	11.5	< 0.02	3.0	< 0.02
St. 5 B	6/16/15	11.1	< 0.02	4.8	< 0.02
ST 1 Surface	6/30/15	24.5	ND	1.3	< 0.02
St. 2	6/30/15	21.3	ND	ND	< 0.02
St. 3	6/30/15	20.0	ND	ND	< 0.02
St. 4	6/30/15	18.9	ND	ND	< 0.02
St. 5	6/30/15	25.8	ND	ND	< 0.02
St1 bottom	6/30/15	21.7	ND	ND	< 0.02
St 2 B	6/30/15	39.7	ND	ND	< 0.02
St 3 B	6/30/15	9.9	ND	ND	< 0.02
St 4 B	6/30/15	44.2	ND	ND	< 0.02
St. 5 B	6/30/15	12.3	ND	ND	< 0.02
ST 1 Surface	7/7/15	29.6	ND	12.1	0.33
St. 2	7/7/15	22.8	ND	10.5	0.34
St. 3	7/7/15	25.9	ND	9.1	0.35
St. 4	7/7/15	24.7	ND	12.8	0.32
St. 5	7/7/15	40.7	ND	ND	0.33
St1 bottom	7/7/15	32.6	ND	1.9	0.41
St 2 B	7/7/15	14.9	ND	ND	0.31
St 3 B	7/7/15	14.2	ND	ND	0.25
St 4 B	7/7/15	14.5	ND	3.0	0.26
St. 5 B	7/7/15	24.7	ND	2.3	0.34
ST 1 Surface	7/21/15	18.9	0.06	2.4	0.30
St. 2	7/21/15	23.8	ND	< 1.2	0.28
St. 3	7/21/15	23.3	ND	< 1.2	0.28
St. 4	7/21/15	24.7	ND	< 1.2	0.30
St. 5	7/21/15	25.9	ND	< 1.2	0.28

Station Designation	Date	TP (µg P/L)	Nitrate (mg N/L)	SRP (µg P/L)	TN (mg N/L)
St 2 B	7/21/15	41.2	ND	1.5	0.16
St 3 B	7/21/15	26.1	0.06	< 1.2	0.20
St 4 B	7/21/15	15.9	0.05	< 1.2	0.25
St. 5 B	7/21/15	26.3	0.11	< 1.2	0.28
ST 1 Surface	7/28/15	21.8	ND	6.5	< 0.02
St. 2	7/28/15	22.1	ND	7.1	< 0.02
St. 3	7/28/15	18.7	ND	2.8	< 0.02
St. 4	7/28/15	17.5	ND	5.7	0.40
St. 5	7/28/15	20.5	ND	2.0	< 0.02
St1 bottom	7/28/15	20.2	< 0.02	3.4	< 0.02
St 2 B	7/28/15	25.1	ND	12.2	< 0.02
St 3 B	7/28/15	24.2	< 0.02	3.6	< 0.02
St 4 B	7/28/15	76.3	ND	30.9	< 0.02
St. 5 B	7/28/15	35.9	< 0.02	3.4	< 0.02
ST 1 Surface	8/4/15	18.6	ND	ND	< 0.02
St. 2	8/4/15	22.2	ND	ND	< 0.02
St. 3	8/4/15	19.4	ND	ND	< 0.02
St. 4	8/4/15	21.4	ND	ND	< 0.02
St. 5	8/4/15	24.8	ND	ND	< 0.02
St1 bottom	8/4/15	24.2	ND	ND	< 0.02
St 2 B	8/4/15	24.3	ND	ND	< 0.02
St 3 B	8/4/15	42.6	ND	23.4	< 0.02
St 4 B	8/4/15	69.0	ND	22.3	< 0.02
St. 5 B	8/4/15	48.3	ND	31.0	< 0.02
ST 1 Surface	8/18/15	21.1	ND	ND	< 0.02
St. 2	8/18/15	18.4	ND	ND	< 0.02
St. 3	8/18/15	23.2	ND	ND	< 0.02
St. 4	8/18/15	21.9	ND	ND	< 0.02
St. 5	8/18/15	17.5	ND	ND	< 0.02
St1 bottom	8/18/15	24.2	ND	ND	< 0.02
St 2 B	8/18/15	21.1	ND	ND	< 0.02
St 3 B	8/18/15	45.8	ND	13.6	< 0.02
St 4 B	8/18/15	280.4	ND	65.2	< 0.02
St. 5 B	8/18/15	96.3	ND	24.8	< 0.02
ST 1 Surface	9/2/15	28.8	ND	< 1.2	< 0.02
St. 2	9/2/15	28.8	ND	3.2	< 0.02
St. 3	9/2/15	24.0	ND	< 1.2	< 0.02
St. 4	9/2/15	18.7	ND	< 1.2	< 0.02
St. 5	9/2/15	25.9	ND	< 1.2	< 0.02

Station Designation	Date	TP (µg P/L)	Nitrate (mg N/L)	SRP (µg P/L)	TN (mg N/L)
St 2 B	9/2/15	24.2	ND	9.1	< 0.02
St 3 B	9/2/15	102.1	ND	62.3	< 0.02
St 4 B	9/2/15	39.4	ND	< 1.2	< 0.02
St. 5 B	9/2/15	174.5	ND	85.9	< 0.02
ST 1 Surface	9/16/15	21.0	ND	ND	< 0.02
St. 2	9/16/15	21.1	ND	1.2	< 0.02
St. 3	9/16/15	22.2	ND	ND	< 0.02
St. 4	9/16/15	20.2	ND	ND	< 0.02
St. 5	9/16/15	18.1	ND	ND	< 0.02
St1 bottom	9/16/15	20.8	ND	ND	< 0.02
St 2 B	9/16/15	22.1	ND	ND	< 0.02
St 3 B	9/16/15	57.4	ND	36.6	< 0.02
St 4 B	9/16/15	77.2	ND	39.6	< 0.02
St. 5 B	9/16/15	159.0	ND	129.6	< 0.02
ST 1 Surface	10/2/15	32.3	ND	4.8	< 0.02
St. 2	10/2/15	30.4	ND	3.9	< 0.02
St. 3	10/2/15	27.5	ND	1.9	< 0.02
St. 4	10/2/15	26.2	ND	6.1	< 0.02
St. 5	10/2/15	27.6	ND	1.7	< 0.02
St1 bottom	10/2/15	29.9	ND	3.1	< 0.02
St 2 B	10/2/15	31.8	ND	7.2	< 0.02
St 3 B	10/2/15	36.7	ND	2.7	< 0.02
St 4 B	10/2/15	31.9	ND	0.9	< 0.02
St. 5 B	10/2/15	27.0	ND	0.6	< 0.02

Appendix III. Water clarity measurements: Turbidity (NTU), Chlorophyll a (ug/L). Secchi depth (m),

Station 1

Date	Depth (m)	Turbidity (NTU)	Chl a (ug/L)	Secchi Depth(m)
6/16/15	1	N/D	1.24	1.2
	3	N/D	2.57	
	6	N/D	1.47	
6/24/15	1	2.8333	N/D	1.6
	3	2.996	N/D	
	6	3.503	N/D	
6/30/15	1	3.98	10.8	1.45
	3	6.32	6.17	
	6	5.76	12.51	
7/6/15	1	7.02	12.4	1.35
	3	8.11	13.88	
	6	9.59	17.8	
7/14/15	1	11.97	20.34	N/D
	3	14.2	23.66	
	6	15.37	15.72	
7/21/15	1	10.5	13.82	0.7
	3	4.87	15.33	
	6	4.76	16.21	
7/28/15	1	7.02	8.44	1.25
	3	8.87	6.795	
	6	7.75	11.46	
8/4/15	1	1.55	5.28	2.55
	3	1.42	5.54	
	6	2.47	3.36	
8/11/15	1	1.15	N/D	2.75
	3	0.98	N/D	
	6	1.44	N/D	
8/19/15	1	2.96	4.02	2.6
	3	2.6	5.74	
	6	2.87	5.04	
8/26/15	1	1.28	N/D	2.8
	3	2.35	N/D	
	6	1.65	N/D	
9/2/15	1	1.48	N/D	2.45
	3	1.57	7.89	
	6	1.19	9.23	
9/9/15	1	1.55	N/D	2.3
	3	1.67	N/D	
	6	1.28	N/D	
9/17/15	1	1.58	9.72	2.2
	3	2.16	10.79	
	6	1.38	6.94	
9/24/15	1	1.63	N/D	2.5
	3	2.62	N/D	
	6	1.41	N/D	
10/2/15	1	1.84	11.22	1.85
	3	1.71	7.87	
	6	2.33	12.5	
10/19/15	1	1.42	N/D	1.7
	3	1.53	N/D	
	6	1.07	N/D	

Station 2

Date	Depth (m)	Turbidity (NTU)	Secchi Depth(m)
6/16/15	1	N/D	0.85
	3	N/D	
	6	N/D	
6/24/15	1	N/D	1.34
	3	N/D	
	6	N/D	
6/30/15	1	2.68	1.5
	3	2.52	
	6	2.53	
7/6/15	1	6.72	1.3
	3	4.99	
	6	5.37	
7/14/15	1	4.85	N/D
	3	4.66	
	6	4.64	
7/21/15	1	3.94	0.65
	3	4.45	
	6	4.14	
7/28/15	1	3.49	1.3
	3	3.18	
	6	2.94	
8/4/15	1	1.44	2.4
	3	0.96	
	6	1.05	
8/11/15	1	1.45	2.8
	3	1.43	
	6	1.14	
8/19/15	1	1.15	2.1
	3	1.2	
	6	0.97	
8/26/15	1	1.65	1.8
	3	2.46	
	6	2.34	
9/2/15	1	1.08	2.25
	3	1.1	
	6	1.32	
9/9/15	1	1.06	1.95
	3	1.57	
	6	1.62	
9/17/15	1	1.42	2
	3	1.34	
	6	1.58	
9/24/15	1	1.24	2.2
	3	1.42	
	6	1.67	
10/2/15	1	2.23	1.85
	3	2.21	
	6	1.78	
10/19/15	1	1.31	
	3	1.46	
	6	1.54	

Station 3

Date	Depth (m)	Turbidity (NTU)	Chl a (ug/L)	Secchi Depth (m)
6/16/15	1	N/D	1.83	0.9
	3	N/D	4.43	
	6	N/D	1.39	
6/24/15	1	3.01	N/D	1.4
	3	3.49	N/D	
	6	2.71	N/D	
6/30/15	1	3.58	8.32	1.4
	3	3.36	1.93	
	6	3.55	7.8	
7/6/15	1	4.59	3.6	1.3
	3	4.46	3.2	
	6	4.83	20.1	
7/14/15	1	6.77	22.4	N/D
	3	9.44	20.36	
	6	5.69	23.8	
7/21/15	1	5.05	1.89	0.75
	3	3.39	16.49	
	6	3.33	6.52	
7/28/15	1	5.23	5.54	1.2
	3	5.73	16.76	
	6	3.62	9.62	
8/4/15	1	1.47	10.89	2.65
	3	1.89	12.22	
	6	1.43	6.6	
8/11/15	1	1.12	N/D	3
	3	1.07	N/D	
	6	1.1	N/D	
8/19/15	1	2.1	8.79	2.75
	3	2.36	N/D	
	6	1.7	N/D	
8/26/15	1	1.21	N/D	2.6
	3	1.76	N/D	
	6	2.62	N/D	
9/2/15	1	1.01	7.09	2.55
	3	1.03	7.73	
	6	0.89	11.18	
9/9/15	1	1.23	N/D	2.3
	3	1.53	N/D	
	6	1.47	N/D	
9/17/15	1	1.32	8.39	2.4
	3	1.91	12.97	
	6	1.63	12.39	
9/24/15	1	1.41	N/D	2.7
	3	1.98	N/D	
	6	1.74	N/D	
10/2/15	1	1.72	13.07	2.35
	3	1.98	10.9	
	6	1.37	11.89	
10/19/15	1	1.17	N/D	N/D
	3	1.58	N/D	
	6	1.38	N/D	

Station 4

Date	Depth (m)	Turbidity (NTU)	Secchi Depth (m)
6/16/15	1	N/D	0.95
	3	N/D	
	6	N/D	
6/24/15	1	N/D	1.6
	3	N/D	
	6	N/D	
6/30/15	1	2.58	1.65
	3	2.81	
	6	2.64	
7/6/15	1	3.4	1.45
	3	3.92	
	6	4.47	
7/14/15	1	4.33	N/D
	3	6.8	
	6	5.77	
7/21/15	1	6.29	0.8
	3	5.5	
	6	3.47	
7/28/15	1	2.97	1.1
	3	3.36	
	6	4.27	
8/4/15/	1	1.3	2.6
	3	1.17	
	6	1.77	
8/11/15	1	0.91	3.15
	3	1.12	
	6	1.18	
8/19/15	1	0.83	2.85
	3	0.99	
	6	0.82	
8/26/15	1	1.68	2.6
	3	2.48	
	6	1.52	
9/2/15	1	1.3	2.75
	3	0.98	
	6	0.91	
9/9/15	1	1.26	2.5
	3	1.13	
	6	0.98	
9/17/15	1	1.34	2.95
	3	1.17	
	6	1.14	
9/24/15	1	1.22	2.7
	3	1.17	
	6	0.94	
10/2/15	1	1.94	2.2
	3	1.66	
	6	2.46	
10/19/15	1	1.51	
	3	1.03	
	6	1.25	

Station 5

Date	Depth (m)	Turbidity (NTU)	Chl a (ug/L)	Secchi Depth (m)
6/16/15	1	N/D	4.11	0.75
	3	N/D	2.31	
	6	N/D	4.41	
6/24/15	1	2.67	N/D	1.77
	3	2.86	N/D	
	6	2.71	N/D	
6/30/15	1	5.94	1.66	1.35
	3	2.86	3.1	
	6	3.04	6.53	
7/6/15	1	3.49	12.69	1.4
	3	4.4	19.92	
	6	5.18	18.75	
7/14/15	1	6.89	24.38	N/D
	3	24.4	21.17	
	6	5.47	16.21	
7/21/15	1	6.42	18.59	0.65
	3	12.2	21.26	
	6	3.29	18.83	
7/28/15	1	5.67	9.96	1.15
	3	8.92	15.54	
	6	5.64	14.48	
8/4/15	1	1.56	4.29	2.9
	3	1.9	6.83	
	6	1.84	8.2	
8/11/15	1	1.77	N/D	2.9
	3	1.35	N/D	
	6	1.24	N/D	
8/19/15	1	2.18	N/D	2.65
	3	3.32	N/D	
	6	4.27	1.19	
8/26/15	1	1.69	N/D	2.55
	3	1.36	N/D	
	6	1.68	N/D	
9/2/15	1	0.86	10.77	2.35
	3	1.32	6.92	
	6	1.69	7.26	
9/9/15	1	1.45	N/D	2.3
	3	1.78	N/D	
	6	1.83	N/D	
9/17/15	1	1.54	N/D	2.8
	3	1.76	12.14	
	6	1.52	10.46	
9/24/15	1	2.59	N/D	2.65
	3	2.32	N/D	
	6	1.49	N/D	
10/2/15	1	2.14	12.21	2.2
	3	1.93	15.43	
	6	N/D	N/D	
10/19/15	1	1.66	N/D	1.90
	3	1.52	N/D	
	6	1.27	N/D	

Appendix IV. Cyanobacteria colony numbers per milliliter from surface skim samples and from grab samples taken below the surface (0.3 m). The identifications of each type are preliminary, pending results of taxonomic analysis.

	Types of *Anabaena*								*Microcystis*		Oscilla-				
	Spiral			Filamnetous		Clumped								Colonies	Estimated
Date	small	med	large	small	med	small	med	large	small	large	toria	*Lyngbia*	Other	per Liter	cells per mL
6/16															
Skim	3			3					18					25	1
6/23															
Skim	305			315			10		65		5			695	16
Grab	255			700					75					1,030	23
6/30															
Skim	890			2,005					605					3,500	88
Grab	255			700					85					1,040	23
7/7															
Skim	7,700			3,000					11,400		4,300	2,400	1,200	30,000	1,119
Grab	5,300			1,400					9,500			3,500		19,700	784
7/15															
Skim	46,667			5,000			25,333	1,333	13,667					92,000	5,033
Grab	16,000			16,667				4,000	10,333					47,000	2,920
7/21															
Skim	75,667	37,667	1,667	2,667					16,000					133,667	4,583
Grab	33,333	23,333	1,333						3,333		4,000	4,667		70,000	2,700
7/27															
Skim	1,500						30,750	1,000	4,750			2,750		40,750	2,143
Grab	13,500						30,000		5,500			5,000		54,000	2,295
8/4															
Skim	3,400								2,400					5,800	188
Grab	1,000	500		500					2,750			750		5,500	320
8/18															
Skim	4,667					5,333		2,500	6,667			4,167		23,333	887
Grab	4,500					12,000		833	4,500			4,500		26,333	789
8/25															
Skim	3,400			2,400	800	10,000		1,600	1,800			600		20,600	1,024
Grab	11,400			5,000	1,200	3,400			2,800			600		24,400	594
9/2															
Skim	6,500	2,667	500	4,667	500	4,167		1,333	1,833			8,833		31,000	1,678
Grab	10,750		1,000	3,750		2,000		250	1,750			6,750		26,250	1,171
9/8															
Skim		10,000	4,000	25,000		18,000		4,000				9,000		70,000	3,640
Grab	20,000			14,000		12,000		2,000				4,000		32,000	1,440
9/16															
Skim	2,558		3,500	76,250	13,721	10,000	2,250	1,000	6,000		750			116,029	3,282
Grab	55,000			4,722	5,000	16,000		1,667	4,333					86,722	3,894
9/17															
Skim		33,500		42,500	4,500	34,000	13,000	0	500					128,000	3,655
Grab		8,500		41,000	2,500		5,000		2,000					59,000	3,850
9/24															
Skim	29,000	12,000	6,000	100,000	6,750	49,250		12,750	9,000	3,750	10,500			210,000	6,858
Grab	26,667	3,333		64,000	10,000	11,333		10,667	9,333		8,000			116,667	4,093
10/2															
Skim	16,200	1,800	2,000	14,600	3,600	3,000	1,800	4,400	600	200	800			49,000	1,846
Grab	19,000			12,000	2,000	5,000								38,000	470
10/8															
Skim	22,500	1,000	2,500	18,000	15,500	50,000	23,500	6,000	500					139,500	5,710
Grab	23,500	3,000		28,000	500	45,000	23,000	6,500						129,500	5,120
10/20															
Skim	2,500			1,000	500	238	1,750	2,000	1,750				750	10,488	687
Grab															