Lay Reservoir Report 2016 & 2019

Rivers and Reservoirs Monitoring Program

Alabama Department of Environmental Management

Field Operations Division
Rivers and Reservoirs Unit
April 2022

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Table of Contents

LIST OF ACRONYMS

A&I	Agricultural and Industrial Water Supply
ADEM	Alabama Department of Environmental Management
AGPT	Algal Growth Potential Test
APCO	Alabama Power Company
Chl *a*	Chlorophyll *a*
DO	Dissolved Oxygen
F&W	Fish and Wildlife
MAX	Maximum
MDL	Method Detection Limit
MIN	Minimum
MSC	Mean Standing Crop
NTU	Nephelometric Turbidity Units
OAW	Outstanding Alabama Waters
ONRW	Outstanding National Resource Water
PWS	Public Water Supply
QAPP	Quality Assurance Project Plan
RRMP	Rivers and Reservoirs Monitoring Program
S	Swimming and Other Whole Body Water-Contact Sports
SD	Standard Deviation
SOP	Standard Operating Procedures
TEMP	Temperature
TN	Total Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSI	Trophic State Index
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Lay Reservoir was created with the completion of Lay Dam on the Coosa River in 1914. The reservoir encompasses approximately 12,000 acres and is located about 12 miles north/east of Clanton, AL. Lay Reservoir is situated between Logan Martin Reservoir and Mitchell Reservoir. In addition to power generation, Lay Reservoir provides recreational opportunities including boating, fishing, and swimming.

Lay Reservoir was placed on Alabama's 1996 Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its Public Water Supply (PWS)/Swimming (S)/Fish & Wildlife (F&W) water use classifications. The reservoir was listed for impairments caused by priority organics (PCBs), nutrients, and organic enrichment/dissolved oxygen (OE/DO). A TMDL developed to address the nutrient and OE/DO impairment in Lay, as well as the entire Coosa River reservoir chain, was approved by the USEPA in 2008 (ADEM 2008). TMDL development for the segments of Lay that remain on the §303(d) list with impairments due to PCBs is to be determined based upon ongoing RCRA/CERCLA program activities. Based on Fish Tissue Monitoring Program (FTMP) data collected in 2008 and 2009, the Alabama Department of Public Health issued a fish consumption advisory for mercury contamination in Lay Reservoir. As a result, the reservoir was also listed on the 2010 §303(d) list for mercury due to atmospheric deposition.

The Alabama Department of Environmental Management (ADEM) monitored Lay Reservoir as part of the 2016 and 2019 assessments of the Coosa River basin under the Rivers and Reservoirs Monitoring Program (RRMP). ADEM began monitoring lake water quality statewide in 1985, followed by a second statewide survey in 1989. In 1990, the Reservoir Water Quality Monitoring (now known as RRMP) Program was initiated by the Field Operations Division of the ADEM. The current objectives of this program are to provide data that can be used to assess current water quality conditions, to identify trends in water quality conditions, and to develop Total Maximum Daily Loads (TMDLs) and water quality criteria. Descriptions of all RRMP monitoring activities are available in ADEM's 2017 Monitoring Strategy (ADEM 2017).

In 2010, the ADEM implemented specific water quality criteria for nutrient management at the lower and mid Lay Reservoir stations (ADEM Admin. Code R. 335-6-10-.11). These criteria represent a growing season mean (April-October) chlorophyll *a* (chl *a*) concentration that is protective of Lay Reservoir's PWS/S/F&W water use classifications. These criteria are denoted in Table 1.

The purpose of this report is to summarize data collected at nine stations in Lay Reservoir during the 2016 and 2019 growing seasons and to evaluate growing season trends in lake trophic status and nutrient concentrations using ADEM's historic dataset. Monthly and/or mean concentrations of nutrients [total nitrogen (TN); total phosphorus (TP)], algal biomass/productivity [chl *a*; algal growth potential testing (AGPT)], sediment [total suspended solids (TSS)] and trophic state [Carlson's trophic state index (TSI)] were compared to ADEM's historical data and established criteria.

METHODS

Sampling stations were selected using historical data and previous assessments (Figure 1). Specific location information can be found in Table 1. Lay Reservoir was sampled in the dam forebay, mid reservoir, and upper reservoir. Tributary embayment stations monitored include: Waxahatchee, Peckerwood, Yellowleaf, Tallaseehatchee, Talladega, and Kelly Creeks.

Water quality sampling was conducted at monthly intervals, April-October. All samples were collected, preserved, stored, and transported according to procedures in the ADEM Field Operations Division Standard Operating Procedures (ADEM 2019), Surface Water Quality Assurance Project Plan (ADEM 2018a) and Quality Management Plan (ADEM 2018b).

Mean growing season TN, TP, chl *a*, and TSS were calculated to evaluate water quality conditions at each site. Monthly concentrations of these parameters were graphed with the closest available Alabama Power Company (APCO) discharge data and ADEM's previously collected data to help interpret the 2016 and 2019 results.

Figure 1. Lay Reservoir with 2016 and 2019 sampling locations.

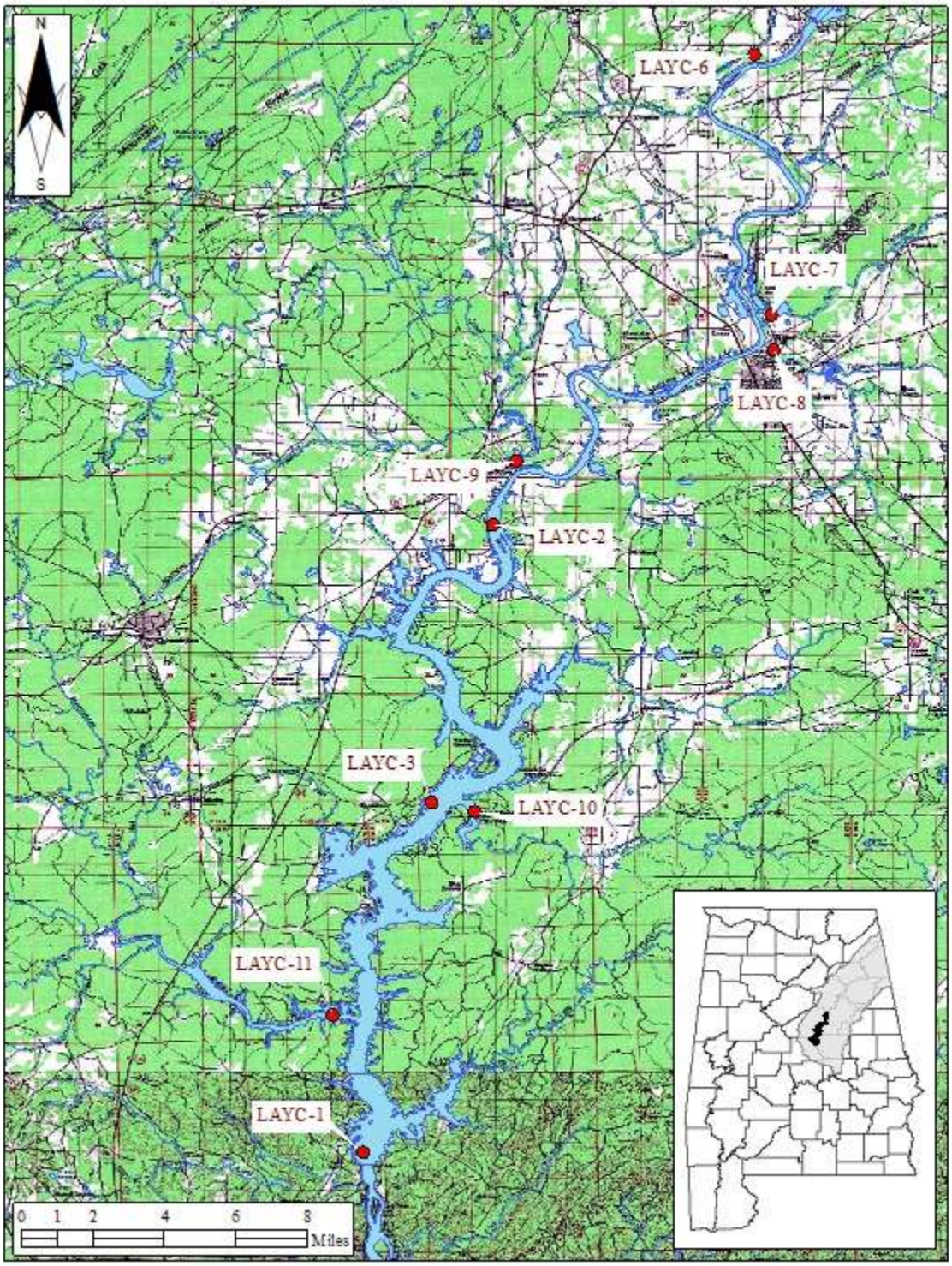


Table 1. Descriptions of the 2016 and 2019 monitoring stations in Lay Reservoir.

HUC	County	Station Number	Report Designation	Waterbody Name	Station Description	Chl *a* Criteria	Latitude	Longitude
031501070503	Chilton	LAYC-1*	Lower	Coosa R	Deepest point, main river channel, dam forebay	17 µg/L	32.96828	-86.51888
031501070304	Shelby	LAYC-2	Upper	Coosa R	Deepest point, main river channel, upstream of Bullock's Islands		33.22166	-86.46648
031501070503	Shelby	LAYC-3*	Mid	Coosa R	Deepest point, main river channel, immediately downstream of Peckerwood Ck/Coosa River confluence	17 µg/L	33.10969	-86.49116
031501060808	St. Clair	LAYC-6	Kelly Ck	Kelly Ck	Deepest point, main creek channel, Kelly Ck embayment, approximately 0.5 miles upstream of lake confluence		33.41151	-86.36058
031501060703	Talladega	LAYC-7	Talladega Ck	Talladega Ck	Deepest point, main creek channel, Talladega Ck embayment, immediately upstream of AL Hwy 235 bridge		33.30642	-86.35371
031501070106	Talladega	LAYC-8	Tallaseehatchee Ck	Tallaseehatchee Ck	Deepest point, main creek channel, Tallaseehatchee Ck embayment, immediately upstream of AL Hwy 235 bridge		33.29233	-86.35281
031501070205	Shelby	LAYC-9	Yellowleaf Ck	Yellowleaf Ck	Deepest point, main creek channel, Yellowleaf Ck embayment, upstream of Gaston Steam Plant discharge		33.24758	-86.45697
031501070501	Talladega	LAYC-10	Peckerwood Ck	Peckerwood Ck	Deepest point, main creek channel, Peckerwood Ck embayment, approximately 0.5 miles upstream of lake confluence		33.10579	-86.47378
031501070406	Shelby	LAYC-11	Waxahatchee Ck	Waxahatchee Ck	Deepest point, main creek channel, Waxahatchee Ck embayment, approximately 0.5 miles upstream of lake confluence		33.02364	-86.53116

*Growing season mean chl *a* criteria implemented at this station in 2010.

RESULTS

Growing season mean graphs for TN, TP, chl *a*, and TSS are provided in this section (Figures 2 and 3). Monthly graphs for TN, TP, chl *a*, TSS, DO, and TSI are also provided (Figures 4-9 and 16-17). Mean monthly discharge is included in monthly graphs for TN, TP, chl *a*, TSS, and TSI as an indicator of flow and retention time in the months sampled. AGPT results appear in Table 2. Depth profile graphs of temperature, DO, and conductivity appear in Figures 10-15. Summary statistics of all data collected during 2016 and 2019 are presented in Appendix Table 1 and Appendix Table 2. The tables contain the minimum, maximum, median, mean, and standard deviation of each parameter analyzed. Due to resource constraints, AGPT samples were only collected in one mainstem location in 2016.

Stations with the highest concentrations of nutrients, chlorophyll *a*, and TSS are noted in the paragraphs to follow. Though stations with lowest concentrations may not always be mentioned, review of the graphs that follow will indicate these stations that may be potential candidates for reference waterbodies and watersheds.

In 2016, the highest mean growing season TN value calculated among Lay Reservoir mainstem stations was in the lower station; however, all three mainstem stations were similar (Figure 2). In 2019, the highest mean growing season TN value calculated among mainstem stations was the upper station. Mean TN values attenuated upstream to downstream in the mainstem stations that year. Talladega Creek had the highest mean TN concentration among embayment stations in both 2016 and 2019. The mean TN values recorded in 2016 were the highest on record for all of the embayment stations. Monthly TN concentrations reached historic highs in September at the upper station and in April, July, and September at the mid station in 2019 (Figure 4). Historic, or near historic lows, were reached in 2016 at the upper station in April and in 2019 at the upper station in June and July, at the mid station in June and August, and at the lower station in June, July, and August.

The upper reservoir station had the highest mean growing season TP value calculated among mainstem stations in both 2016 and 2019, though values at all of the mainstem stations were similar both years (Figure 2). Tallasseehatchee Creek had the highest mean growing season TP value calculated among Lay Reservoir embayment stations in 2016 and in 2019. Overall,

mean TP values in the mainstem stations appeared to decline 1997-2019. Mean values in the embayment stations also appeared to decline 2005-2019. Mean monthly TP values were below historic means in all months sampled in both 2016 and 2019 (Figure 5). Many monthly samples reached historic lows throughout the growing season in both sample years.

Specific water quality criteria for nutrient management have been established for the lower and mid stations on Lay Reservoir. The growing season mean chl *a* values calculated in the mid station in Lay Reservoir exceeded the criteria limit in 2016 (Figure 3). The lower station was below criteria in both 2016 and 2019. In 2016, the highest mean growing season chl *a* value calculated among Lay Reservoir mainstem stations was in the upper station. The highest value calculated among tributary stations was in Waxahatchee Creek. In 2019, the highest mean chl *a* value among mainstem stations was in the mid station. Peckerwood Creek had the highest mean chl *a* concentration among embayment stations in 2019. Mean values at all of the embayment stations, except Tallaseehatchee Creek, were the lowest since monitoring began in 2016. Mainstem values were higher in 2016 than in 2013, but concentrations decreased at all three stations in 2019. Mean monthly chl *a* concentrations reached a historic high in 2016 at the upper station in September (Figure 6). In 2019, all monthly means were near or below historic means at all stations throughout the growing season, except in September at the lower station, which was a historic high value.

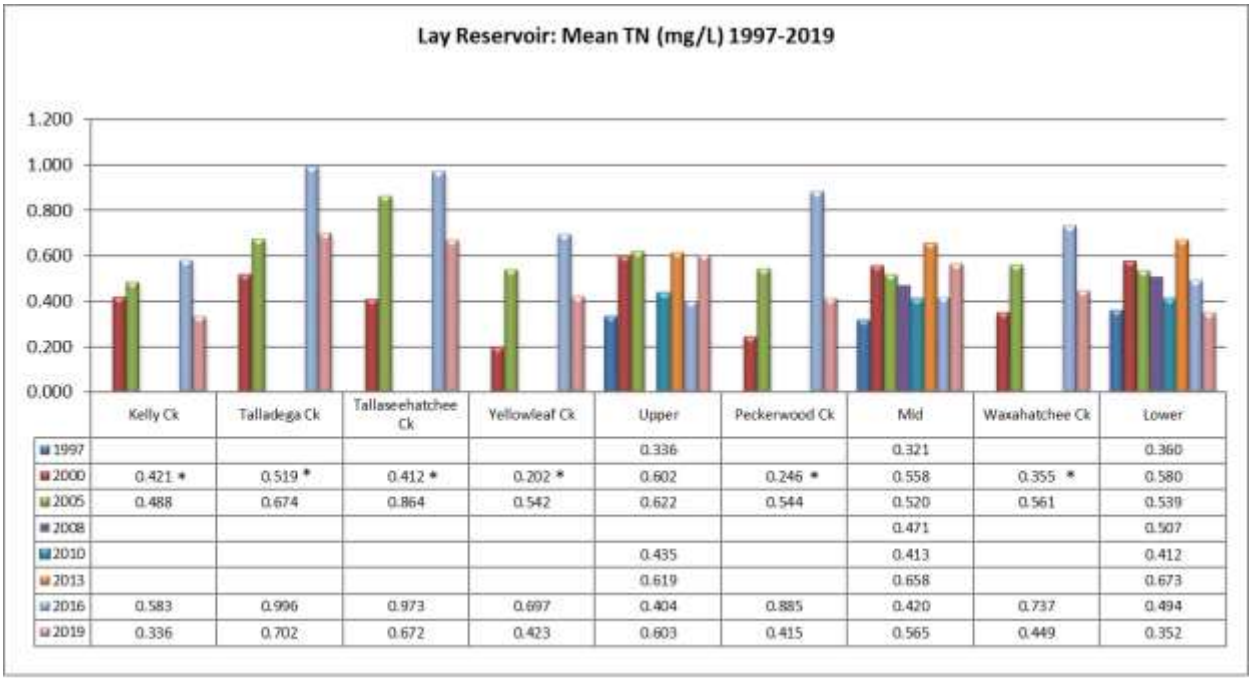
In both 2016 and 2019, the highest mean growing season TSS value calculated among Lay Reservoir mainstem stations was in the upper station (Figure 3). Likewise, Talladega Creek had the highest mean TSS concentration among embayment stations in both years. Mean TSS in the mainstem stations appeared to decrease upstream to downstream along the length of the reservoir. Values in all mainstem stations were lower in 2016 than in 2013, but increased in 2019. In general, mean TSS concentrations in Talladega and Tallaseehatchee Creeks decreased 2000-2010, but increased from 2016-2019. Peckerwood and Waxahatchee Creeks had the lowest mean TSS values on record in 2016. Mean monthly TSS values were near or below historic means at all mainstem stations during most months sampled in both 2016 and 2019 (Figure 7). In 2016, historic lows were reached in April, May, June, and September at the upper station and in September at the mid station. In 2019, historic lows were reached in May and June at the upper station and in September at the mid station.

AGPT results for the upper Lay Reservoir station indicated it was co-limiting in 2016 (Table 2). In 2019, the mid station was co-limiting, and the upper and lower stations were nitrogen-limited. Raschke and Schultz (1987) defined a mean standing crop (MSC) value of 5.0 mg/L as protective of reservoir and lake systems. The MSC value at the upper station was greater than 5.0 mg/L in both 2016 and 2019 and has been in all years sampled, except 2000. The MSC values at the mid and lower stations were both less than 5.0 mg/L in 2019.

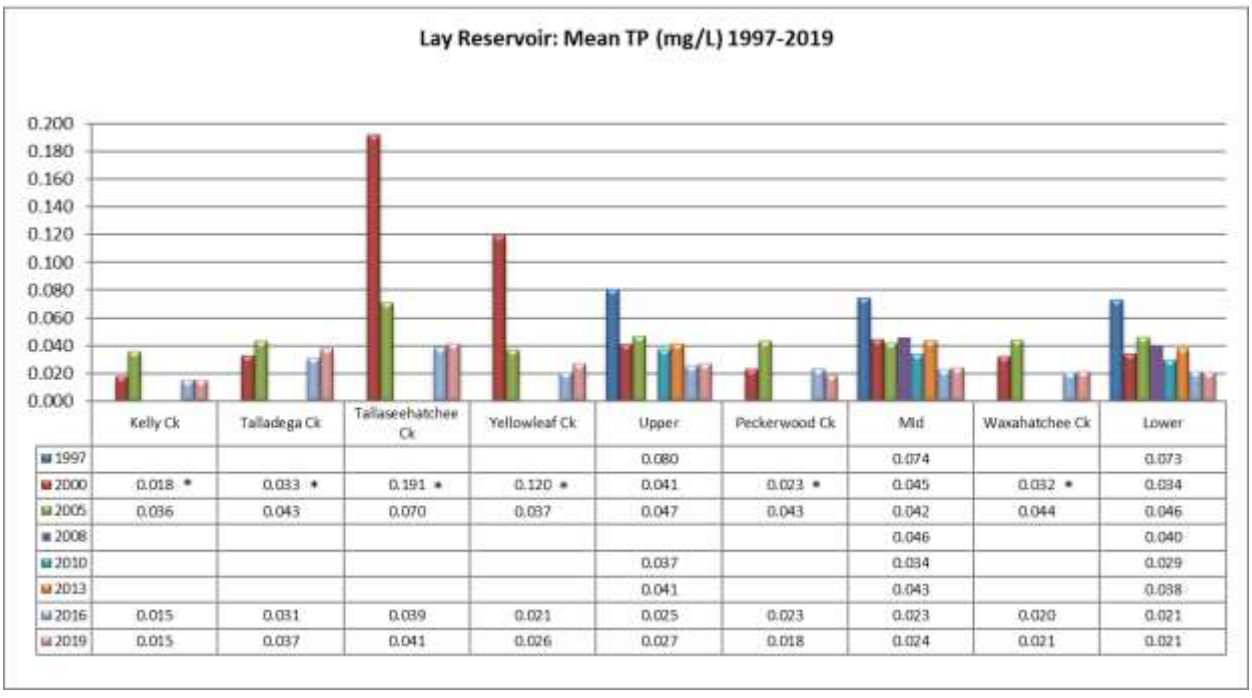
In 2016, dissolved oxygen (DO) concentrations were below the ADEM criteria (ADEM Admin. Code R. 335-6-10-.09) limit of 5.0 mg/L at 5.0 ft (1.5 m) in the lower Lay Reservoir station in September and in Kelly Creek in June and September (Figure 8). All other values measured at mainstem and embayment stations were at, or above, the criteria limit throughout the growing season in 2016. In 2019, all DO concentrations at mainstem and embayment stations were at, or above, the criteria limit (Figure 9). Based on monthly DO profiles collected in 2016, the lower and mid stations were stratified April-September, and the upper station showed slight stratification May-October, though DO concentrations never reached 0 mg/L (Figures 10-12). At the lower station, DO concentrations were below 5.0 mg/L in the entire water column in September. The upper station indicated the presence of a chemocline May-September. In 2019, the lower station was stratified May-September, and the mid station was stratified April-October (Figures 13-15). The upper station showed very weak stratification May-September.

TSI values were calculated using monthly chl *a* concentrations and Carlson's Trophic State Index. In 2016, all mainstem stations were eutrophic throughout the growing season April-October (Figure 16). Among the tributary stations, Kelly Creek had the lowest TSI, remaining oligotrophic in all months sampled. Peckerwood Creek and Waxahatchee Creek both remained eutrophic all months, except June, which was mesotrophic. In 2019, the mid and lower stations were eutrophic all months sampled (Figure 17). The upper station was mesotrophic in May and August, but eutrophic all other months. While Talladega Creek has the lowest monthly TSI among tributary stations, reaching 24 in August, Kelly Creek was the only station to remain oligotrophic-mesotrophic throughout the growing season in 2019. Peckerwood Creek and Waxahatchee Creek were eutrophic all months sampled, with Peckerwood Creek recording the highest tributary TSI in August.

Figure 2. Mean growing season TN and TP measured in Lay Reservoir, April-October, 1997-2019. Stations are illustrated from upstream to downstream as the graph is read from left to right.



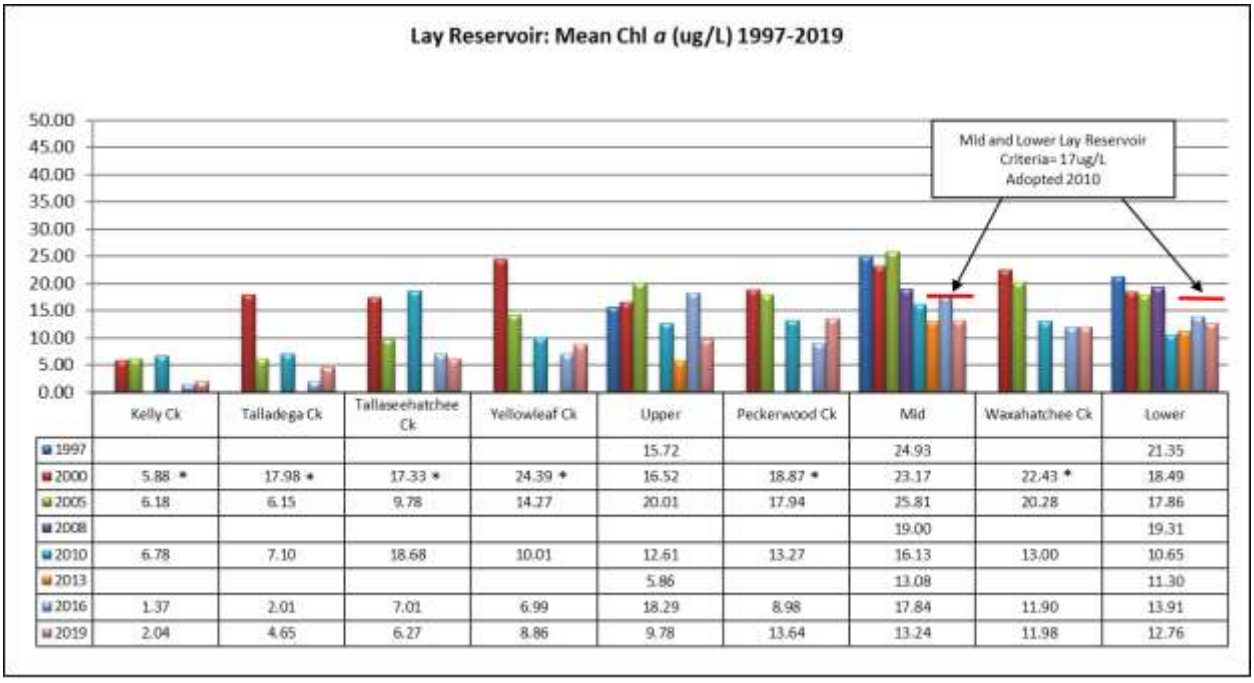
	Kelly Ck	Talladega Ck	Tallaseehatchee Ck	Yellowleaf Ck	Upper	Peckerwood Ck	Mid	Waxahatchee Ck	Lower
1997					0.336		0.321		0.360
2000	0.421 *	0.519 *	0.412 *	0.202 *	0.602	0.246 *	0.558	0.355 *	0.580
2005	0.488	0.674	0.864	0.542	0.622	0.544	0.520	0.561	0.539
2008							0.471		0.507
2010					0.435		0.413		0.412
2013					0.619		0.658		0.673
2016	0.583	0.996	0.973	0.697	0.404	0.885	0.420	0.737	0.494
2019	0.336	0.702	0.672	0.423	0.603	0.415	0.565	0.449	0.352



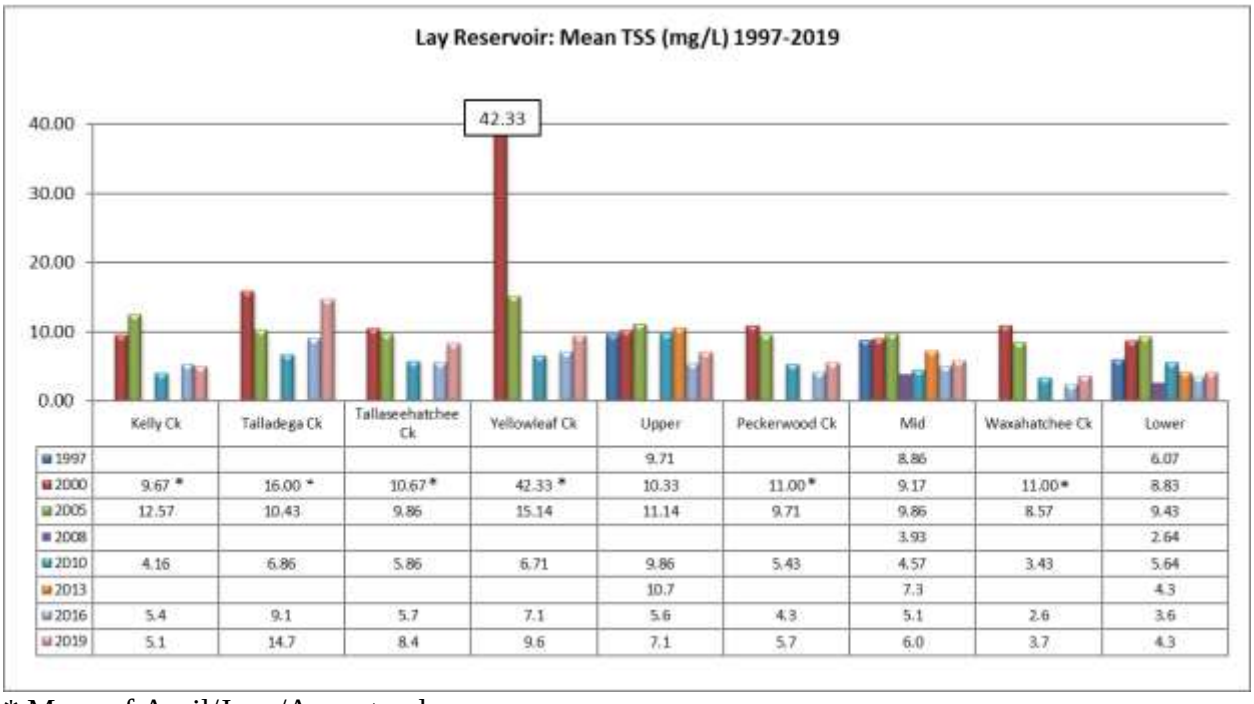
	Kelly Ck	Talladega Ck	Tallaseehatchee Ck	Yellowleaf Ck	Upper	Peckerwood Ck	Mid	Waxahatchee Ck	Lower
1997					0.080		0.074		0.073
2000	0.018 *	0.033 *	0.191 *	0.120 *	0.041	0.023 *	0.045	0.032 *	0.034
2005	0.036	0.043	0.070	0.037	0.047	0.043	0.042	0.044	0.046
2008							0.046		0.040
2010					0.037		0.034		0.029
2013					0.041		0.043		0.038
2016	0.015	0.031	0.039	0.021	0.025	0.023	0.023	0.020	0.021
2019	0.015	0.037	0.041	0.026	0.027	0.018	0.024	0.021	0.021

* Mean of April/June/August only.

Figure 3. Mean growing season chl *a* and TSS measured in Lay Reservoir, April-October, 1997-2019. Stations are illustrated from upstream to downstream as the graph is read from left to right. Chl *a* criteria applies to the growing season means of the lower and mid stations.



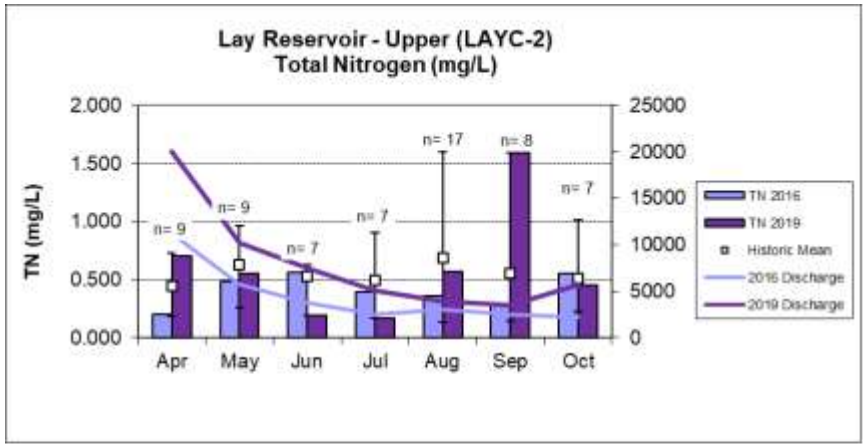
	Kelly Ck	Talladega Ck	Tallaseehatchee Ck	Yellowleaf Ck	Upper	Peckerwood Ck	Mid	Waxahatchee Ck	Lower
1997					15.72		24.93		21.35
2000	5.88 *	17.98 *	17.33 *	24.39 *	16.52	18.87 *	23.17	22.43 *	18.49
2005	6.18	6.15	9.78	14.27	20.01	17.94	25.81	20.28	17.86
2008							19.00		19.31
2010	6.78	7.10	18.68	10.01	12.61	13.27	16.13	13.00	10.65
2013					5.86		13.08		11.30
2016	1.37	2.01	7.01	6.99	18.29	8.98	17.84	11.90	13.91
2019	2.04	4.65	6.27	8.86	9.78	13.64	13.24	11.98	12.76

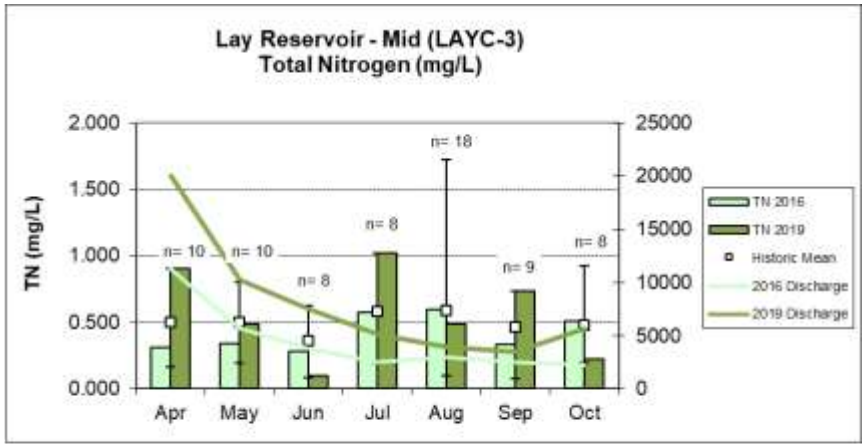


	Kelly Ck	Talladega Ck	Tallaseehatchee Ck	Yellowleaf Ck	Upper	Peckerwood Ck	Mid	Waxahatchee Ck	Lower
1997					9.71		8.86		6.07
2000	9.67 *	16.00 *	10.67 *	42.33 *	10.33	11.00 *	9.17	11.00 *	8.83
2005	12.57	10.43	9.86	15.14	11.14	9.71	9.86	8.57	9.43
2008							3.93		2.64
2010	4.16	6.86	5.86	6.71	9.86	5.43	4.57	3.43	5.64
2013					10.7		7.3		4.3
2016	5.4	9.1	5.7	7.1	5.6	4.3	5.1	2.6	3.6
2019	5.1	14.7	8.4	9.6	7.1	5.7	6.0	3.7	4.3

* Mean of April/June/August only.

Figure 4. Monthly TN concentrations measured in Lay Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.





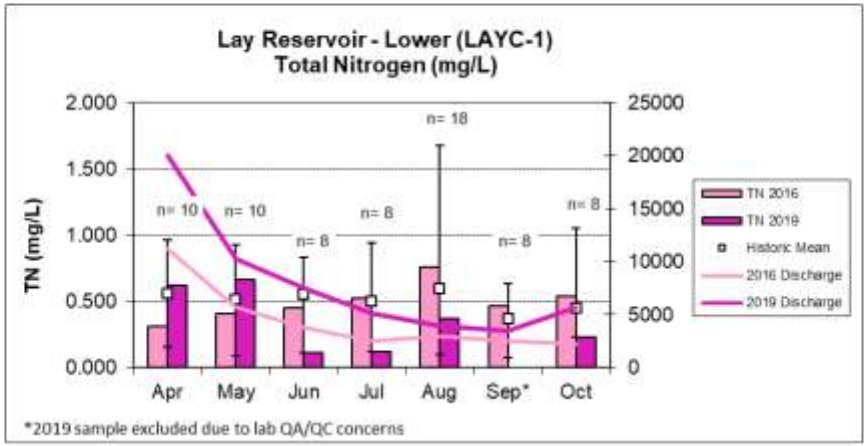


Figure 5. Monthly TP concentrations measured in Lay Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.

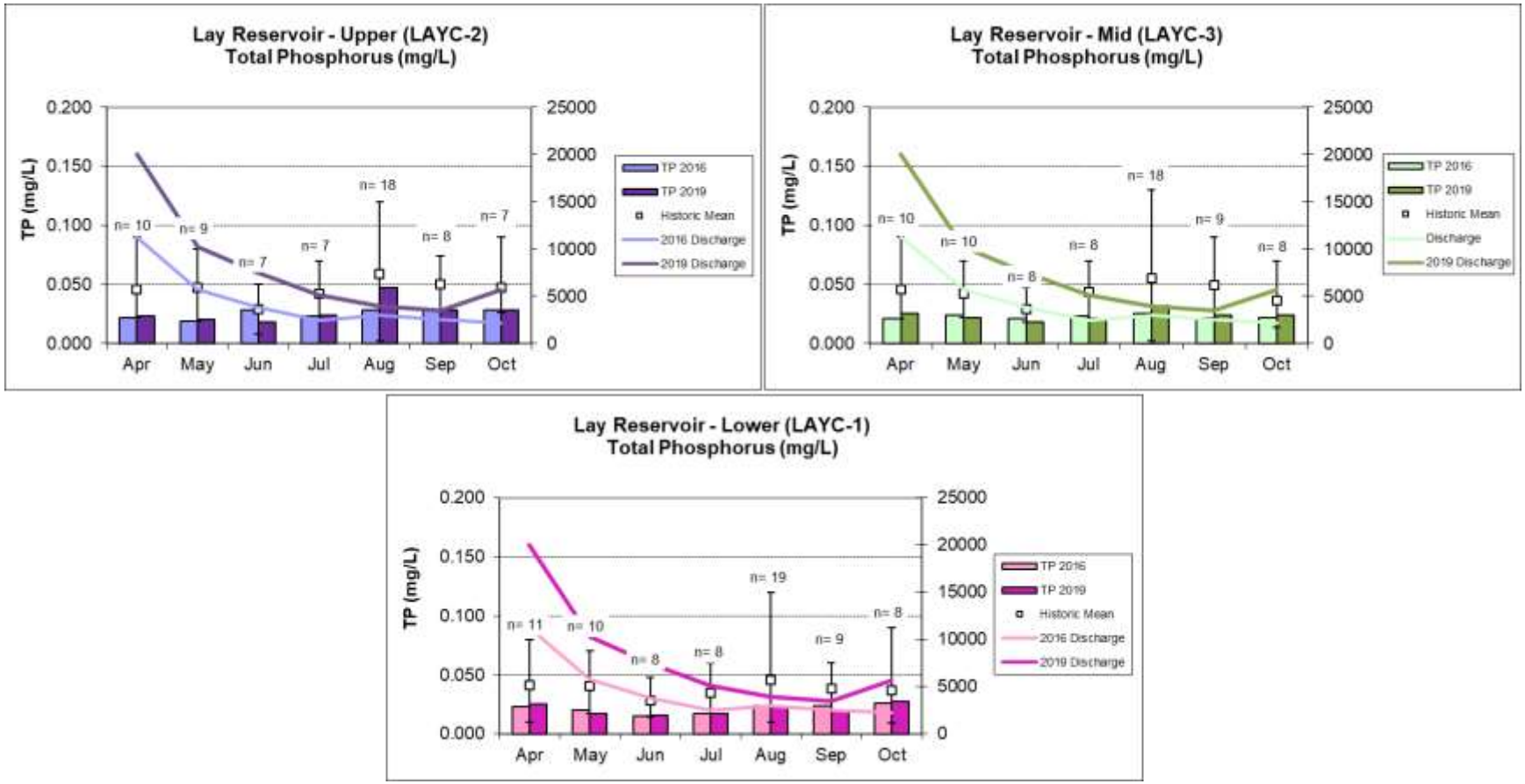


Figure 6. Monthly chl *a* concentrations measured in Lay Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.

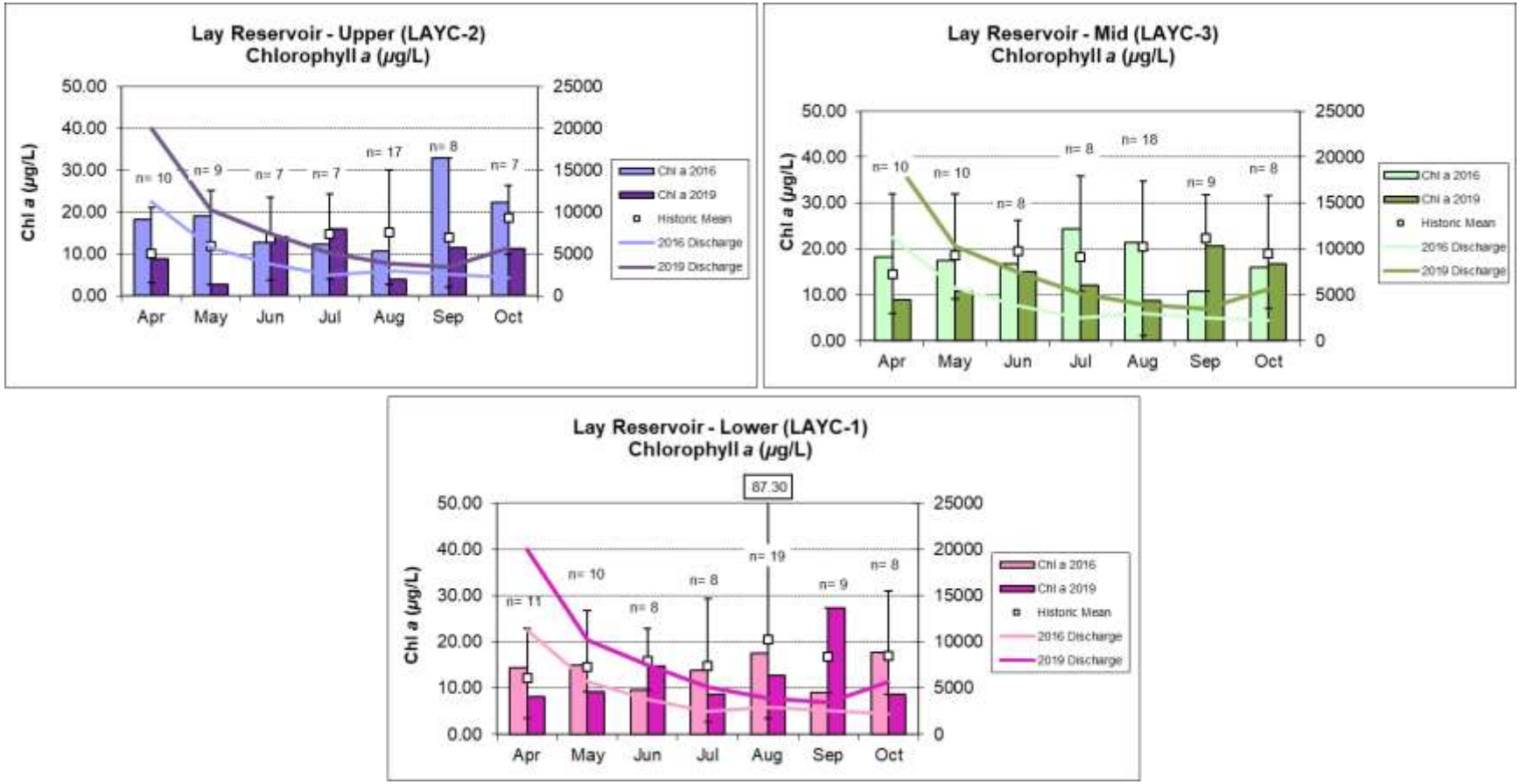


Figure 7. Monthly TSS concentrations measured in Lay Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.

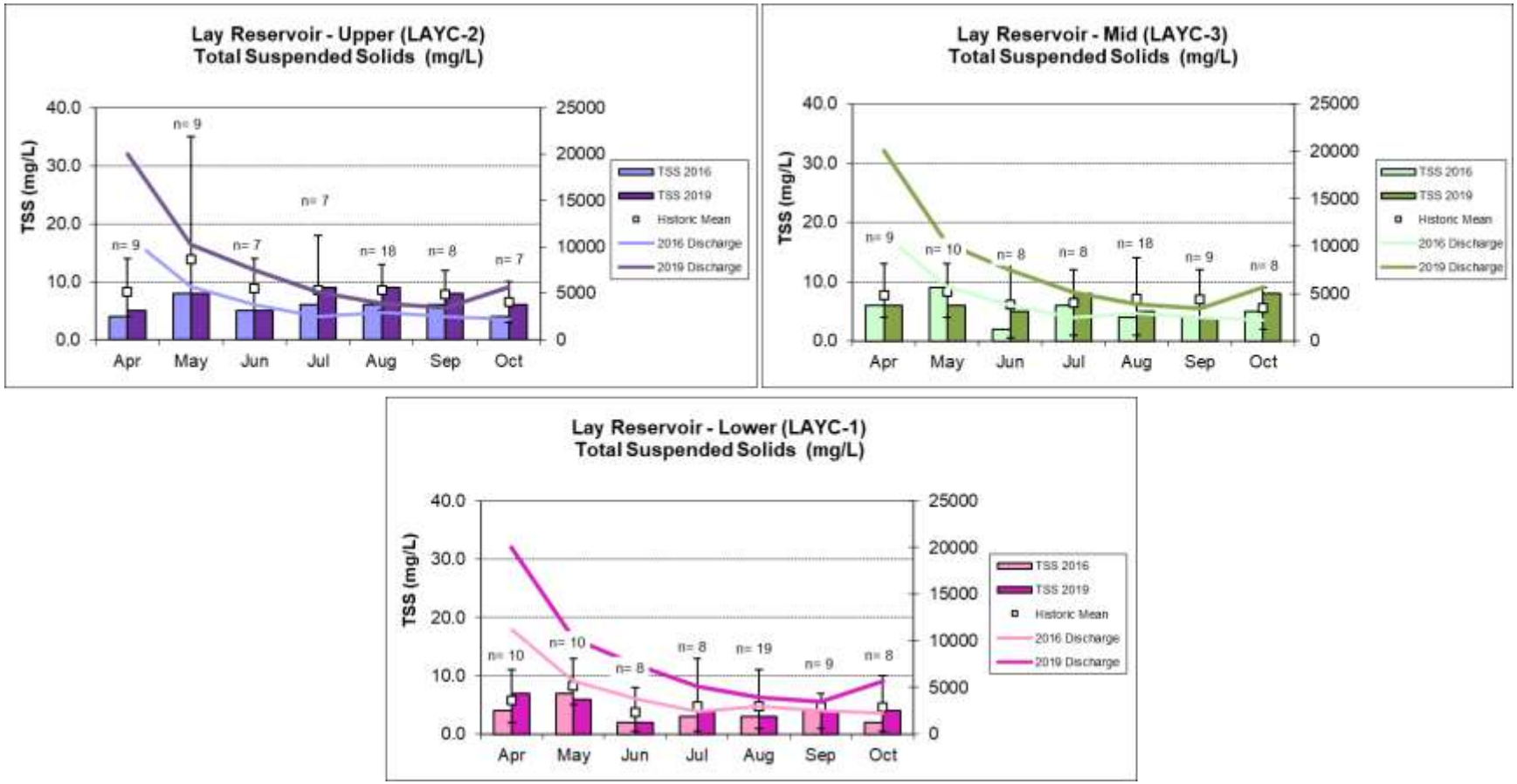
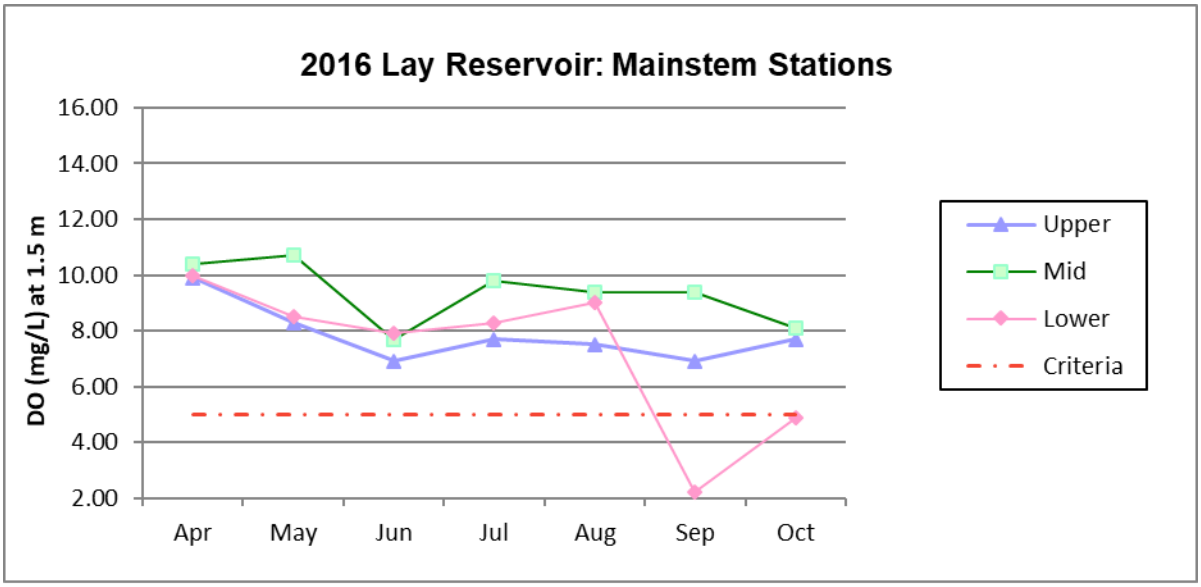


Table 2. Algal growth potential test results, Lay Reservoir, 1997-2019 (expressed as mean Maximum Standing Crop (MSC) dry weights of Selenastrum capricornutum in mg/L) and limiting nutrient status. MSC values below 5 mg/L are considered to be protective in reservoirs and lakes; values below 20 mg/L MSC are considered protective of flowing streams and rivers. (Raschke and Schultz 1987).

Station	Upper (LAYC-2)		Mid (LAYC-3)		Lower (LAYC-1)	
	MSC	**Limiting Nutrient**	**MSC**	**Limiting Nutrient**	**MSC**	**Limiting Nutrient**
1997	10.48	CO-LIMITING	2.21	NITROGEN	6.8	NITROGEN
2000	3.04	CO-LIMITING	5.55	NITROGEN	2.67	NON-LIMITING
2005	10.35	NITROGEN	3.72	NITROGEN	3.31	NON-LIMITING
2010	9.71	PHOSPHORUS	---	---	---	---
2016	8.54	CO-LIMITING	---	---	---	---
2019	6.55	NITROGEN	4.32	CO-LIMITING	2.91	NITROGEN

Figure 8. Monthly DO concentrations at 1.5 m (5 ft) for Lay Reservoir stations collected April-October 2016. ADEM Water Quality Criteria pertaining to reservoir waters require a minimum DO concentration of 5.0 mg/L at this depth (ADEM Admin. Code R. 335-6-10-.09).



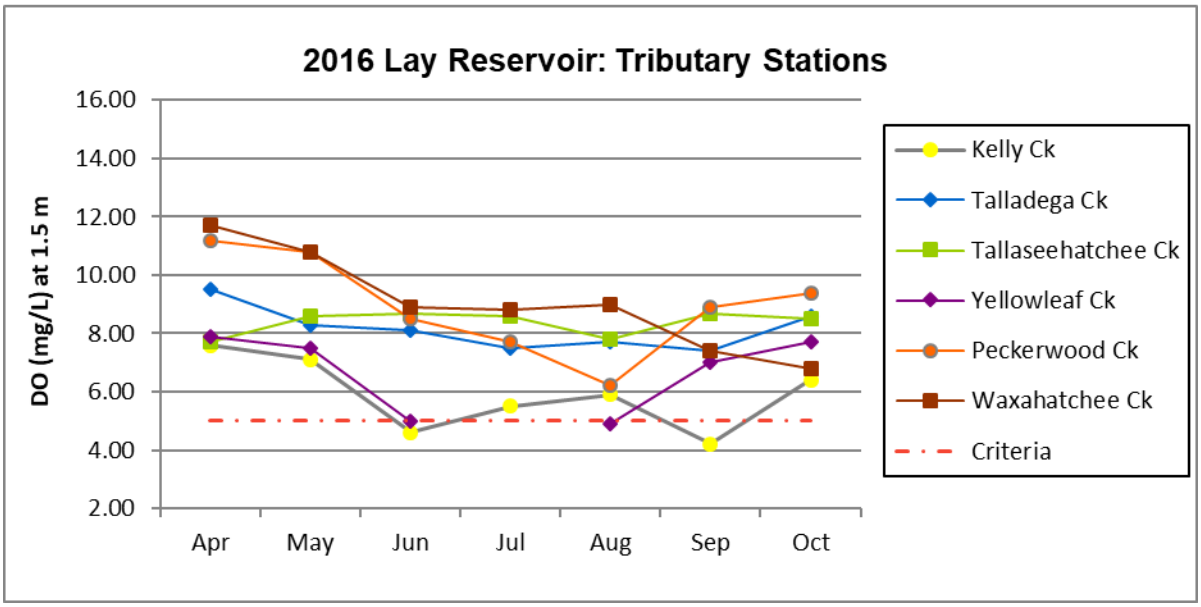


Figure 9. Monthly DO concentrations at 1.5 m (5 ft) for Lay Reservoir stations collected April-October 2019. ADEM Water Quality Criteria pertaining to reservoir waters require a minimum DO concentration of 5.0 mg/L at this depth (ADEM Admin. Code R. 335-6-10-.09).

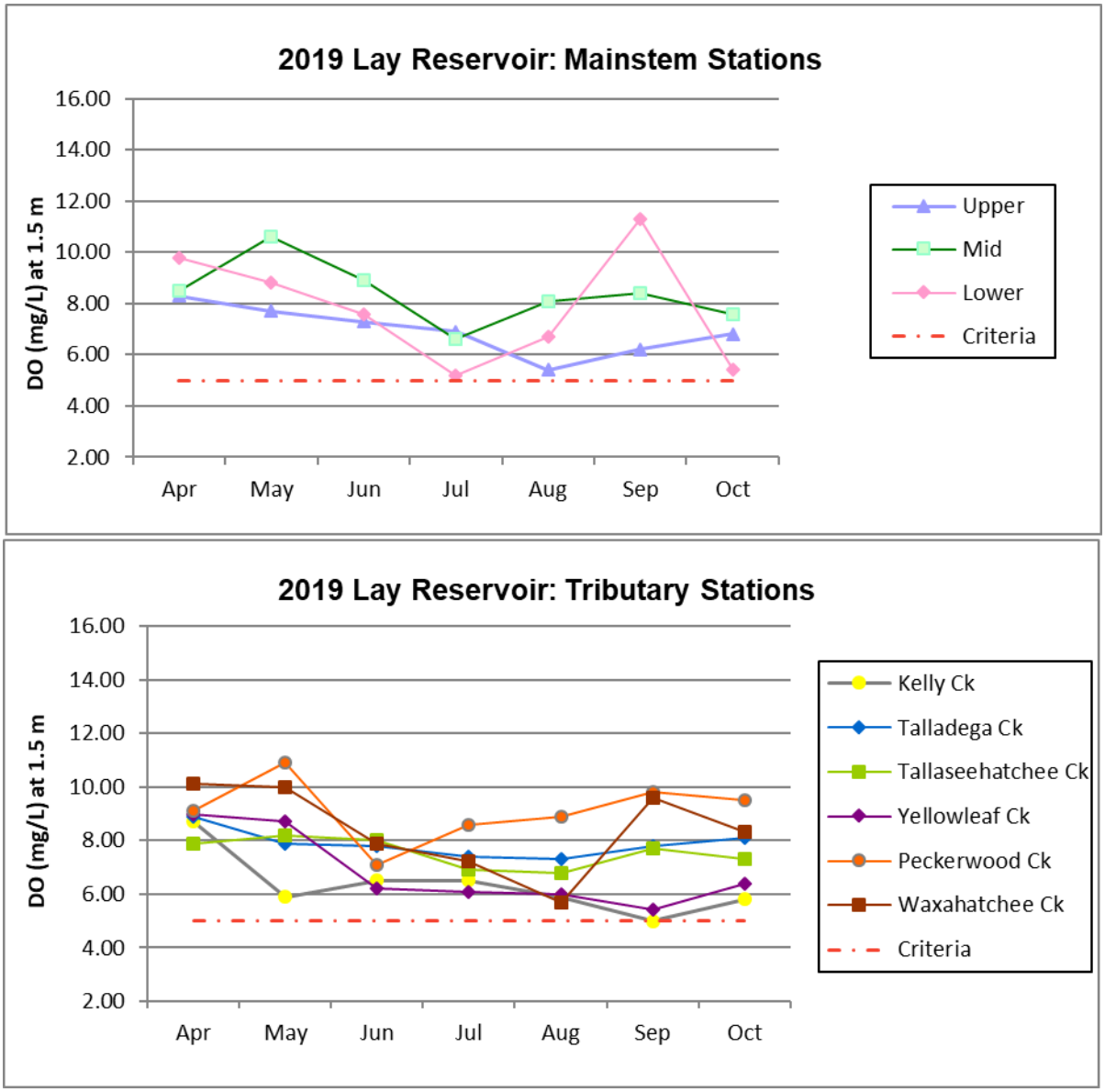


Figure 10. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the lower Lay Reservoir station, April-October 2016.

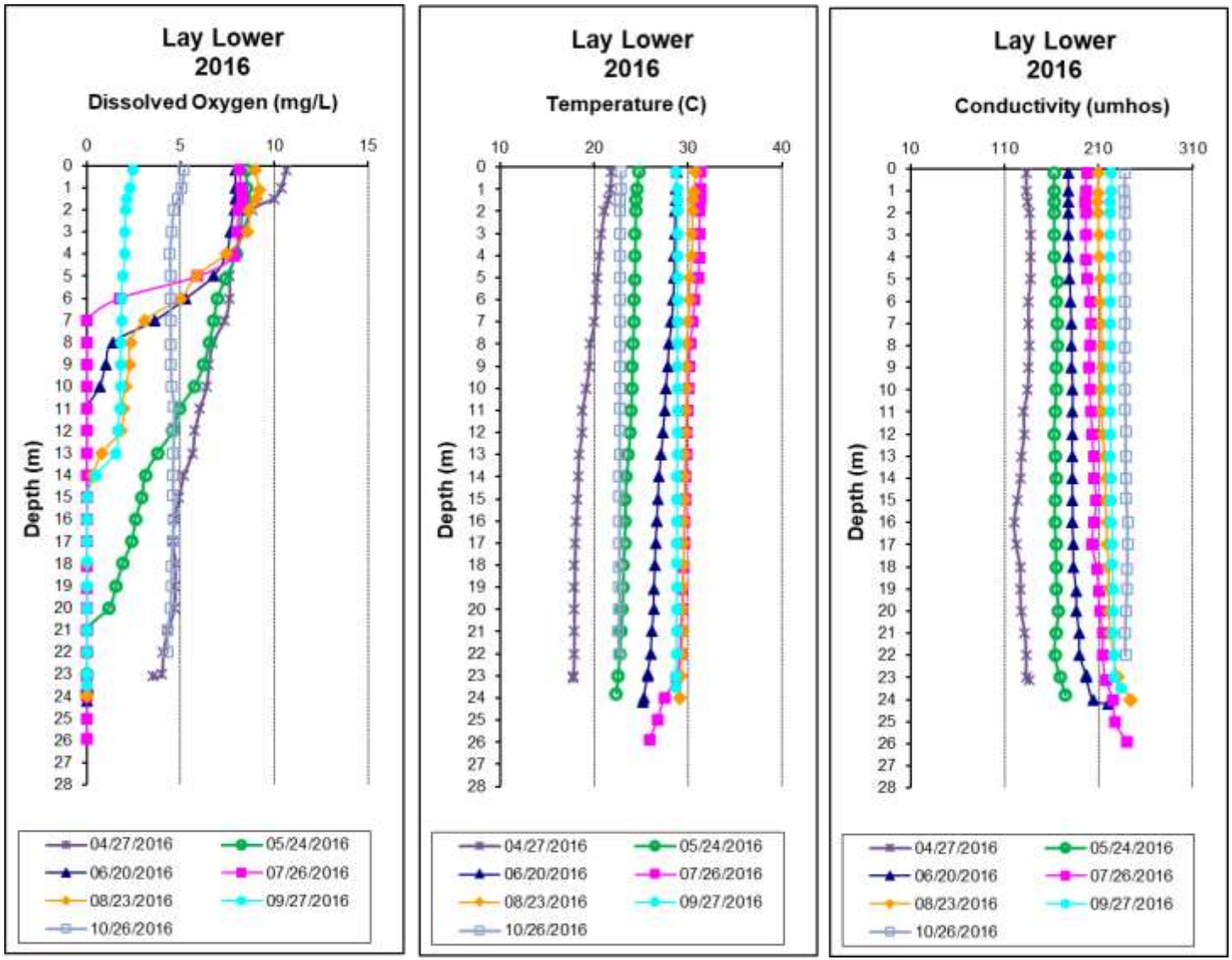


Figure 11. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the mid Lay Reservoir station, April-October 2016.

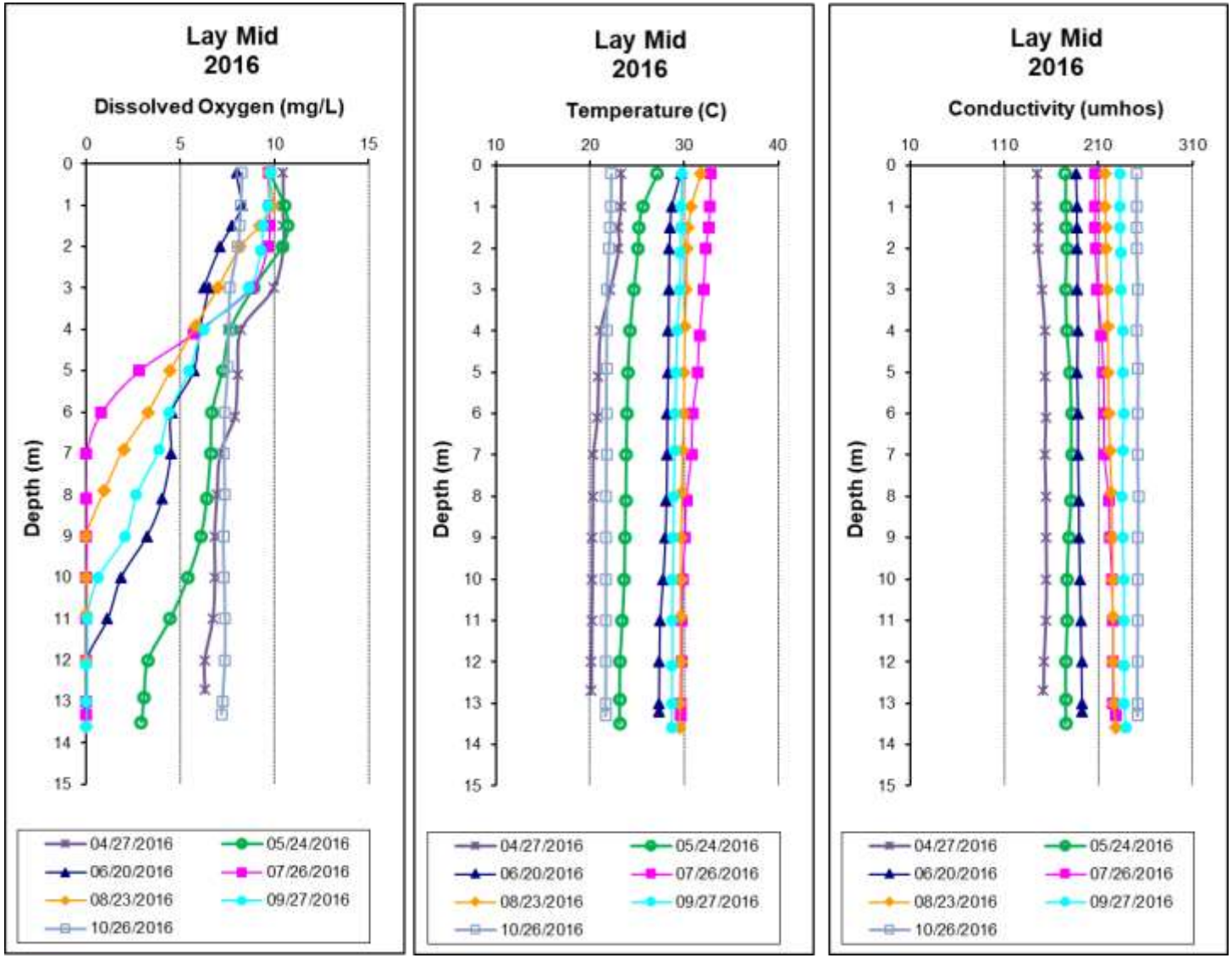


Figure 12. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the upper Lay Reservoir station, April-October 2016.

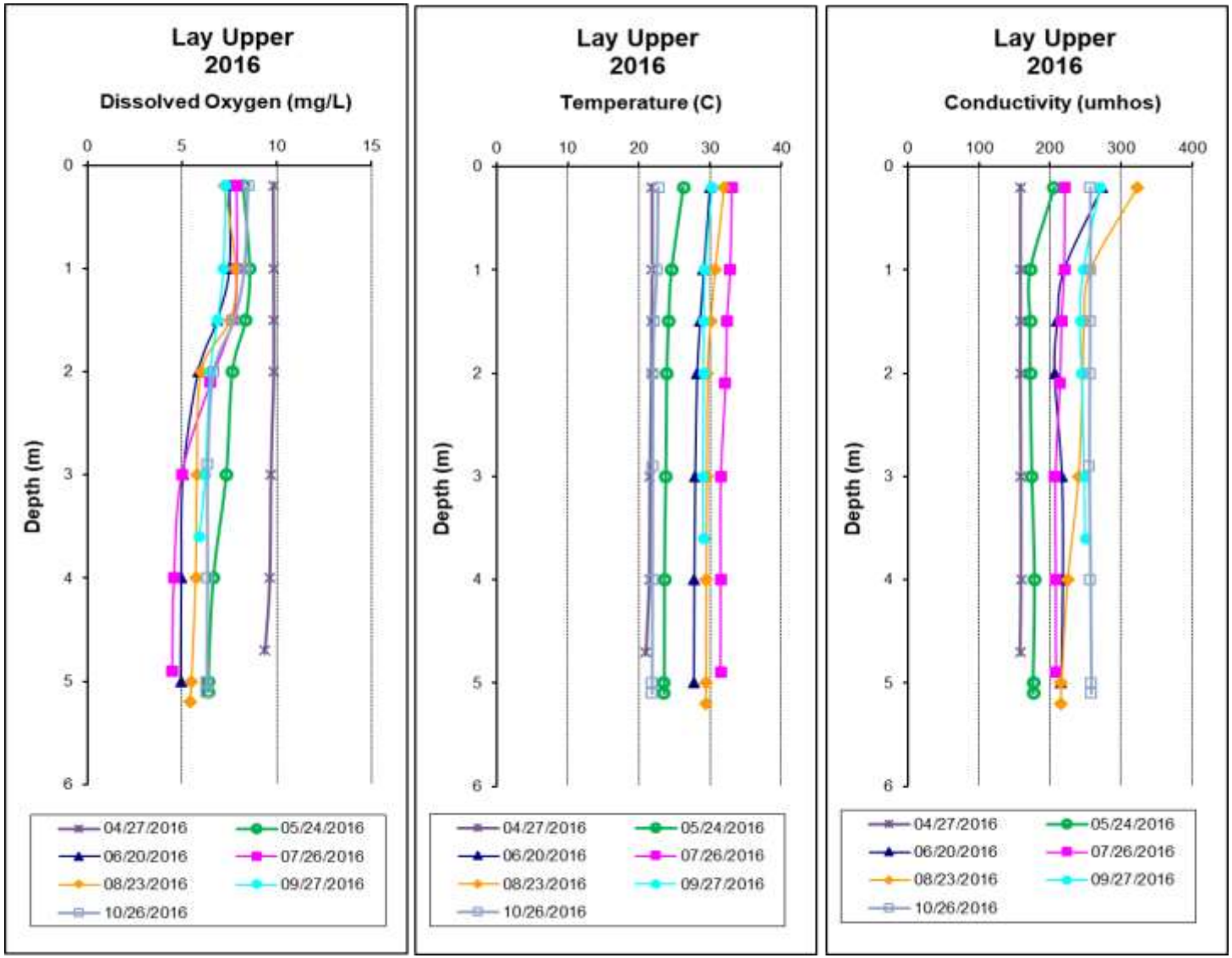


Figure 13. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the lower Lay Reservoir station, April-October 2019.

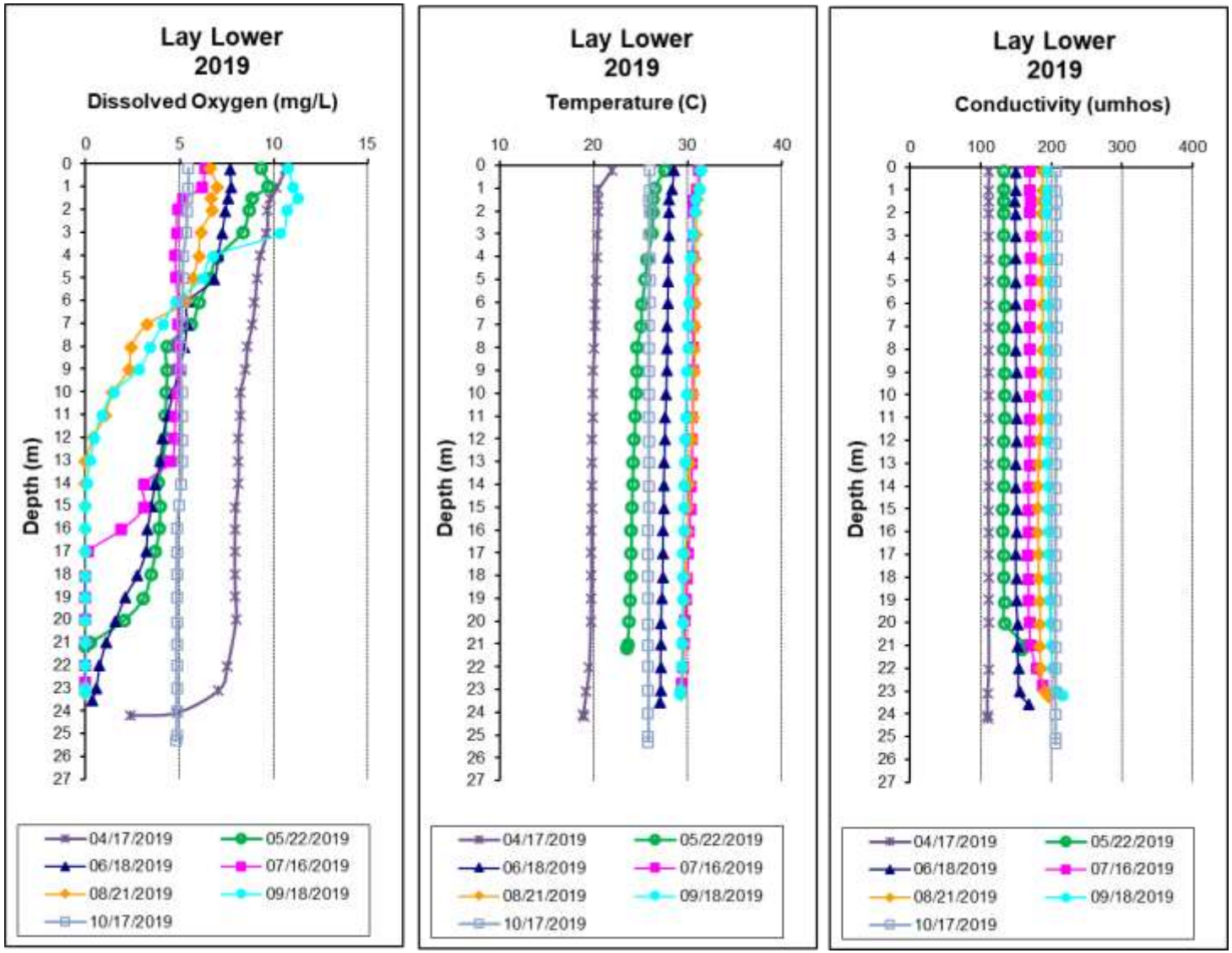


Figure 14. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the mid Lay Reservoir station, April-October 2019.

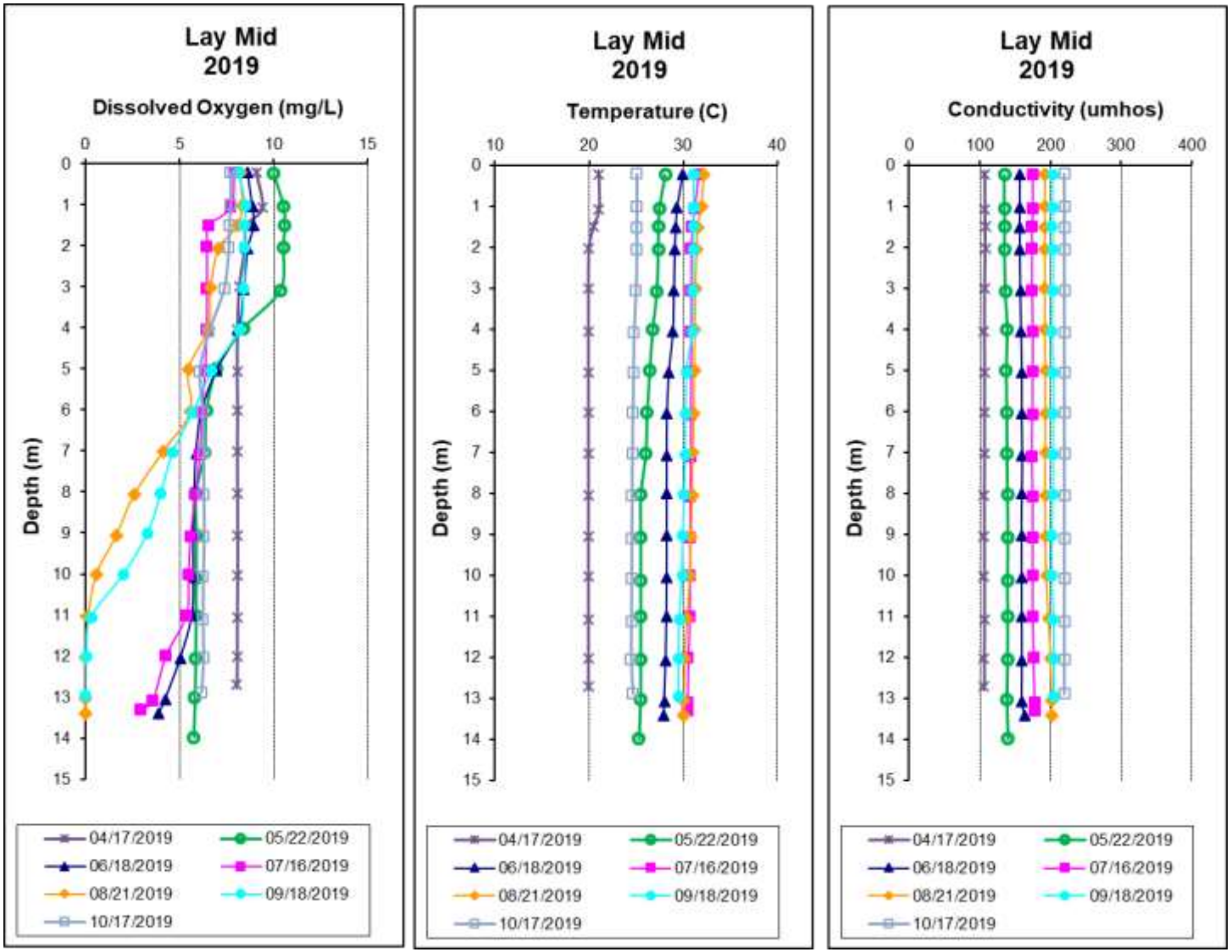


Figure 15. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the upper Lay Reservoir station, April-October 2019.

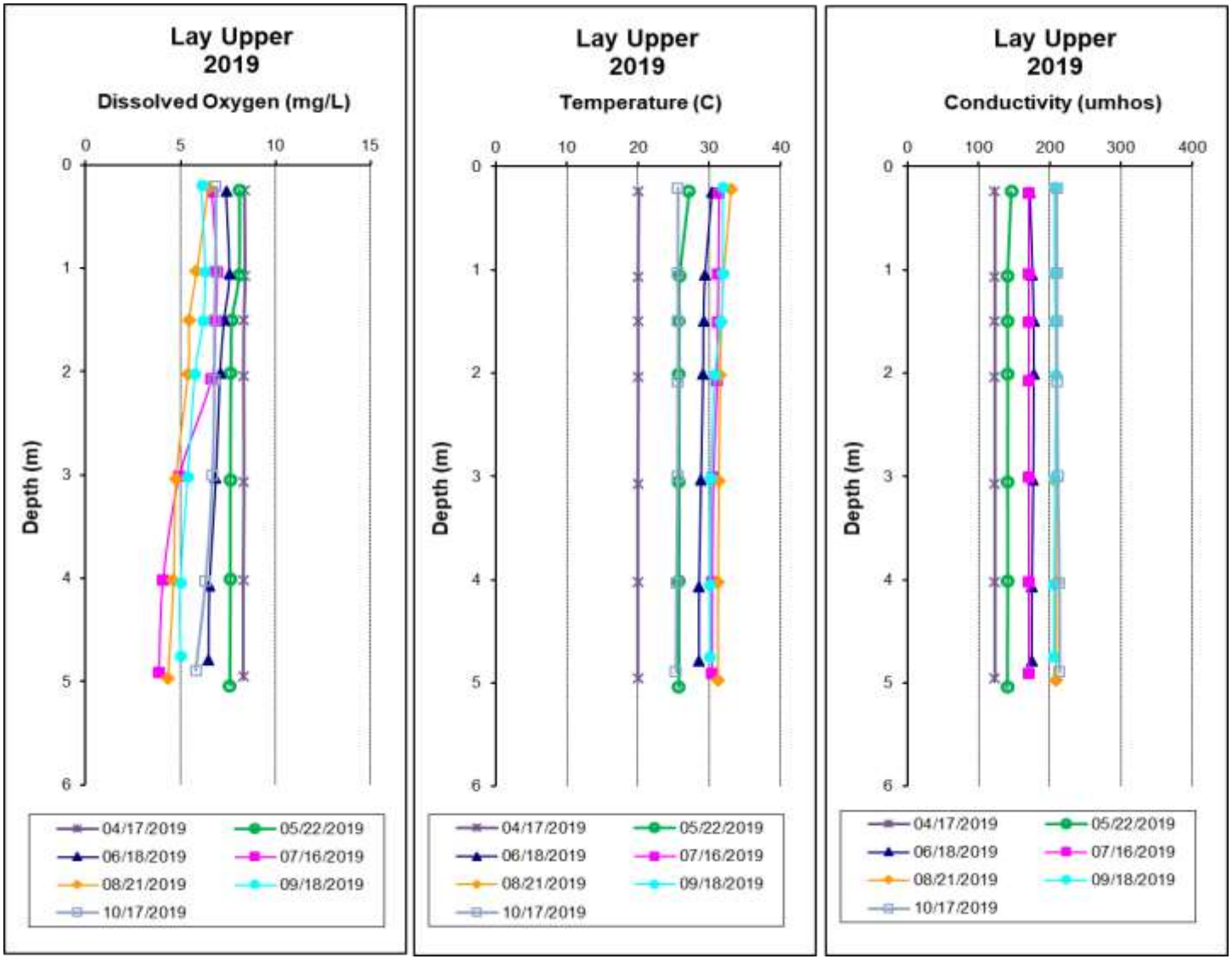
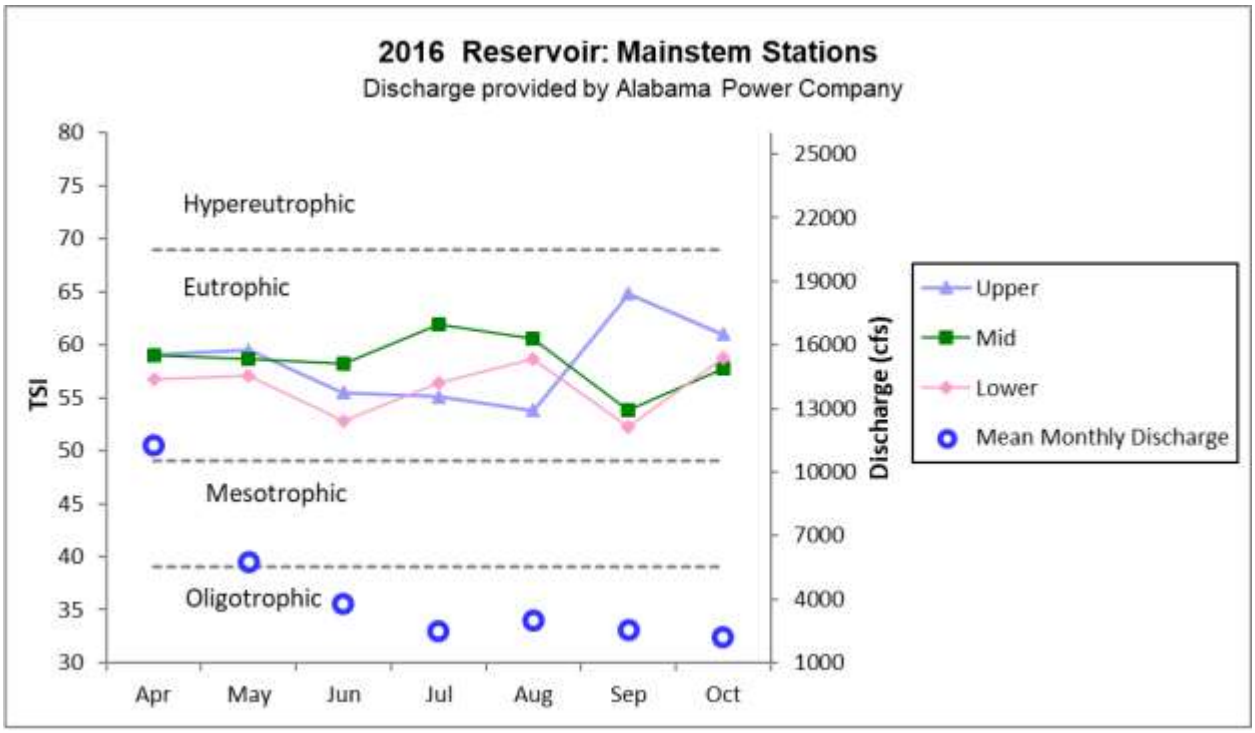


Figure 16. Monthly TSI values calculated for mainstem and tributary Lay Reservoir stations in 2016 using chl *a* concentrations and Carlson's Trophic State Index calculation (Carlson 1977). Monthly discharge provided by APCO.



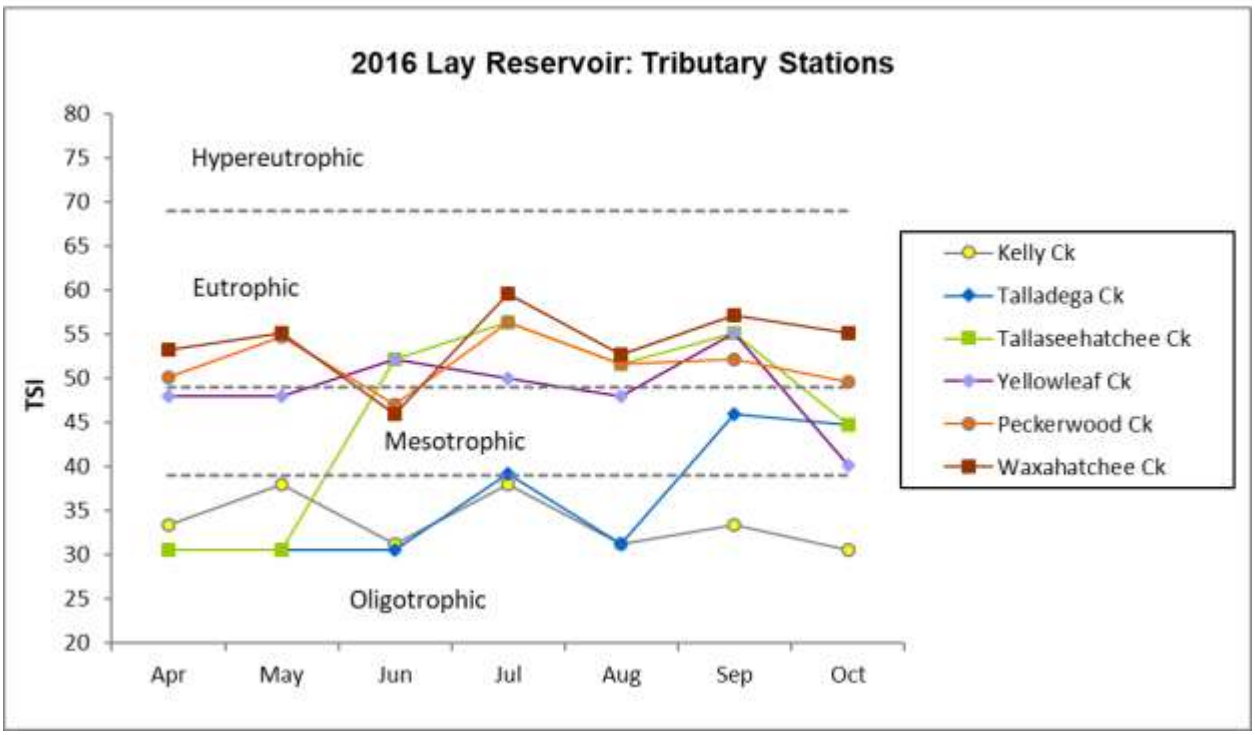
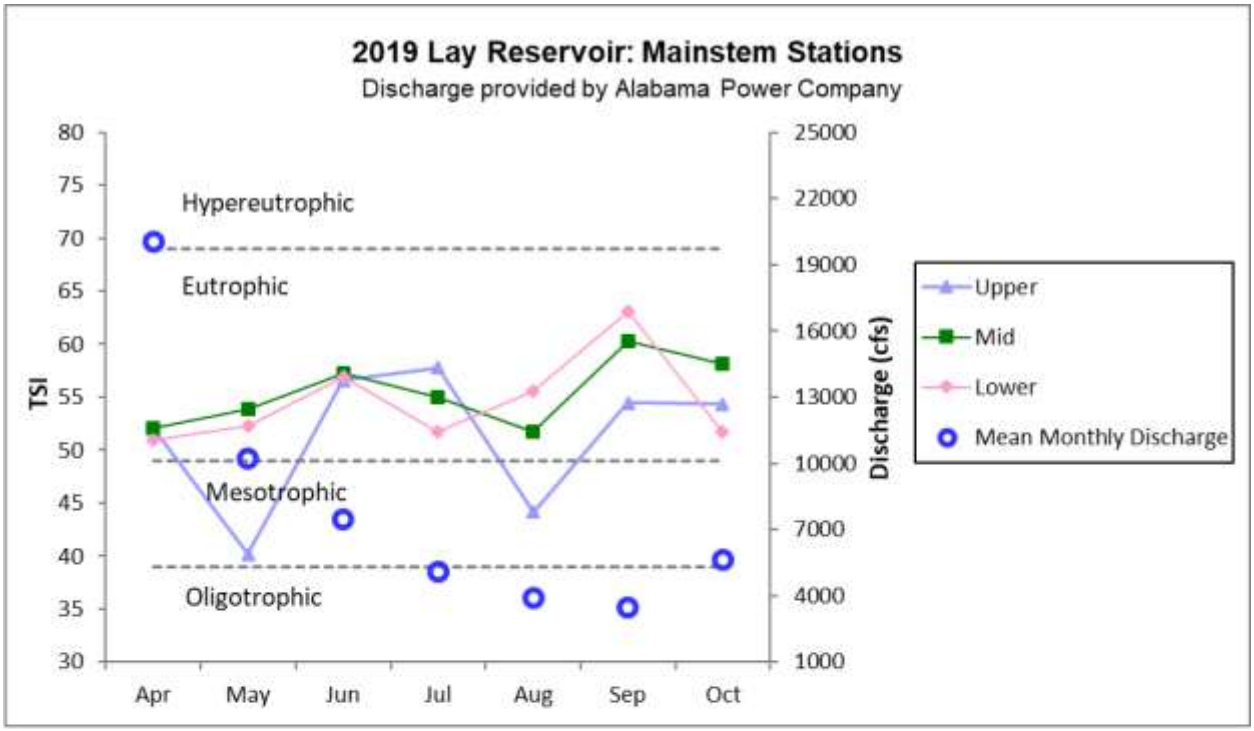
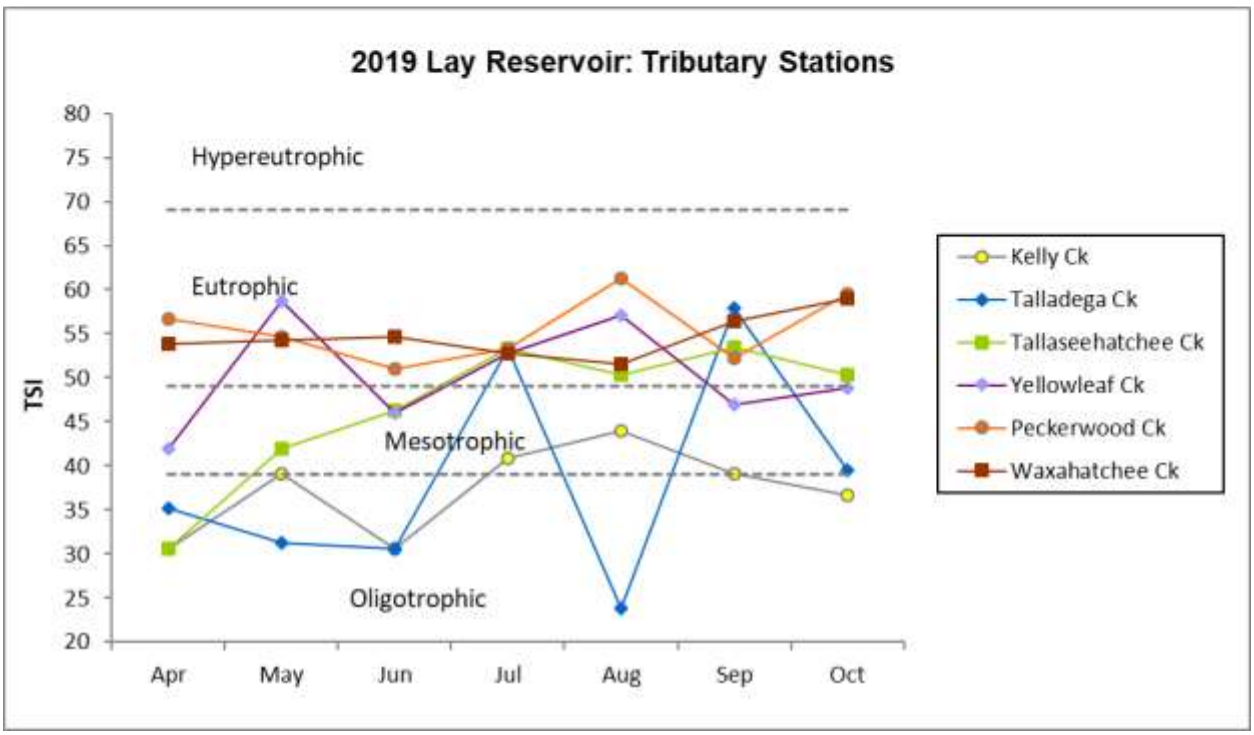


Figure 17. Monthly TSI values calculated for mainstem and tributary Lay Reservoir stations in 2019 using chl *a* concentrations and Carlson's Trophic State Index calculation (Carlson 1977). Monthly discharge provided by APCO.





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APPENDIX

Appendix Table 1. Summary of Lay Reservoir water quality data collected April-October, 2016. Minimum (min) and maximum (max) values calculated using minimum detection limits when results were less than this value. Median (med), mean and standard deviation (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-1	**Physical**							
	Turbidity (NTU)	7		2.2	4.3	3.1	3.0	0.7
	Total Dissolved Solids (mg/L)	7		78.0	131.0	112.0	104.4	23.5
	Total Suspended Solids (mg/L)[J]	7		2.0	7.0	3.0	3.6	1.7
	Hardness (mg/L)	4		74.2	85.4	81.3	80.6	5.0
	Alkalinity (mg/L)	7		60.6	96.0	84.6	81.8	12.4
	Photic Zone (m)	7		3.32	7.20	5.22	5.12	1.23
	Secchi (m)	7		1.12	2.34	1.37	1.58	0.41
	Bottom Depth (m)	7		22.0	25.9	23.8	23.8	1.2
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.007	0.035	0.015	0.014	0.012
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.095	0.002	0.023	0.036
	Total Kjeldahl Nitrogen (mg/L)	7		0.299	0.760	0.446	0.471	0.144
	Total Nitrogen (mg/L)[J]	7	<	0.930	2.283	0.468	0.494	0.141
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.006	0.003	0.003	0.002
	Total Phosphorus (mg/L)	7		0.015	0.026	0.023	0.021	0.004
	CBOD-5 (mg/L)	7	<	2.0	2.2	1.0	1.2	0.4
	Chlorides (mg/L)	7		4.0	10.9	7.4	7.2	2.5
	Biological							
	Chlorophyll a (mg/m³)	7		9.08	17.80	14.40	13.91	3.46
	E. coli (MPN/DL)[J]	4		1	1	1	1	0
LAYC-2	**Physical**							
	Turbidity (NTU)	7		4.6	5.2	4.9	4.9	0.2
	Total Dissolved Solids (mg/L)	7		82.0	151.0	134.0	124.0	27.4
	Total Suspended Solids (mg/L)	7		4.0	8.0	6.0	5.6	1.4
	Hardness (mg/L)	4		82.7	102.0	98.6	95.5	9.1
	Alkalinity (mg/L)	7		71.4	101.0	90.3	87.3	10.2
	Photic Zone (m)	7		2.39	5.00	3.18	3.54	0.97
	Secchi (m)	7		0.95	1.30	1.17	1.17	0.11
	Bottom Depth (m)	7		3.6	5.2	5.0	4.8	0.6
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.007	0.060	0.004	0.015	0.020
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7		0.012	0.106	0.064	0.059	0.032
	Total Kjeldahl Nitrogen (mg/L)[J]	7		0.123	0.476	0.378	0.345	0.128
	Total Nitrogen (mg/L)[J]	7		0.588	1.668	0.390	0.404	0.137
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.009	0.005	0.005	0.002
	Total Phosphorus (mg/L)	7		0.019	0.029	0.028	0.025	0.004
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		4.3	19.6	12.2	11.2	5.5
	Biological							
	Chlorophyll a (mg/m³)	7		10.70	32.90	18.20	18.29	7.70
	E. coli (MPN/DL)[J]	4		1	2	1	1	1

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-3	**Physical**							
	Turbidity (NTU)	7		3.4	5.4	4.8	4.5	0.8
	Total Dissolved Solids (mg/L)	7		85.0	127.0	112.0	107.4	15.5
	Total Suspended Solids (mg/L)	7		2.0	9.0	5.0	5.1	2.2
	Hardness (mg/L)	4		77.6	89.2	84.3	83.8	5.0
	Alkalinity (mg/L)	7		66.6	99.3	88.2	86.0	11.4
	Photic Zone (m)	7		3.34	4.60	3.43	3.76	0.56
	Secchi (m)	7		0.98	1.26	1.14	1.14	0.08
	Bottom Depth (m)	7		12.7	13.7	13.3	13.3	0.3
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.007	0.030	0.015	0.012	0.007
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.017	0.001	0.004	0.006
	Total Kjeldahl Nitrogen (mg/L)	7		0.280	0.593	0.340	0.416	0.136
	Total Nitrogen (mg/L)[J]	7	<	0.852	1.782	0.342	0.420	0.133
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.005	0.003	0.003	0.001
	Total Phosphorus (mg/L)	7		0.021	0.025	0.022	0.023	0.002
	CBOD-5 (mg/L)	7	<	2.0	2.3	1.0	1.4	0.6
	Chlorides (mg/L)	7		4.1	12.2	8.5	8.0	2.9
	Biological							
	Chlorophyll a (mg/m³)	7		10.70	24.40	17.50	17.84	4.31
	E. coli (MPN/DL)[J]	4		1	1	1	1	0
LAYC-6	**Physical**							
	Turbidity (NTU)	7		3.1	13.2	3.7	5.5	3.8
	Total Dissolved Solids (mg/L)[J]	6		81.0	138.0	113.0	111.2	20.5
	Total Suspended Solids (mg/L)	7		1.0	12.0	4.0	5.4	3.6
	Hardness (mg/L)	4		63.6	111.0	95.6	91.5	22.7
	Alkalinity (mg/L)	7		49.1	115.0	79.8	81.1	24.0
	Photic Zone (m)	7		2.29	2.86	2.61	2.58	0.21
	Secchi (m)	7		0.55	2.51	2.15	1.80	0.77
	Bottom Depth (m)	7		2.3	2.9	2.6	2.6	0.2
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.012	0.440	0.044	0.120	0.172
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.014	0.224	0.159	0.123	0.084
	Total Kjeldahl Nitrogen (mg/L)	7		0.220	0.746	0.471	0.460	0.194
	Total Nitrogen (mg/L)[J]	7	<	0.681	2.910	0.627	0.583	0.227
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.004	0.030	0.006	0.009	0.010
	Total Phosphorus (mg/L)[J]	7		0.007	0.043	0.011	0.015	0.012
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		1.5	4.8	2.6	2.8	1.1
	Biological							
	Chlorophyll a (mg/m³)	7	<	1.00	2.14	1.34	1.37	0.60
	E. coli (MPN/DL)	4		9	67	54	46	27

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-7	**Physical**							
	Turbidity (NTU)	7		6.0	14.7	9.9	9.8	2.7
	Total Dissolved Solids (mg/L)[J]	6		129.0	167.0	148.0	146.5	13.6
	Total Suspended Solids (mg/L)	7		3.0	14.0	10.0	9.1	3.5
	Hardness (mg/L)	4		118.0	150.0	140.5	137.2	14.9
	Alkalinity (mg/L)	7		84.5	133.0	126.0	111.4	22.8
	Photic Zone (m)	7		1.80	3.80	3.17	2.87	0.74
	Secchi (m)	7		0.89	1.30	1.04	1.05	0.15
	Bottom Depth (m)	7		2.0	4.5	3.2	3.2	0.8
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.012	0.046	0.018	0.021	0.016
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7		0.201	0.643	0.553	0.482	0.188
	Total Kjeldahl Nitrogen (mg/L)	7		0.241	1.400	0.400	0.513	0.397
	Total Nitrogen (mg/L)[J]	7		1.740	4.890	1.034	0.996	0.331
	Dis Reactive Phosphorus (mg/L)[J]	7		0.005	0.026	0.016	0.016	0.007
	Total Phosphorus (mg/L)	7		0.021	0.040	0.030	0.031	0.007
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		1.8	4.8	2.4	3.0	1.2
	Biological							
	Chlorophyll a (mg/m³)	7	<	1.00	4.81	1.07	2.01	1.86
	E. coli (MPN/DL)	4		31	99	53	59	33
LAYC-8	**Physical**							
	Turbidity (NTU)	7		4.0	8.2	5.7	6.1	1.6
	Total Dissolved Solids (mg/L)[J]	6		131.0	159.0	138.5	141.5	10.3
	Total Suspended Solids (mg/L)	7		3.0	10.0	5.0	5.7	2.4
	Hardness (mg/L)	4		102.0	115.0	110.5	109.5	6.1
	Alkalinity (mg/L)	7		77.9	109.0	97.3	95.4	10.8
	Photic Zone (m)	7		2.70	4.33	3.85	3.60	0.57
	Secchi (m)	7		0.75	2.10	1.29	1.29	0.41
	Bottom Depth (m)	7		2.7	4.3	4.1	3.8	0.6
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.012	0.067	0.018	0.024	0.022
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.014	0.985	0.381	0.440	0.382
	Total Kjeldahl Nitrogen (mg/L)	7		0.297	0.680	0.592	0.533	0.158
	Total Nitrogen (mg/L)[J]	7	<	1.677	3.846	1.033	0.973	0.288
	Dis Reactive Phosphorus (mg/L)[J]	7		0.008	0.045	0.017	0.019	0.012
	Total Phosphorus (mg/L)	7		0.027	0.054	0.037	0.039	0.010
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		2.8	9.2	5.0	5.5	2.3
	Biological							
	Chlorophyll a (mg/m³)	7	<	1.00	13.90	8.54	7.01	5.39
	E. coli (MPN/DL)	4		6	69	8	23	31

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-9	**Physical**							
	Turbidity (NTU)	7		6.1	8.8	7.2	7.4	1.0
	Total Dissolved Solids (mg/L)[J]	6		99.0	161.0	114.0	122.0	23.6
	Total Suspended Solids (mg/L)	7		5.0	10.0	6.0	7.1	1.9
	Hardness (mg/L)	4		76.1	94.8	84.8	85.1	8.2
	Alkalinity (mg/L)	7		44.5	100.0	73.9	74.9	17.8
	Photic Zone (m)	7		2.45	3.49	2.70	2.82	0.36
	Secchi (m)	7		0.38	1.45	1.00	1.04	0.35
	Bottom Depth (m)	7		3.8	7.2	6.4	5.8	1.2
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.012	0.406	0.009	0.071	0.148
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.009	0.190	0.007	0.046	0.070
	Total Kjeldahl Nitrogen (mg/L)	7		0.446	1.230	0.552	0.651	0.264
	Total Nitrogen (mg/L)[J]	7	<	1.587	3.704	0.636	0.697	0.241
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.004	0.004	0.002	0.002	0.001
	Total Phosphorus (mg/L)	7		0.016	0.026	0.019	0.021	0.004
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		1.9	10.7	4.9	5.4	3.1
	Biological							
	Chlorophyll a (mg/m³)	7		2.67	12.30	5.87	6.99	3.03
	E. coli (MPN/DL)	4		1	9	6	5	3
LAYC-10	**Physical**							
	Turbidity (NTU)	7		3.3	4.9	3.8	3.9	0.5
	Total Dissolved Solids (mg/L)[J]	6		109.0	165.0	133.5	133.8	19.7
	Total Suspended Solids (mg/L)	7		3.0	6.0	4.0	4.3	1.1
	Hardness (mg/L)	4		89.5	99.5	91.3	92.9	4.6
	Alkalinity (mg/L)	7		43.3	99.4	70.1	73.3	19.0
	Photic Zone (m)	7		3.42	4.25	3.70	3.76	0.30
	Secchi (m)	7		0.97	1.64	1.40	1.38	0.24
	Bottom Depth (m)	7		4.4	4.7	4.5	4.5	0.1
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.012	0.671	0.009	0.103	0.250
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.009	0.045	0.026	0.022	0.017
	Total Kjeldahl Nitrogen (mg/L)	7		0.436	1.360	0.750	0.863	0.371
	Total Nitrogen (mg/L)[J]	7	<	1.322	4.215	0.754	0.885	0.380
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.004	0.022	0.006	0.007	0.007
	Total Phosphorus (mg/L)[J]	7		0.009	0.047	0.021	0.023	0.012
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		3.1	11.4	7.8	7.5	2.9
	Biological							
	Chlorophyll a (mg/m³)	7		5.34	13.90	8.54	8.98	2.94
	E. coli (MPN/DL)	4	<	1	1	1	1	0

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-11	**Physical**							
	Turbidity (NTU)	7		3.0	5.8	3.5	3.7	0.9
	Total Dissolved Solids (mg/L)[J]	6		106.0	151.0	129.5	128.3	15.5
	Total Suspended Solids (mg/L)[J]	7		1.0	5.0	3.0	2.6	1.4
	Hardness (mg/L)	4		87.0	97.6	91.0	91.6	4.4
	Alkalinity (mg/L)	7		52.4	95.7	68.2	72.0	16.4
	Photic Zone (m)	7		3.00	10.00	4.50	4.99	2.32
	Secchi (m)	7		0.91	1.90	1.45	1.43	0.39
	Bottom Depth (m)	7		8.1	10.6	10.4	10.1	0.9
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.012	0.726	0.009	0.115	0.270
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.009	0.026	0.007	0.011	0.008
	Total Kjeldahl Nitrogen (mg/L)	7		0.564	0.822	0.713	0.725	0.091
	Total Nitrogen (mg/L)[J]	7	<	1.706	2.502	0.739	0.737	0.094
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.004	0.021	0.004	0.006	0.007
	Total Phosphorus (mg/L)	7		0.013	0.031	0.018	0.020	0.006
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		1.8	8.9	5.5	5.3	2.6
	Biological							
	Chlorophyll a (mg/m³)	7		4.81	19.20	12.30	11.90	4.51
	E. coli (MPN/DL)	4	<	1	4	2	2	2

J=one or more of the values provided are estimated; < = Actual value is less than the detection limit.

Appendix Table 2. Summary of Lay Reservoir water quality data collected April-October, 2019. Minimum (min) and maximum (max) values calculated using minimum detection limits when results were less than this value. Median (med), mean, and standard deviation (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-1	**Physical**							
	Turbidity (NTU)	7		2.2	9.6	3.0	4.0	2.6
	Total Dissolved Solids (mg/L)	7		52.0	114.0	73.0	82.1	23.6
	Total Suspended Solids (mg/L)	7		2.0	7.0	4.0	4.3	1.7
	Hardness (mg/L)	4		60.1	76.6	65.2	66.8	7.0
	Alkalinity (mg/L)	7		45.4	79.8	66.0	64.8	12.5
	Photic Zone (m)	7		2.98	6.56	4.81	4.79	1.19
	Secchi (m)	7		1.02	2.02	1.70	1.60	0.33
	Bottom Depth (m)	7		21.2	25.3	23.2	23.4	1.3
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.004	0.040	0.008	0.013	0.014
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.003	#####	0.052	2.085	5.386
	Total Kjeldahl Nitrogen (mg/L)[J]	7	<	0.075	0.614	0.179	0.265	0.217
	Total Nitrogen (mg/L)[J]	7	<	0.324	#####	0.370	2.350	5.291
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.005	0.009	0.002	0.003	0.002
	Total Phosphorus (mg/L)[J]	7		0.016	0.027	0.019	0.021	0.004
	CBOD-5 (mg/L)[J]	7	<	2.0	2.3	1.0	1.2	0.5
	Chlorides (mg/L)	7		3.2	8.5	5.5	5.8	1.9
	Biological							
	Chlorophyll a (mg/m³)	7		8.01	27.40	9.15	12.76	6.92
	E. coli (MPN/DL)[J]	4	<	1	1	1	1	0
LAYC-2	**Physical**							
	Turbidity (NTU)	7		6.1	10.6	8.1	8.0	1.9
	Total Dissolved Solids (mg/L)	7		66.0	148.0	99.0	102.9	29.4
	Total Suspended Solids (mg/L)	7		5.0	9.0	8.0	7.1	1.8
	Hardness (mg/L)	4		68.6	79.7	71.0	72.6	4.9
	Alkalinity (mg/L)	7		48.0	80.0	68.3	68.0	11.8
	Photic Zone (m)	7		2.38	3.64	2.87	3.00	0.49
	Secchi (m)	7		0.90	1.19	1.01	1.01	0.09
	Bottom Depth (m)	7		4.8	5.0	4.9	4.9	0.1
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.039	0.008	0.017	0.017
	Nitrate+Nitrite Nitrogen (mg/L)	7		0.068	0.929	0.122	0.250	0.304
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.200	0.658	0.343	0.352	0.204
	Total Nitrogen (mg/L)	7	<	0.504	4.761	0.554	0.603	0.477
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.005	0.012	0.005	0.006	0.004
	Total Phosphorus (mg/L)	7		0.018	0.047	0.024	0.027	0.010
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		4.0	8.9	6.9	6.9	1.8
	Biological							
	Chlorophyll a (mg/m³)	7		2.67	16.00	11.30	9.78	4.96
	E. coli (MPN/DL)[J]	4	<	1	3	1	1	1

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-3	**Physical**							
	Turbidity (NTU)	7		4.1	15.9	5.2	6.9	4.1
	Total Dissolved Solids (mg/L)	7		57.0	127.0	77.0	92.3	29.9
	Total Suspended Solids (mg/L)[J]	7		4.0	8.0	6.0	6.0	1.5
	Hardness (mg/L)	4		64.2	79.2	68.9	70.3	6.4
	Alkalinity (mg/L)	7		42.5	80.9	68.8	66.4	14.0
	Photic Zone (m)	7		1.89	4.72	3.20	3.47	0.97
	Secchi (m)	7		0.69	1.60	1.25	1.22	0.28
	Bottom Depth (m)	7		12.7	14.0	13.3	13.2	0.4
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.030	0.008	0.009	0.010
	Nitrate+Nitrite Nitrogen (mg/L)	7	<	0.003	0.183	0.002	0.042	0.068
	Total Kjeldahl Nitrogen (mg/L)[J]	7	<	0.143	1.020	0.487	0.523	0.331
	Total Nitrogen (mg/L)[J]	7	<	0.304	3.064	0.488	0.565	0.341
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.005	0.013	0.002	0.004	0.004
	Total Phosphorus (mg/L)	7		0.018	0.032	0.024	0.024	0.004
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		3.3	10.2	5.8	6.3	2.4
	Biological							
	Chlorophyll a (mg/m³)	7		8.68	20.60	12.00	13.24	4.42
	E. coli (MPN/DL)[J]	4	<	1	1	1	1	0
LAYC-6	**Physical**							
	Turbidity (NTU)	7		2.8	10.3	5.0	5.9	2.8
	Total Dissolved Solids (mg/L)[J]	7		64.0	280.0	101.0	125.9	70.8
	Total Suspended Solids (mg/L)[J]	7		1.0	9.0	4.0	5.1	2.9
	Hardness (mg/L)	4		76.6	122.0	88.2	93.8	21.1
	Alkalinity (mg/L)	7		25.4	104.0	76.9	74.1	27.0
	Photic Zone (m)	7		2.25	3.41	3.00	2.95	0.36
	Secchi (m)	7		1.01	1.79	1.34	1.37	0.29
	Bottom Depth (m)	7		2.2	3.4	3.0	3.0	0.4
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.004	0.037	0.020	0.018	0.013
	Nitrate+Nitrite Nitrogen (mg/L)	7		0.091	0.255	0.115	0.148	0.068
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.075	0.485	0.038	0.187	0.197
	Total Nitrogen (mg/L)	7	<	0.386	2.220	0.174	0.336	0.247
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.006	0.017	0.003	0.007	0.006
	Total Phosphorus (mg/L)[J]	7		0.009	0.019	0.016	0.015	0.004
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		1.1	3.8	2.5	2.6	1.0
	Biological							
	Chlorophyll a (mg/m³)	7	<	0.36	3.92	2.40	2.04	1.27
	E. coli (MPN/DL)	4		7	31	19	18	12

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-7	**Physical**							
	Turbidity (NTU)	7		8.1	31.6	12.0	14.7	7.9
	Total Dissolved Solids (mg/L)	7		89.0	137.0	122.0	117.0	18.0
	Total Suspended Solids (mg/L)[J]	7		10.0	22.0	14.0	14.7	4.6
	Hardness (mg/L)	4		67.4	108.0	96.1	91.9	19.8
	Alkalinity (mg/L)	7		62.2	114.0	96.4	92.0	18.5
	Photic Zone (m)	7		1.06	3.20	2.70	2.47	0.73
	Secchi (m)	7		0.65	0.98	0.84	0.81	0.13
	Bottom Depth (m)	7		2.0	3.2	2.7	2.7	0.4
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.004	0.029	0.015	0.014	0.012
	Nitrate+Nitrite Nitrogen (mg/L)	7		0.273	0.629	0.447	0.443	0.129
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.075	0.578	0.313	0.259	0.222
	Total Nitrogen (mg/L)	7	<	1.022	3.027	0.830	0.702	0.247
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.006	0.032	0.019	0.019	0.010
	Total Phosphorus (mg/L)	7		0.023	0.052	0.039	0.037	0.009
	CBOD-5 (mg/L)	7	<	2.0	3.3	1.0	1.3	0.8
	Chlorides (mg/L)[J]	7		1.5	4.8	2.2	2.5	1.1
	Biological							
	Chlorophyll a (mg/m³)	7	<	1.00	16.30	1.60	4.65	6.15
	E. coli (MPN/DL)	4		10	144	33	55	62
LAYC-8	**Physical**							
	Turbidity (NTU)	7		4.8	11.5	8.0	8.0	2.6
	Total Dissolved Solids (mg/L)	7		103.0	145.0	114.0	121.0	16.7
	Total Suspended Solids (mg/L)	7		5.0	12.0	9.0	8.4	2.3
	Hardness (mg/L)	4		74.0	98.9	81.4	83.9	10.6
	Alkalinity (mg/L)	7		73.6	91.3	78.7	82.4	7.0
	Photic Zone (m)	7		3.11	3.86	3.35	3.42	0.27
	Secchi (m)	7		0.91	1.23	1.13	1.09	0.11
	Bottom Depth (m)	7		4.0	4.9	4.3	4.3	0.3
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.004	0.026	0.015	0.013	0.011
	Nitrate+Nitrite Nitrogen (mg/L)	7		0.160	0.537	0.338	0.351	0.140
	Total Kjeldahl Nitrogen (mg/L)[J]	7		0.077	0.556	0.312	0.321	0.152
	Total Nitrogen (mg/L)[J]	7		1.032	2.682	0.825	0.672	0.236
	Dis Reactive Phosphorus (mg/L)	7	<	0.006	0.037	0.023	0.020	0.011
	Total Phosphorus (mg/L)	7		0.023	0.062	0.040	0.041	0.014
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		2.2	7.0	5.2	4.8	1.7
	Biological							
	Chlorophyll a (mg/m³)	7		0.36	10.30	7.48	6.27	3.65
	E. coli (MPN/DL)	4		4	16	12	11	5

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-9	**Physical**							
	Turbidity (NTU)	7		7.0	15.2	9.4	10.4	3.0
	Total Dissolved Solids (mg/L)[J]	7		68.0	142.0	104.0	103.1	26.0
	Total Suspended Solids (mg/L)[J]	7		6.0	14.0	9.0	9.6	2.5
	Hardness (mg/L)	4		61.4	90.4	80.2	78.1	12.1
	Alkalinity (mg/L)	7		34.7	77.0	72.3	64.5	15.5
	Photic Zone (m)	7		2.14	2.80	2.49	2.48	0.21
	Secchi (m)	7		0.61	0.95	0.82	0.80	0.13
	Bottom Depth (m)	7		5.7	6.9	6.4	6.3	0.5
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.004	0.041	0.018	0.021	0.013
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7		0.009	0.144	0.104	0.091	0.044
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.075	0.548	0.358	0.332	0.158
	Total Nitrogen (mg/L)[J]	7	<	0.140	1.974	0.476	0.423	0.196
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.006	0.007	0.003	0.004	0.002
	Total Phosphorus (mg/L)	7		0.019	0.047	0.022	0.026	0.010
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		1.7	9.4	5.1	5.1	2.5
	Biological							
	Chlorophyll a (mg/m³)	7		3.20	17.60	6.48	8.86	5.50
	E. coli (MPN/DL)	4		4	12	9	8	4
LAYC-10	**Physical**							
	Turbidity (NTU)	7		3.8	11.8	5.0	5.9	2.8
	Total Dissolved Solids (mg/L)	7		73.0	131.0	97.0	100.9	23.6
	Total Suspended Solids (mg/L)	7		2.0	11.0	4.0	5.7	3.7
	Hardness (mg/L)	4		64.4	81.7	74.6	73.8	7.4
	Alkalinity (mg/L)	7		43.4	77.4	68.8	64.8	12.5
	Photic Zone (m)	7		2.13	3.82	3.34	3.20	0.64
	Secchi (m)	7		0.72	1.19	1.06	1.02	0.18
	Bottom Depth (m)	7		4.3	4.7	4.6	4.6	0.1
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.004	0.041	0.002	0.010	0.014
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.008	0.150	0.004	0.026	0.055
	Total Kjeldahl Nitrogen (mg/L)[J]	7	<	0.075	0.749	0.432	0.389	0.240
	Total Nitrogen (mg/L)[J]	7	<	0.124	2.259	0.436	0.415	0.255
	Dis Reactive Phosphorus (mg/L)	7	<	0.006	0.006	0.003	0.003	0.000
	Total Phosphorus (mg/L)	7		0.012	0.032	0.015	0.018	0.007
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		2.2	8.4	4.6	5.2	2.2
	Biological							
	Chlorophyll a (mg/m³)	7		8.01	23.00	11.70	13.64	5.60
	E. coli (MPN/DL)	4	<	1	2	1	1	1

Station	Parameter	N		Min	Max	Med	Avg	SD
LAYC-11	**Physical**							
	Turbidity (NTU)	7		3.1	11.8	3.5	4.8	3.1
	Total Dissolved Solids (mg/L)	7		73.0	127.0	98.0	100.7	20.8
	Total Suspended Solids (mg/L)	7		2.0	11.0	2.0	3.7	3.3
	Hardness (mg/L)	4		64.5	80.7	74.8	73.7	6.9
	Alkalinity (mg/L)	7		46.6	75.6	68.9	64.6	10.8
	Photic Zone (m)	7		3.04	5.07	4.15	4.15	0.66
	Secchi (m)	7		0.86	1.60	1.35	1.29	0.25
	Bottom Depth (m)	7		9.0	10.4	9.6	9.7	0.5
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.004	0.042	0.022	0.019	0.015
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.008	0.197	0.011	0.038	0.071
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.075	0.705	0.464	0.411	0.275
	Total Nitrogen (mg/L)[J]	7	<	0.124	2.127	0.522	0.449	0.290
	Dis Reactive Phosphorus (mg/L)	7	<	0.006	0.013	0.003	0.004	0.004
	Total Phosphorus (mg/L)	7		0.013	0.031	0.019	0.021	0.007
	CBOD-5 (mg/L)	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)[J]	7		2.4	7.7	4.6	5.1	1.8
	Biological							
	Chlorophyll a (mg/m³)	7		8.54	18.20	11.20	11.98	3.22
	E. coli (MPN/DL)	4	<	1	5	1	2	2

J=one or more of the values provided are estimated; < = Actual value is less than the detection limit.