2017 & 2021 Oliver Reservoir Report

Rivers and Reservoirs Monitoring Program

Alabama Department of Environmental Management

Field Operations Division
Rivers and Reservoirs Unit
August 2025

Rivers and Reservoirs Monitoring Program

2021

Oliver Reservoir

Black Warrior River Basin

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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
BW	Black Warrior
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

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INTRODUCTION

Completed in 1940 by the US Army Corps of Engineers (USACOE), the William Bacon Oliver Lock & Dam was constructed on the Black Warrior River to improve barge traffic to the City of Tuscaloosa. The 1,000 surface acres impounded by Oliver Lock & Dam (Oliver Reservoir) extends nine river miles upstream to Holt Lock & Dam.

In 2024, the Alabama Department of Public Health (ADPH) issued a fish consumption advisory due to mercury found in fish tissue. As a result, Oliver Reservoir was placed on Alabama's 2024 CWA §303(d) list of impaired waters for not meeting its Swimming/Fish & Wildlife (S/F&W) water use classification for mercury caused by atmospheric deposition.

The Alabama Department of Environmental Management (ADEM) monitored Oliver Reservoir as part of the 2017 and 2021 assessments of the Black Warrior River (BW) 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 Program (now known as RRMP) was initiated by 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).

A specific water quality criterion for nutrient management was implemented in 2004 at the dam forebay, or lower end sampling location (OLIT-1) on Oliver Reservoir. This criterion represents a growing season mean (April-October) chlorophyll *a* (chl *a*) concentration that is protective of Oliver Reservoir's Swimming/Fish & Wildlife (S/F&W) use classifications.

The purpose of this report is to summarize data collected at three stations in Oliver Reservoir during the 2017 and 2021 growing seasons and to evaluate growing season trends in mean lake trophic status and nutrient concentrations using ADEM's historic dataset. Monthly and 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. Oliver Reservoir was sampled in the dam forebay, mid reservoir, and upper reservoir.

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 2021), Surface Water Quality Assurance Project Plan (ADEM 2023) and Quality Management Plan (ADEM 2018).

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 flow data and ADEM's previously collected data to help interpret the 2017 and 2021 results.

Figure 1. Oliver Reservoir with 2017 and 2021 sampling locations. A description of each sampling location is provided in Table 1.

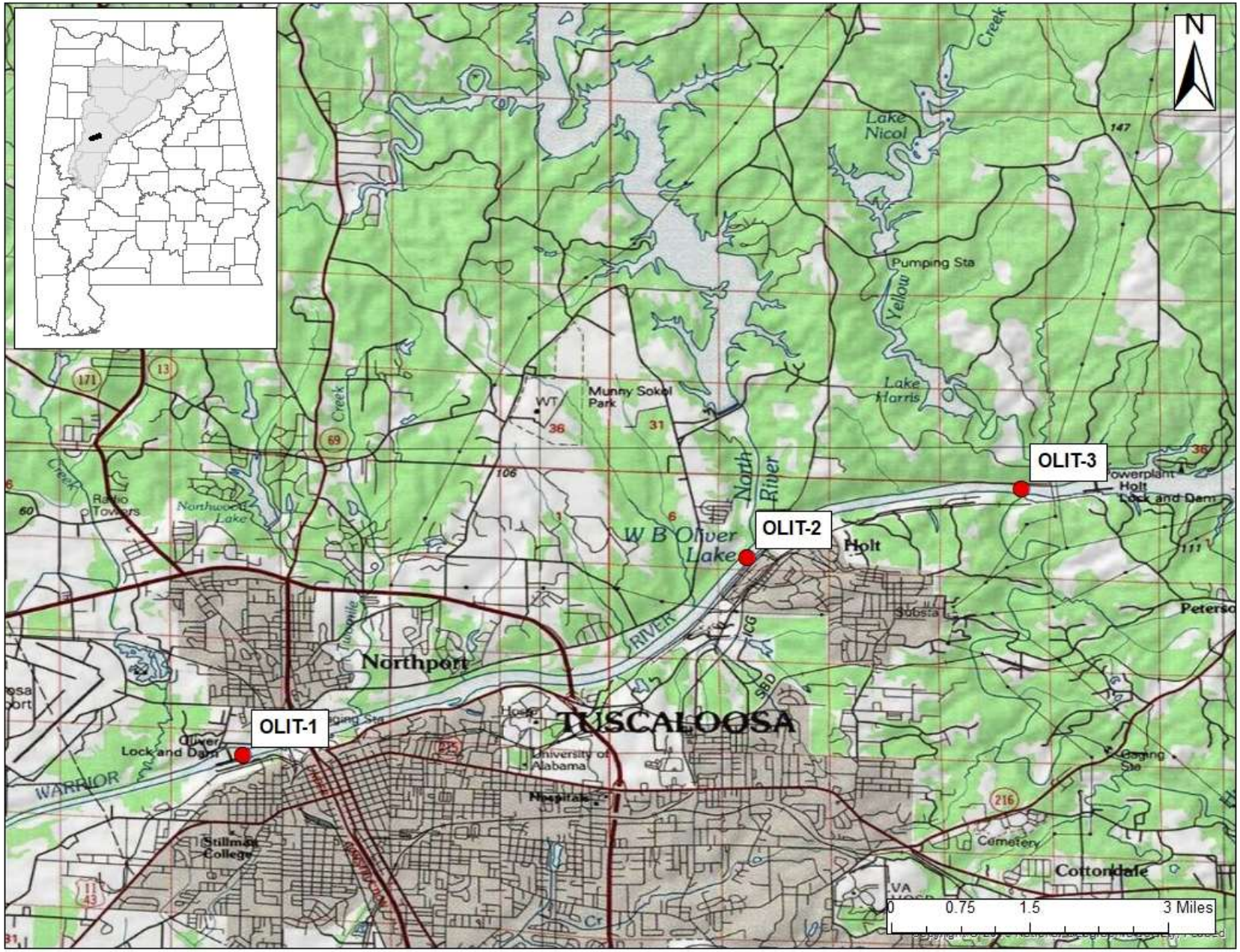


Table 1. Descriptions of the 2017 and 2021 monitoring stations in Oliver Reservoir.

HUC	County	Station Number	Report Designation	Waterbody Name	Station Description	Chl *a* Criterion	Latitude	Longitude
Oliver Reservoir								
031601120505	Tuscaloosa	OLIT-1*	Lower	Black Warrior R	Deepest point, main river channel, dam forebay.	12 µg/L	33.21139	-87.58344
03101120505	Tuscaloosa	OLIT-2	Mid	Black Warrior R	Deepest point, main river channel, immediately downstream of North River-Black Warrior R confluence.		33.24257	-87.50428
031601120505	Tuscaloosa	OLIT-3	Upper	Black Warrior R	Deepest point, main river channel, approximately 0.5 miles downstream of confluence with Hurricane Creek.		33.25320	-87.46100

*Growing season mean chl *a* criteria implemented at this station in 2004.

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, dissolved oxygen (DO), and TSI are also provided (Figures 4-8 and 13). 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 9-12. Summary statistics of all data collected during 2017 and 2021 are presented in Appendix Table 1 and Appendix Table 2, respectively. The tables contain the minimum, maximum, median, mean, and standard deviation of each parameter analyzed.

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

In 2017, the highest mean growing season TN value calculated among Oliver Reservoir stations was at the Lower station (Figure 2). Mean growing season TN concentrations were similar at all three Oliver stations in 2021. While mean TN concentrations have been variable across sampling years at all three stations, all values, except the Lower station in 2002, have been less than 1.0 mg/L. Monthly TN graphs are available in Figure 4.

In both 2017 and 2021, mean growing season TP concentrations among all Oliver Reservoir stations were less than 0.25 mg/L (Figure 2). After a decrease in 2007, mean TP values at all three stations have remained stable. Monthly TP graphs are available in Figure 5.

The growing season mean chl *a* concentration at the Lower Oliver station was below the established criterion in both the 2017 and 2021 sampling years (Figure 3). The highest growing season means were calculated for the Upper station in both years. Mean chl *a* values decreased 2007 to 2012 at all three stations but were higher in 2017 than previous years. Monthly chl *a* graphs are available in Figure 6.

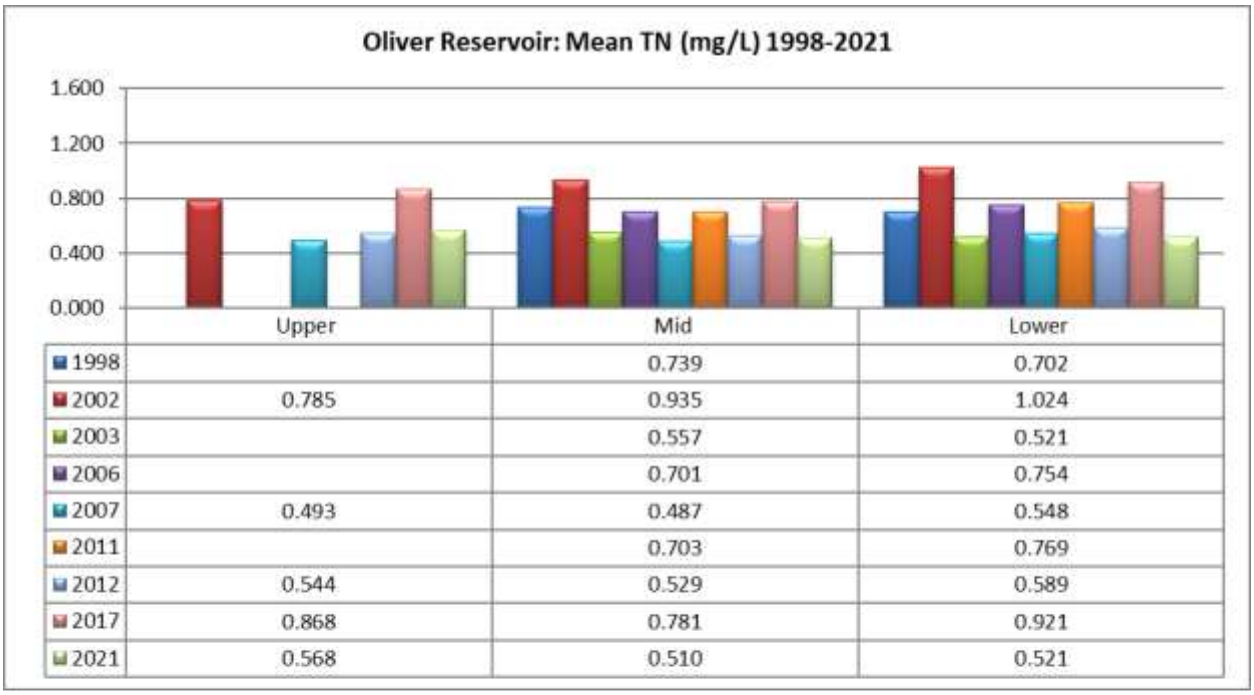
In 2017 and 2021, the highest growing season mean TSS concentrations were calculated for the Lower station (Figure 3). While mean TSS declined at all three stations from the start of monitoring until 2012, concentrations have increased at all stations the last two sampling years. Monthly TSS graphs are available in Figure 7.

AGPT results for the Mid station indicated phosphorus-limited conditions in 2017 (Table 2). Mean standing crop (MSC) at all stations has remained below 5.0 mg/L, the value that Raschke and Shultz (1987) defined as protective of reservoir and lake systems, except for samples collected in 2012. No AGPT samples were collected in 2021.

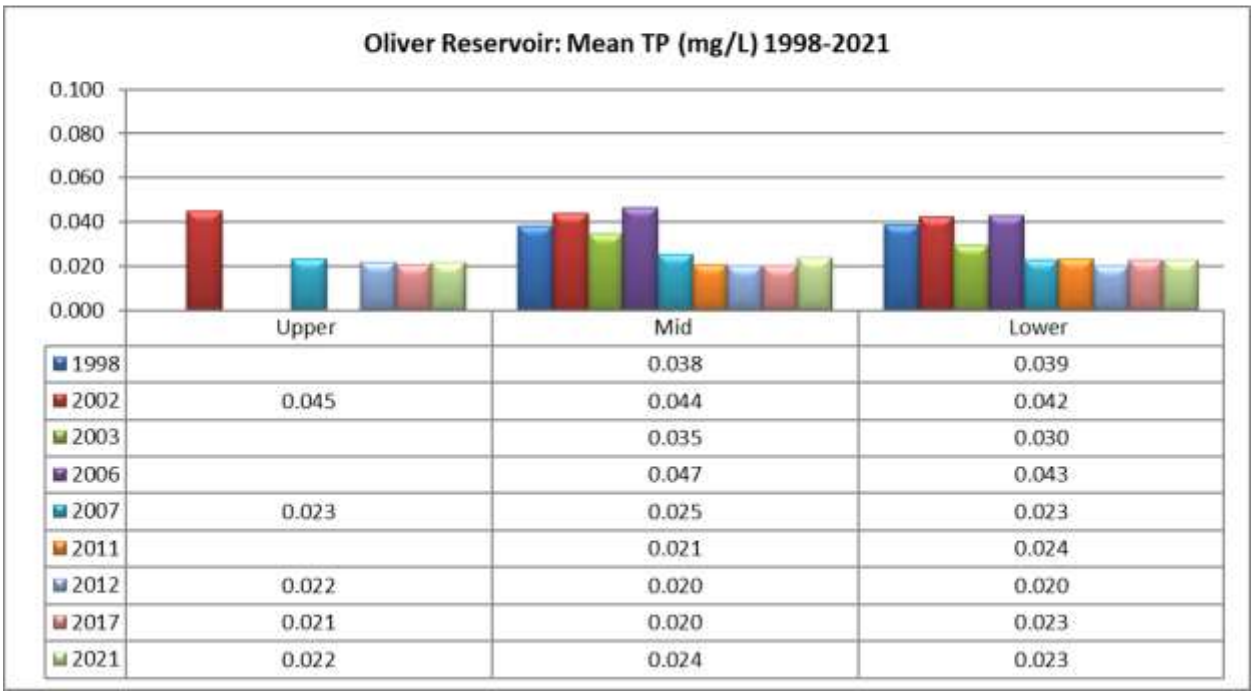
Dissolved oxygen concentrations at all Oliver Reservoir stations were above the ADEM criteria limit of 5.0 mg/L at 5.0 ft (1.5 m) in both 2017 and 2021 (ADEM Admin. Code R. 335-6-10-.09) (Figure 8). Based on monthly profiles data, both the Upper and Lower Oliver stations were generally well-mixed April-October in 2017 and 2021 (Figures 9-12). The highest water temperatures were observed in the month of August both sampling years.

TSI values were calculated using monthly chl *a* concentrations and Carlson's Trophic State Index. In 2017, the Mid and Upper stations were eutrophic all months except for July, at which time they were oligotrophic (Figure 13). In 2021, all stations were borderline eutrophic/mesotrophic for much of the growing season.

Figure 2. Mean growing season TN and TP concentrations measured in Oliver Reservoir, April-October, 1998-2021. Stations are illustrated from upstream to downstream as the graph is read from left to right.

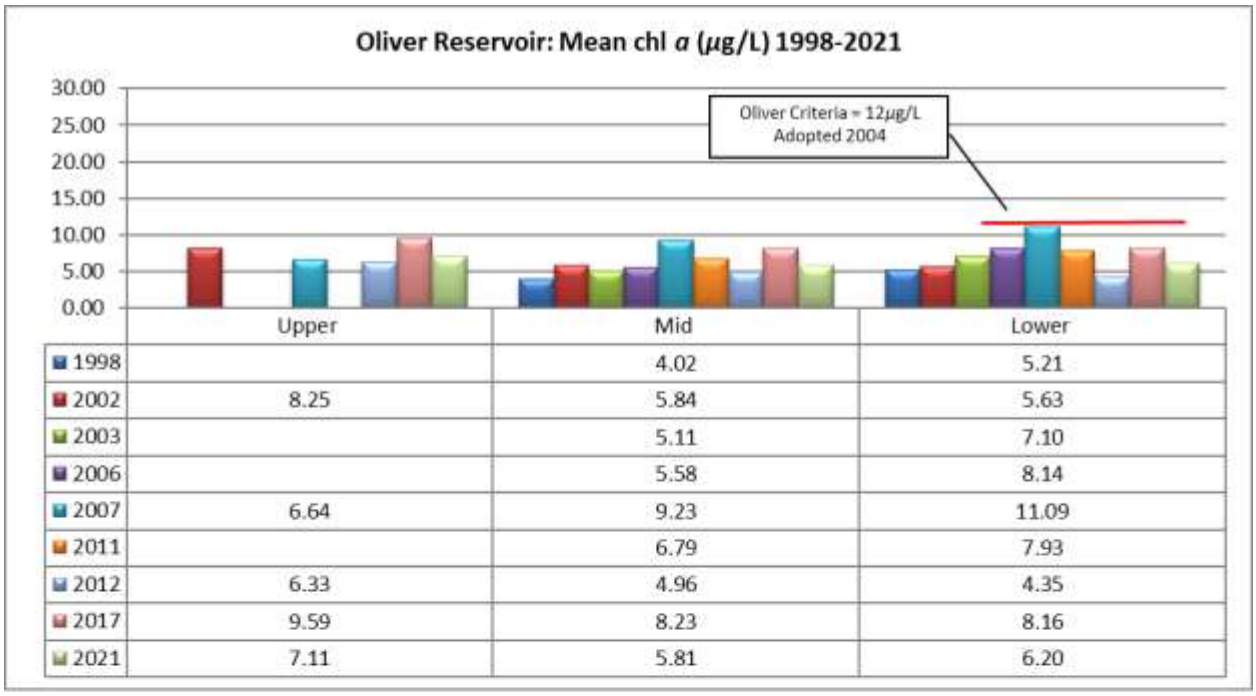


	Upper	Mid	Lower
1998		0.739	0.702
2002	0.785	0.935	1.024
2003		0.557	0.521
2006		0.701	0.754
2007	0.493	0.487	0.548
2011		0.703	0.769
2012	0.544	0.529	0.589
2017	0.868	0.781	0.921
2021	0.568	0.510	0.521

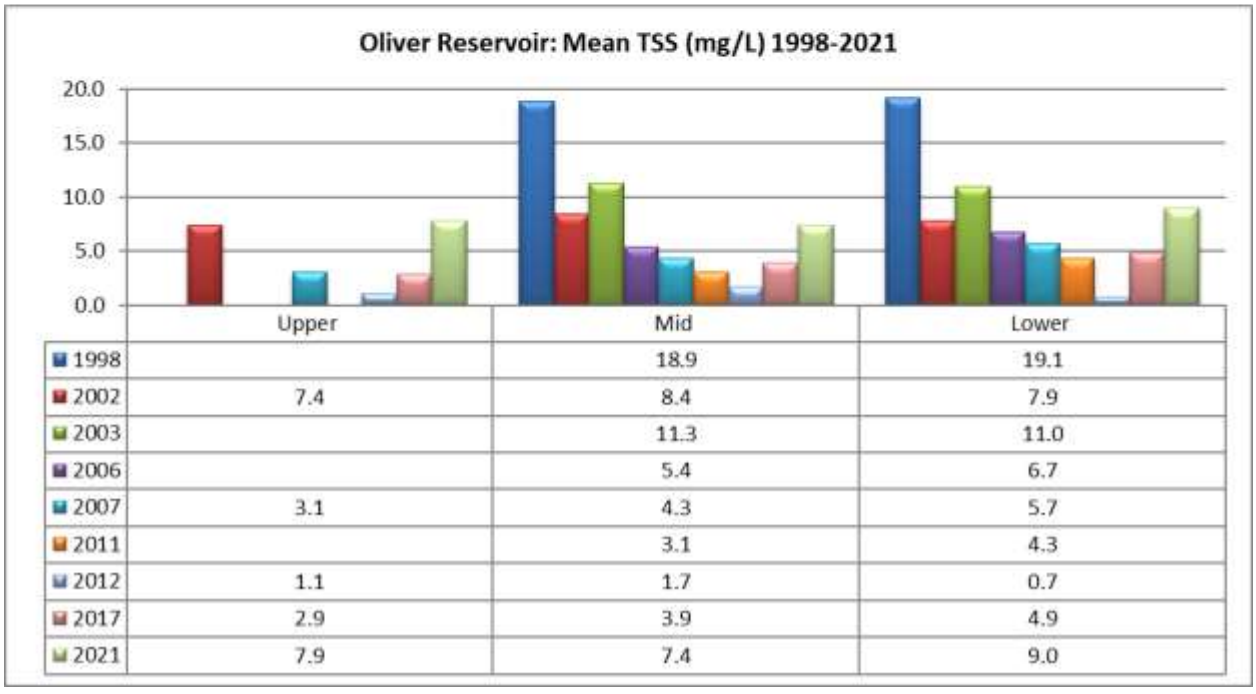


	Upper	Mid	Lower
1998		0.038	0.039
2002	0.045	0.044	0.042
2003		0.035	0.030
2006		0.047	0.043
2007	0.023	0.025	0.023
2011		0.021	0.024
2012	0.022	0.020	0.020
2017	0.021	0.020	0.023
2021	0.022	0.024	0.023

Figure 3. Mean growing season chl *a* and TSS concentrations measured in Oliver Reservoir, April-October, 1998-2021. Stations are illustrated from upstream to downstream as the graph is read from left to right. Chl *a* criteria applies to the growing season mean of the lower station only.

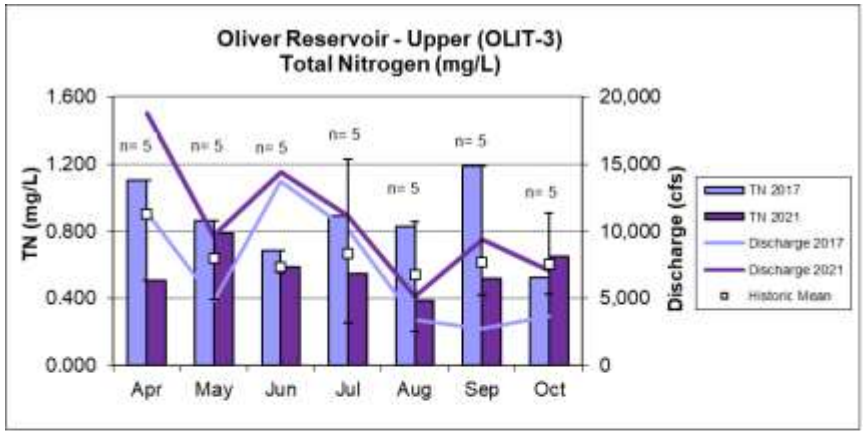


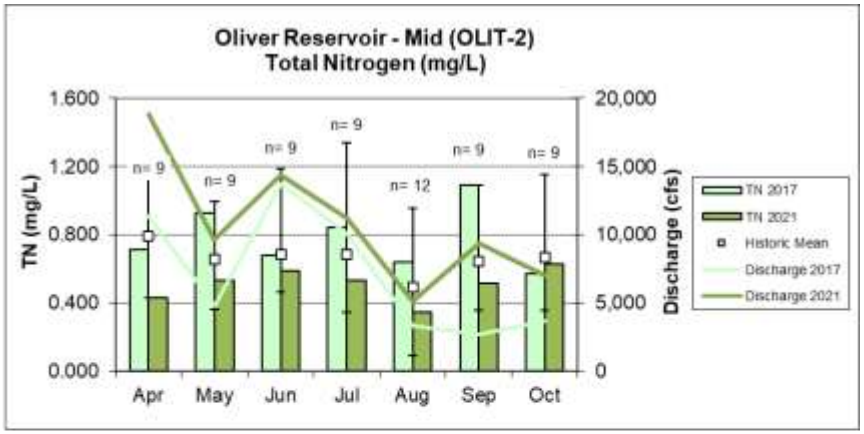
	Upper	Mid	Lower
1998		4.02	5.21
2002	8.25	5.84	5.63
2003		5.11	7.10
2006		5.58	8.14
2007	6.64	9.23	11.09
2011		6.79	7.93
2012	6.33	4.96	4.35
2017	9.59	8.23	8.16
2021	7.11	5.81	6.20



	Upper	Mid	Lower
1998		18.9	19.1
2002	7.4	8.4	7.9
2003		11.3	11.0
2006		5.4	6.7
2007	3.1	4.3	5.7
2011		3.1	4.3
2012	1.1	1.7	0.7
2017	2.9	3.9	4.9
2021	7.9	7.4	9.0

Figure 4. Monthly TN concentrations measured in Oliver Reservoir, April-October, 2017 and 2021. Each bar graph depicts monthly changes in each station. The historic mean (1992-2021) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations. TN was plotted vs. the closest discharge (USGS gage 02465000, Black Warrior River at Northport, AL).





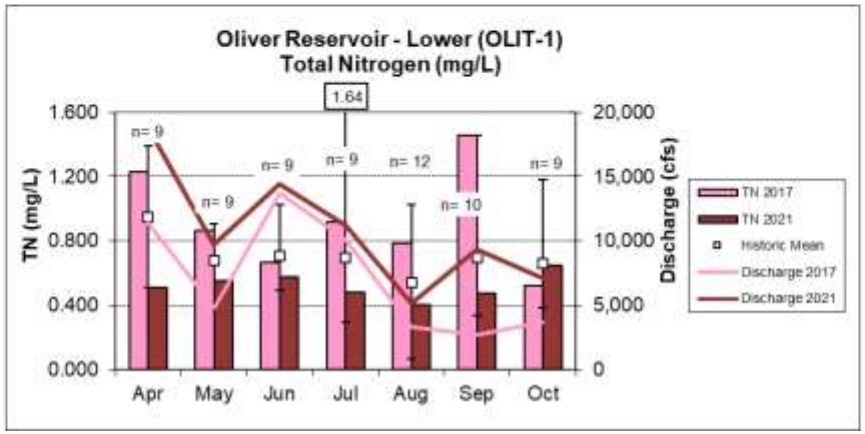


Figure 5. Monthly TP concentrations measured in Oliver Reservoir, April-October, 2017 and 2021. Each bar graph depicts monthly changes in each station. The historic mean (1992-2021) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations. TP was plotted vs. the closest discharge (USGS gage 02465000, Black Warrior River at Northport, AL).

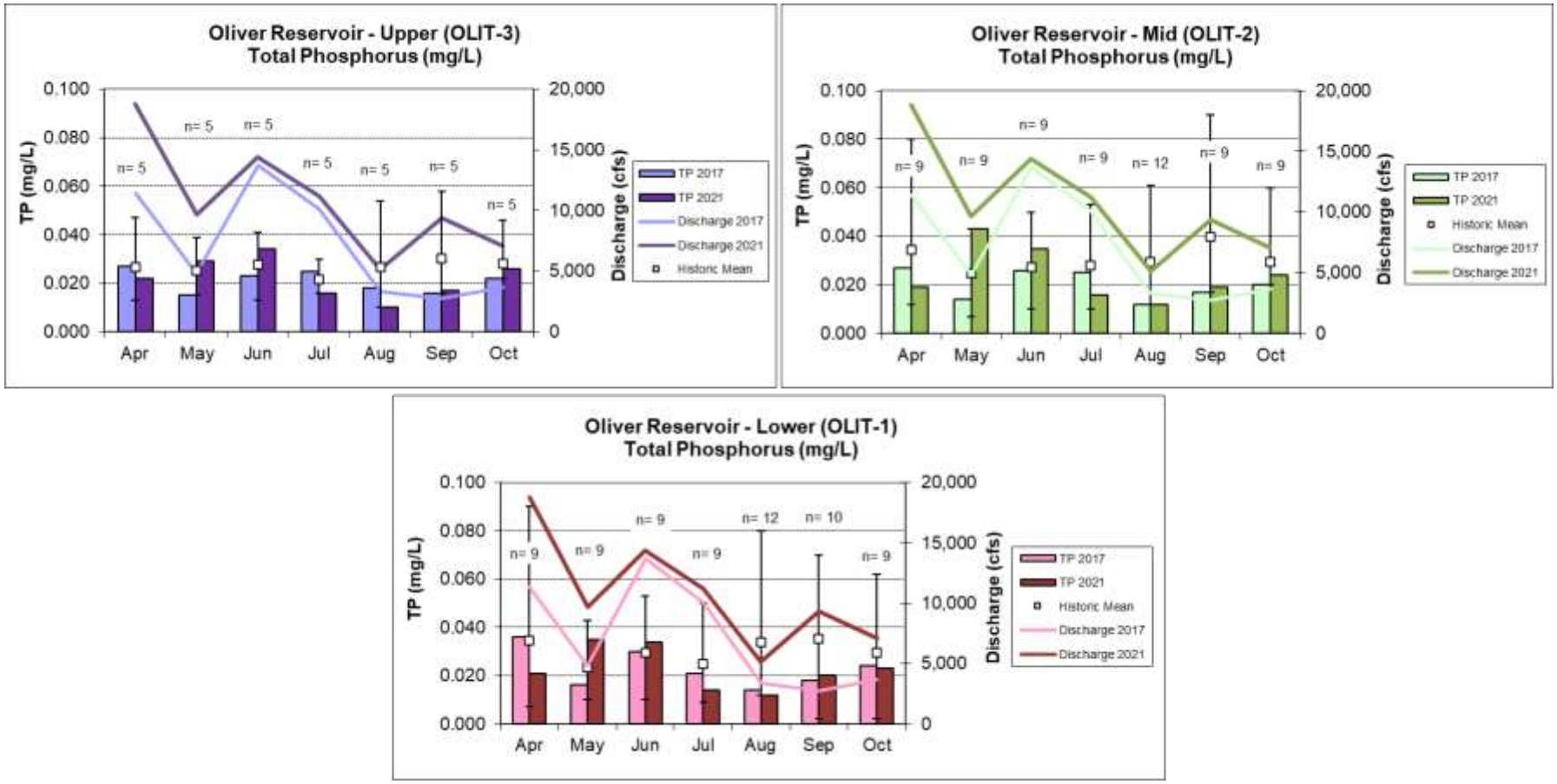


Figure 6. Monthly chl *a* concentrations measured in Oliver Reservoir, April-October, 2017 and 2021. Each bar graph depicts monthly changes in each station. The historic mean (1992-2021) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations. Chl *a* was plotted vs. the closest discharge (USGS gage 02465000, Black Warrior River at Northport, AL).

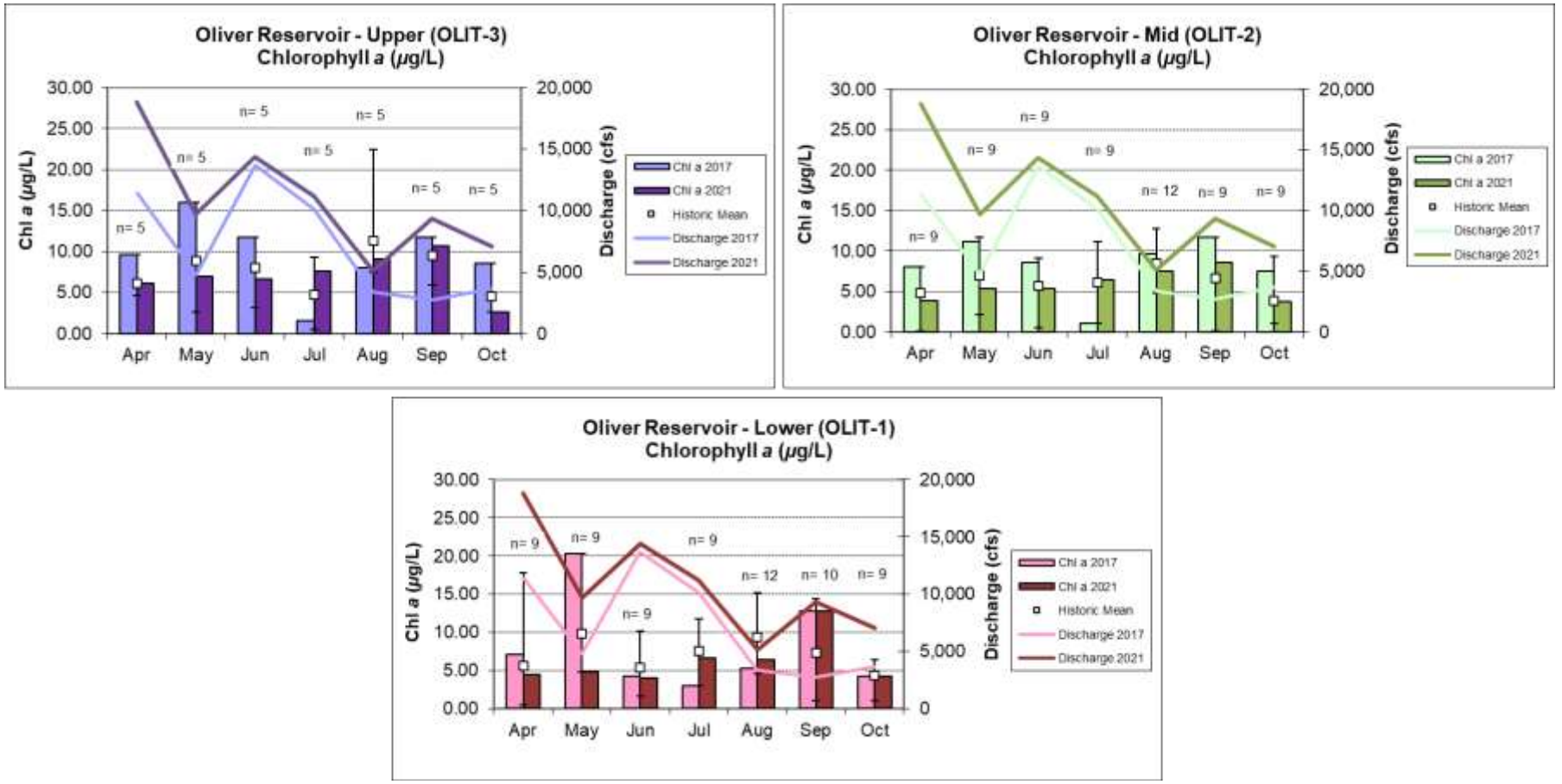


Figure 7. Monthly TSS concentrations measured in Oliver Reservoir, April-October, 2017 and 2021. Each bar graph depicts monthly changes in each station. The historic mean (1992-2021) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations. TSS was plotted vs. the closest discharge (USGS gage 02465000, Black Warrior River at Northport, AL).

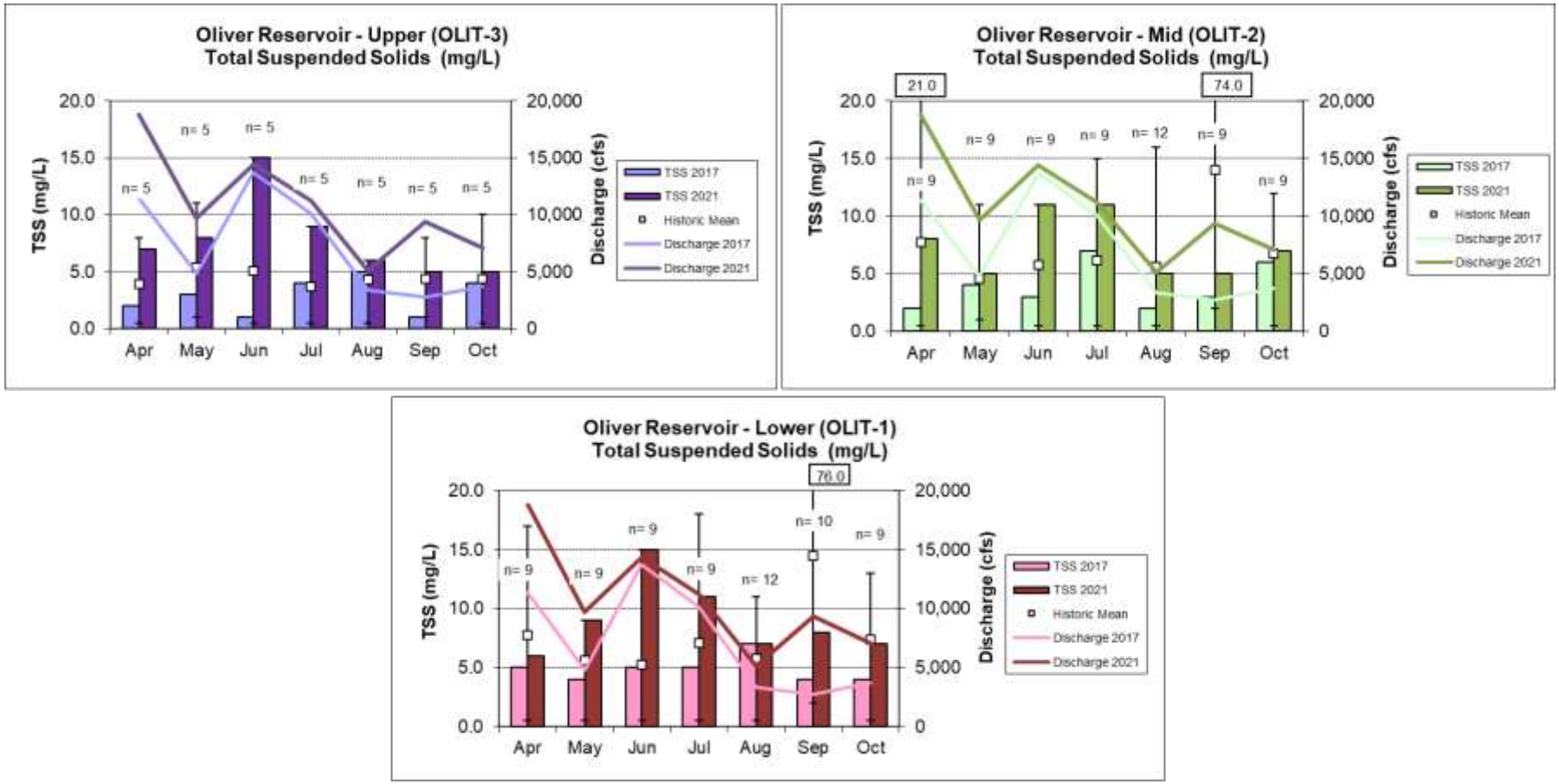


Table 2. Algal growth potential test results, Oliver Reservoir, 1998-2017, (expressed as mean Maximum Standing Crop (MSC) dry weights of *Selenastrum capricornutum* in mg/L) and limiting nutrient status. MSC values below 5 mg/L are considered to be protective in reservoirs and lakes; values below 20 mg/L MSC are considered protective of flowing streams and rivers (Raschke and Schultz 1987).

Station	Upper		Mid		Lower	
	MSC	Limiting Nutrient	MSC	Limiting Nutrient	MSC	Limiting Nutrient
August 1998	---	---	2.79	Phosphorus	2.27	Phosphorus
August 2002	2.89	Phosphorus	3.15	Phosphorus	3.19	Phosphorus
June 2007	---	---	2.33	Phosphorus	3.55	Phosphorus
July 2007	---	---	2.09	Phosphorus	2.54	Phosphorus
August 2007	---	---	3.34	Non-Limiting	2.6	Co-Limiting
August 2012	7.59	Co-Limiting	9.01	Phosphorus	8.16	Co-Limiting
August 2017	---	---	4.35	Phosphorus	---	---

Figure 8. Monthly DO concentrations at 1.5 m (5 ft) for Oliver Reservoir stations collected April-October, 2017 and 2021. ADEM Water Quality Criteria pertaining to reservoir waters require a DO concentration of 5.0 mg/L at this depth (ADEM Admin. Code R. 335-6-10-.09).

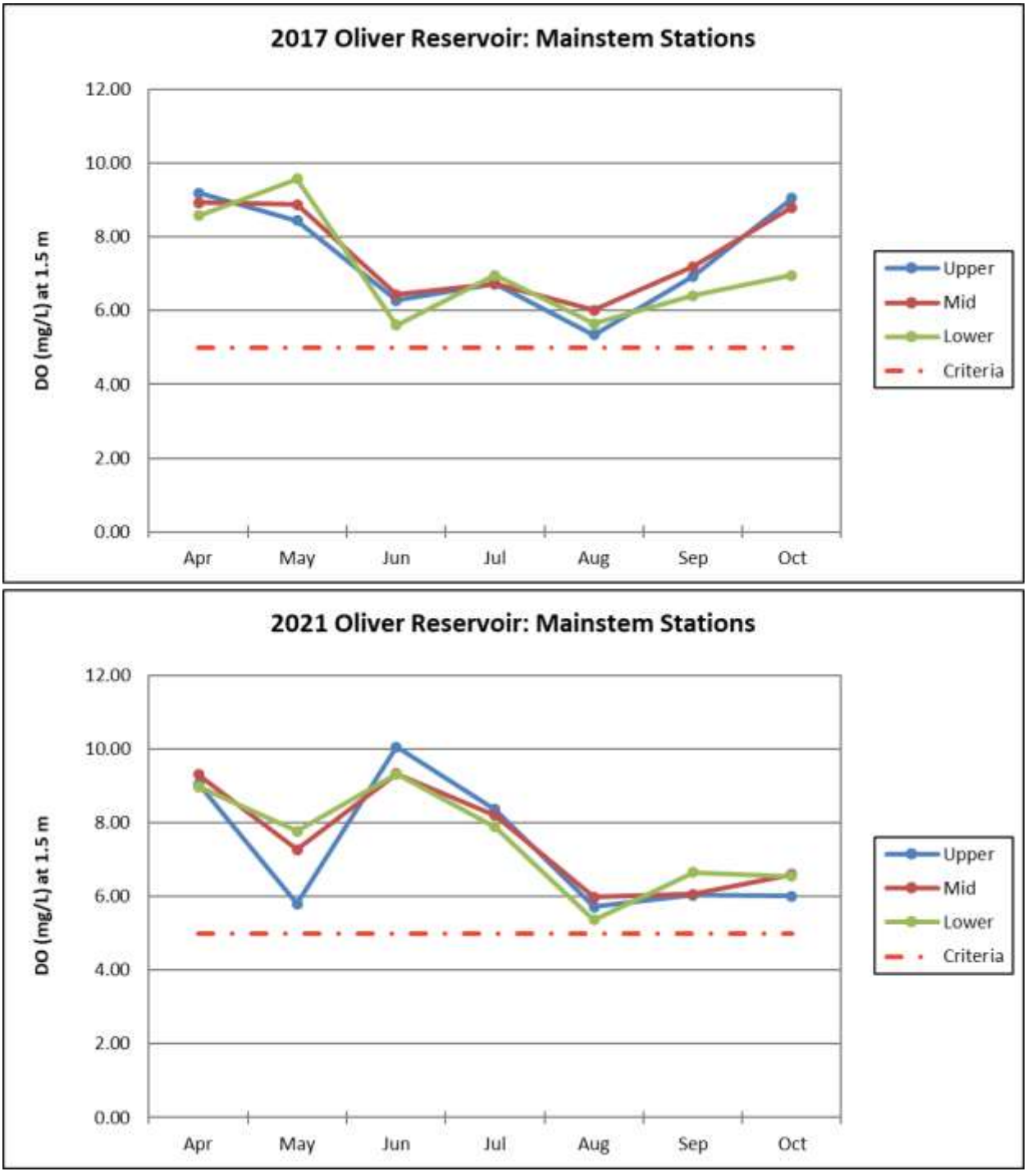


Figure 9. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the lower Oliver Reservoir station, April-October, 2017.

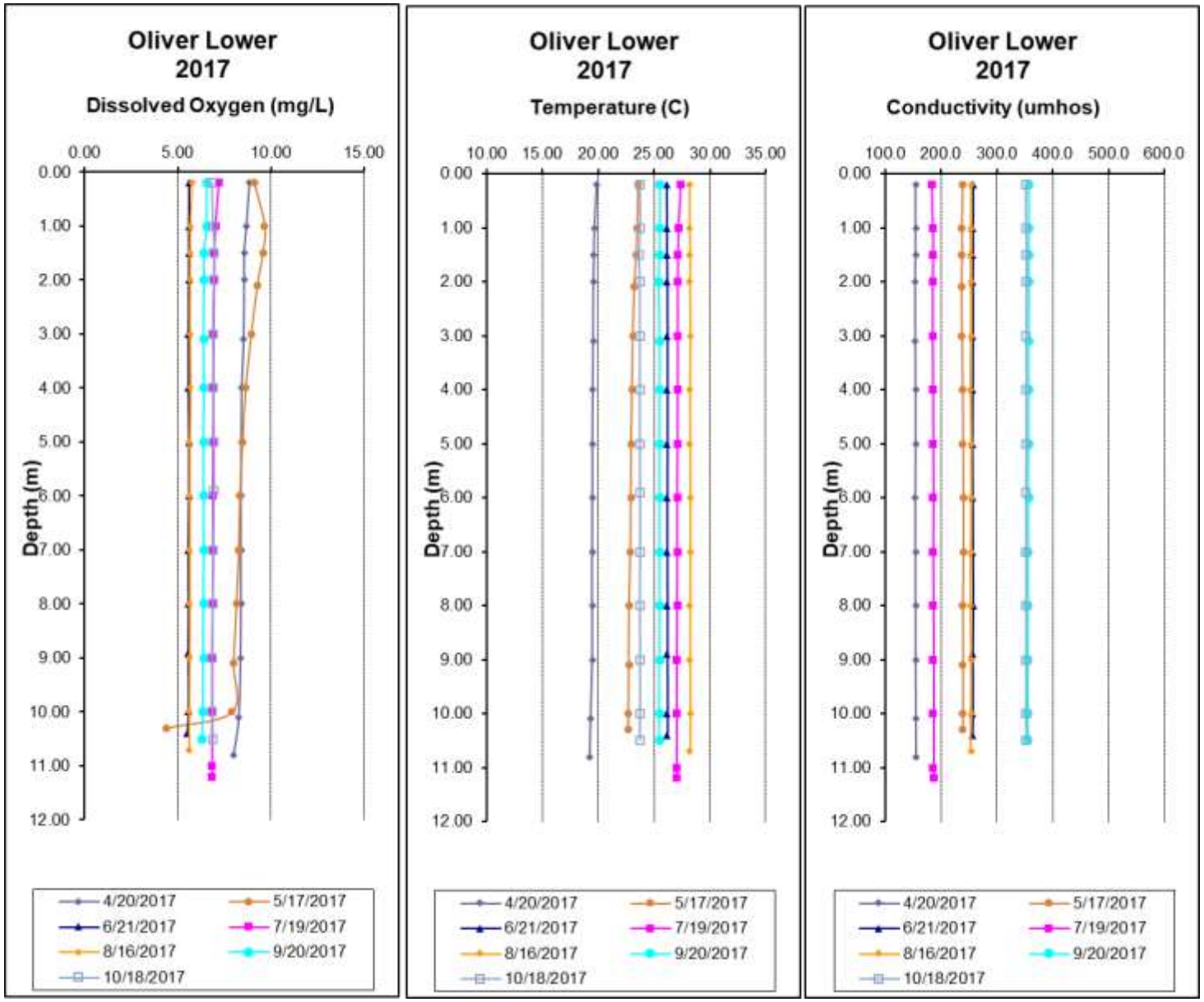


Figure 10. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the upper Oliver Reservoir station, April-October, 2017.

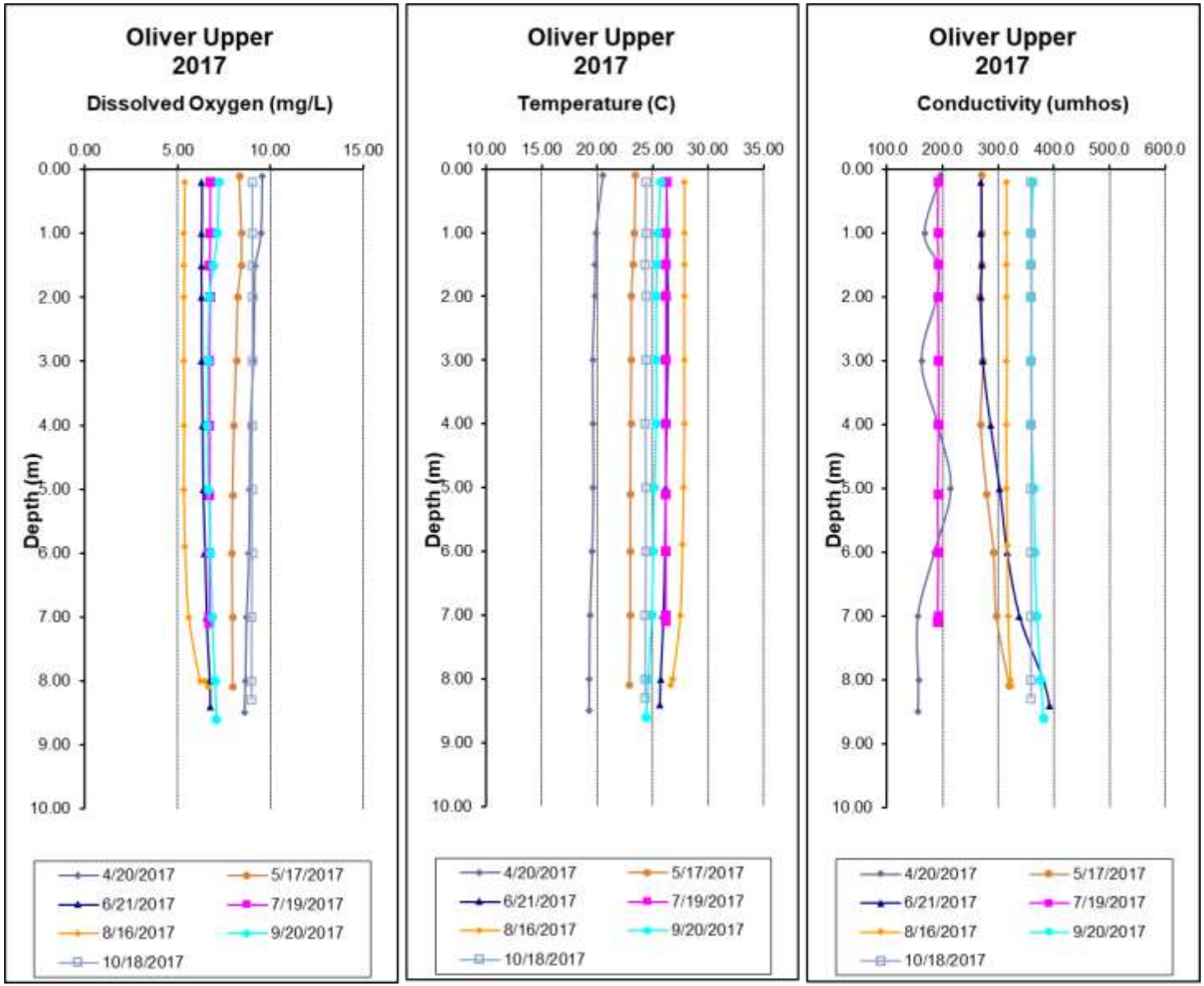


Figure 11. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the lower Oliver Reservoir station, April-October, 2021.

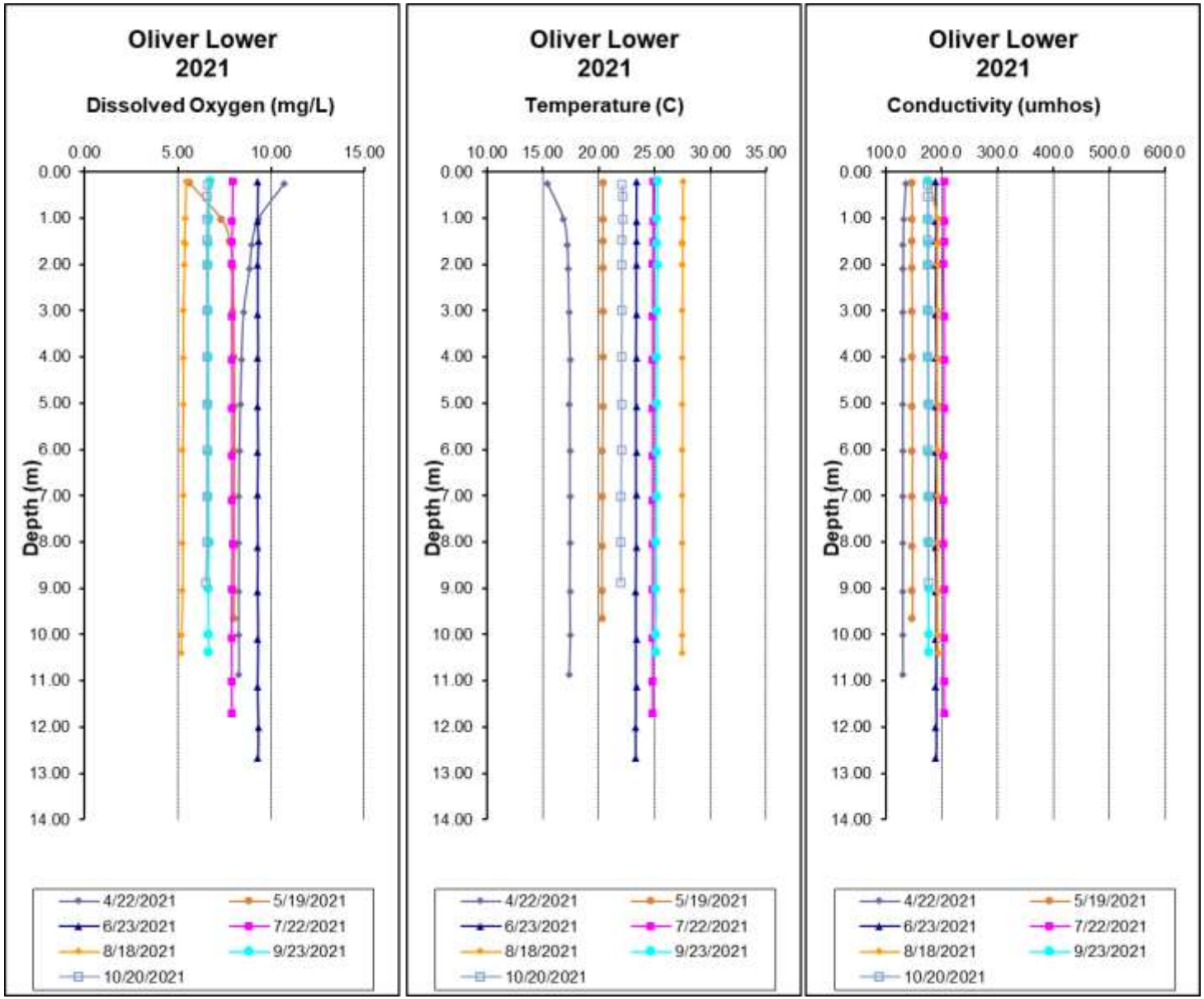


Figure 12. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the upper Oliver Reservoir station, April-October, 2021.

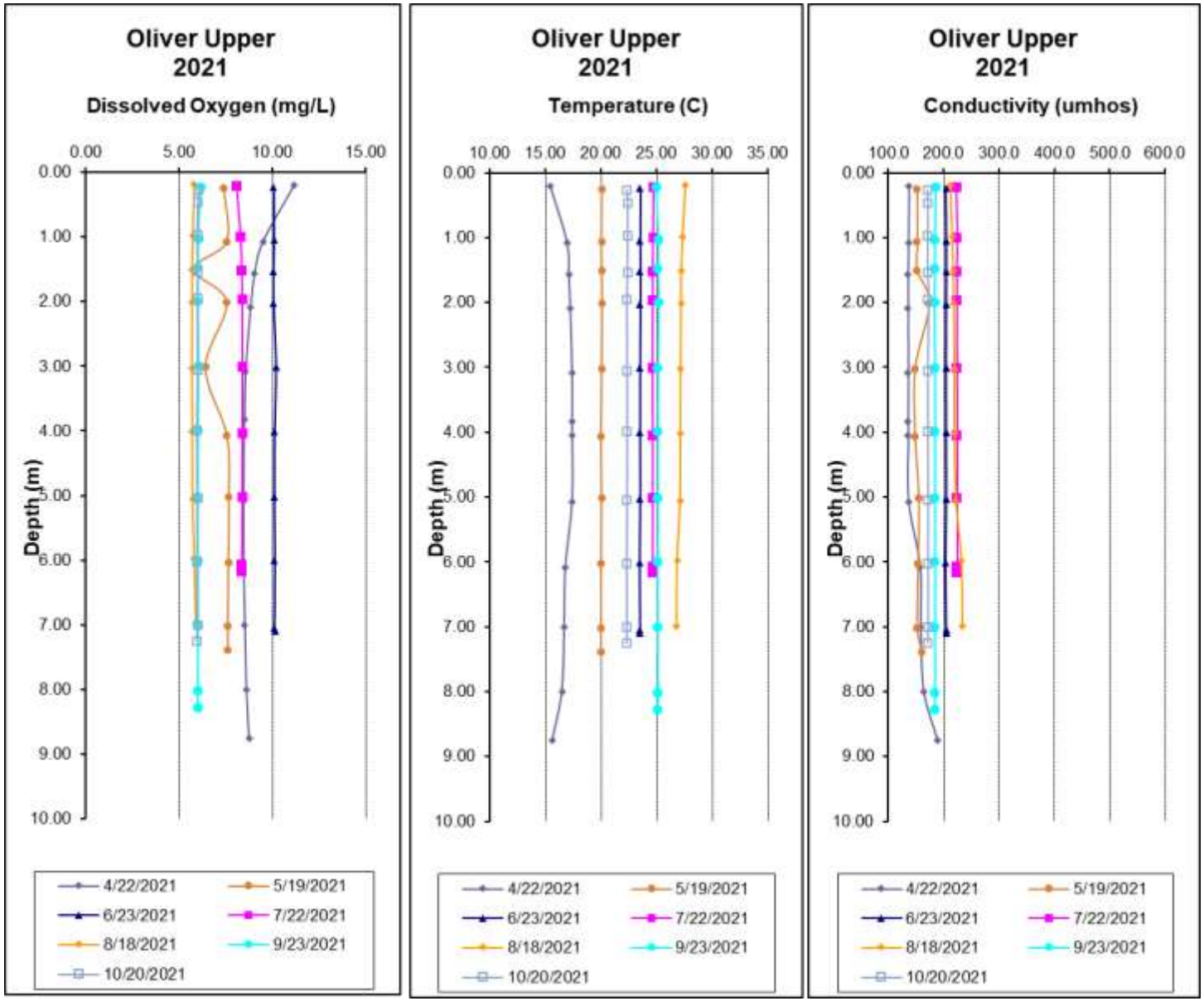
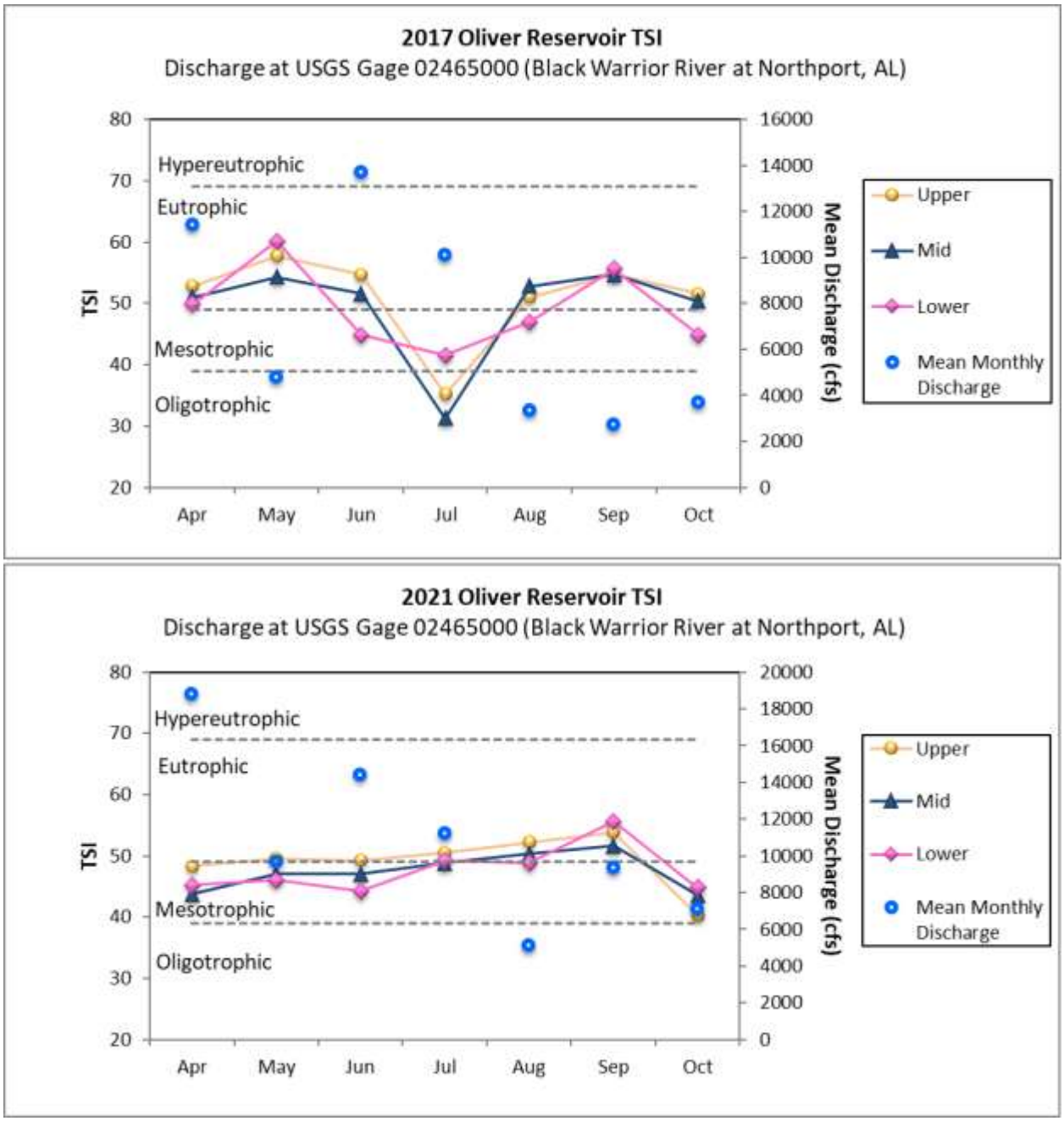


Figure 13. Monthly TSI values calculated at Oliver Reservoir stations, April-October, 2017 and 2021, using chl *a* concentrations and Carlson's Trophic State Index calculation. Discharge for Oliver Reservoir measured at USGS gage 02465000, Black Warrior River at Northport, AL.



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APPENDIX

Appendix Table 1. Summary of Oliver Reservoir water quality data collected April-October, 2017. 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
OLIT-1	**Physical**						
	Turbidity (NTU)	7	4.7	9.3	6.3	6.6	1.6
	Total Dissolved Solids (mg/L)	7	56.0	212.0	156.0	139.1	52.0
	Total Suspended Solids (mg/L)	7	4.0	7.0	5.0	4.9	1.1
	Hardness (mg/L)	4	62.4	122.0	93.6	92.9	24.4
	Alkalinity (mg/L)	7	33.5	80.5	56.5	56.7	17.1
	Photic Zone (m)	7	3.13	3.91	3.48	3.45	0.26
	Secchi (m)	7	1.11	1.45	1.32	1.27	0.13
	Bottom Depth (m)	7	10.3	11.2	10.5	10.6	0.3
	Chemical						
	Ammonia Nitrogen (mg/L)[J]	7	< 0.004	0.029	0.004	0.008	0.010
	Nitrate+Nitrite Nitrogen (mg/L)	7	0.262	0.689	0.410	0.408	0.143
	Total Kjeldahl Nitrogen (mg/L)	7	0.257	1.170	0.453	0.513	0.310
	Total Nitrogen (mg/L)	7	1.572	4.374	0.862	0.921	0.323
	Dis Reactive Phosphorus (mg/L)[J]	7	< 0.002	0.010	0.003	0.004	0.004
	Total Phosphorus (mg/L)	7	0.014	0.036	0.021	0.023	0.008
	CBOD-5 (mg/L)[J]	6	< 2.0	< 2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7	3.7	9.0	6.2	6.3	2.0
	Biological						
	Chlorophyll a (mg/m³)	7	3.05	20.30	5.34	8.16	6.25
	E. coli (MPN/DL)[J]	4	8	387	85	141	168
OLIT-2	**Physical**						
	Turbidity (NTU)	7	4.3	5.8	5.3	5.0	0.7
	Total Dissolved Solids (mg/L)	7	65.0	220.0	134.0	139.4	50.3
	Total Suspended Solids (mg/L)	7	2.0	7.0	3.0	3.9	2.0
	Hardness (mg/L)	4	62.9	120.0	90.9	91.2	23.5
	Alkalinity (mg/L)	7	22.9	79.2	52.7	54.8	20.0
	Photic Zone (m)	7	3.29	4.14	3.89	3.83	0.32
	Secchi (m)	7	1.22	1.98	1.45	1.59	0.32
	Bottom Depth (m)	7	10.2	11.3	10.8	10.8	0.3
	Chemical						
	Ammonia Nitrogen (mg/L)[J]	7	< 0.004	0.029	0.004	0.011	0.011
	Nitrate+Nitrite Nitrogen (mg/L)	7	0.237	0.476	0.341	0.344	0.093
	Total Kjeldahl Nitrogen (mg/L)	7	0.307	0.841	0.370	0.437	0.184
	Total Nitrogen (mg/L)	7	1.722	3.267	0.711	0.781	0.181
	Dis Reactive Phosphorus (mg/L)[J]	7	< 0.002	0.006	0.002	0.003	0.002
	Total Phosphorus (mg/L)	7	0.012	0.027	0.020	0.020	0.006
	CBOD-5 (mg/L)[J]	6	< 2.0	< 2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7	3.9	9.0	6.2	6.3	1.9
	Biological						
	Chlorophyll a (mg/m³)	7	1.07	11.70	8.54	8.23	3.53
	E. coli (MPN/DL)[J]	4	< 1	13	9	8	6

Station	Parameter	N	Min	Max	Med	Avg	SD
OLIT-3	**Physical**						
	Turbidity (NTU)	7	3.4	7.8	4.8	5.2	1.5
	Total Dissolved Solids (mg/L)	7	92.0	196.0	156.0	150.9	41.8
	Total Suspended Solids (mg/L)	7	1.0	5.0	3.0	2.9	1.6
	Hardness (mg/L)	4	66.8	124.0	107.8	101.6	25.8
	Alkalinity (mg/L)	7	33.5	79.1	62.1	59.4	17.4
	Photic Zone (m)	7	3.45	4.10	3.73	3.80	0.25
	Secchi (m)	7	1.19	1.71	1.50	1.47	0.16
	Bottom Depth (m)	7	8.1	11.2	8.4	8.8	1.1
	Chemical						
	Ammonia Nitrogen (mg/L)[J]	7	< 0.004	0.014	0.004	0.004	0.004
	Nitrate+Nitrite Nitrogen (mg/L)	7	0.236	0.564	0.406	0.401	0.118
	Total Kjeldahl Nitrogen (mg/L)	7	0.287	0.922	0.419	0.467	0.218
	Total Nitrogen (mg/L)	7	1.569	3.570	0.860	0.868	0.229
	Dis Reactive Phosphorus (mg/L)[J]	7	< 0.002	0.006	0.002	0.003	0.002
	Total Phosphorus (mg/L)	7	0.015	0.027	0.022	0.021	0.005
	CBOD-5 (mg/L)[J]	6	< 2.0	< 2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7	4.0	9.2	6.6	6.5	1.8
	Biological						
	Chlorophyll a (mg/m³)	7	1.60	16.00	9.61	9.59	4.42
	E. coli (MPN/DL)	4	1	56	6	17	26

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

Appendix Table 2. Summary of Oliver Reservoir water quality data collected April-October, 2021. 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	Parameters	N	Min	Max	Med	Avg	SD
OLIT-1	**Physical**						
	Turbidity (NTU)	7	6.0	14.6	7.5	9.0	3.3
	Total Dissolved Solids (mg/L)[J]	7	71.0	139.0	103.0	103.9	25.9
	Total Suspended Solids (mg/L)[J]	7	6.0	15.0	8.0	9.0	3.1
	Hardness (mg/L)	4	62.8	77.0	71.6	70.7	6.0
	Alkalinity (mg/L)	7	28.9	58.3	42.4	41.4	9.7
	Photic Zone (m)	7	2.05	3.73	2.98	2.99	0.59
	Secchi (m)	7	0.77	1.32	0.92	1.03	0.23
	Bottom Depth (m)	7	8.9	12.7	10.4	10.6	1.3
	Chemical						
	Ammonia Nitrogen (mg/L)	7	< 0.016	0.046	0.023	0.021	0.006
	Nitrate+Nitrite Nitrogen (mg/L)	7	0.243	0.484	0.350	0.359	0.078
	Total Kjeldahl Nitrogen (mg/L)	7	< 0.324	0.324	0.162	0.162	0.000
	Total Nitrogen (mg/L)	7	< 1.215	1.938	0.512	0.521	0.078
	Dis Reactive Phosphorus (mg/L)[J]	7	< 0.004	0.013	0.005	0.006	0.004
	Total Phosphorus (mg/L)	7	0.012	0.035	0.021	0.023	0.009
	CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7	2.6	4.2	3.6	3.5	0.6
	Biological						
	Chlorophyll a (mg/m³)	7	4.00	12.80	4.81	6.20	3.09
	E. coli (MPN/DL)	4	20	36	21	25	8
OLIT-2	**Physical**						
	Turbidity (NTU)	7	4.4	14.6	7.6	8.2	3.4
	Total Dissolved Solids (mg/L)[J]	7	56.0	129.0	99.0	92.4	23.6
	Total Suspended Solids (mg/L)[J]	7	5.0	11.0	7.0	7.4	2.7
	Hardness (mg/L)	4	56.8	84.4	71.9	71.2	12.2
	Alkalinity (mg/L)	7	24.1	47.4	42.2	38.4	8.7
	Photic Zone (m)	7	2.11	3.69	3.10	3.00	0.55
	Secchi (m)	7	0.65	1.63	1.23	1.15	0.39
	Bottom Depth (m)	7	10.5	12.1	11.1	11.2	0.6
	Chemical						
	Ammonia Nitrogen (mg/L)	7	< 0.016	0.046	0.023	0.021	0.006
	Nitrate+Nitrite Nitrogen (mg/L)	7	0.183	0.465	0.373	0.348	0.096
	Total Kjeldahl Nitrogen (mg/L)	7	< 0.324	< 0.324	0.162	0.162	0.000
	Total Nitrogen (mg/L)	7	< 1.035	1.881	0.535	0.510	0.096
	Dis Reactive Phosphorus (mg/L)[J]	7	< 0.004	0.012	0.005	0.007	0.004
	Total Phosphorus (mg/L)	7	0.012	0.043	0.019	0.024	0.011
	CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7	2.6	3.9	3.7	3.5	0.5
	Biological						
	Chlorophyll a (mg/m³)	7	3.74	8.54	5.34	5.81	1.80
	E. coli (MPN/DL)	4	12	39	19	23	12

Station	Parameter	N	Min	Max	Med	Avg	SD
OLIT-3	**Physical**						
	Turbidity (NTU)	7	4.5	20.5	7.4	8.8	5.4
	Total Dissolved Solids (mg/L)[J]	7	55.0	130.0	103.0	102.7	26.7
	Total Suspended Solids (mg/L)[J]	7	5.0	15.0	7.0	7.9	3.5
	Hardness (mg/L)	4	65.6	84.2	79.8	77.4	8.1
	Alkalinity (mg/L)	7	29.2	48.6	42.1	40.6	7.3
	Photic Zone (m)	7	1.84	3.56	3.23	3.02	0.58
	Secchi (m)	7	0.60	1.30	1.00	0.99	0.24
	Bottom Depth (m)	7	6.2	8.7	7.2	7.4	0.8
	Chemical						
	Ammonia Nitrogen (mg/L)	7	< 0.046	0.121	0.023	0.037	0.037
	Nitrate+Nitrite Nitrogen (mg/L)	7	0.223	0.488	0.374	0.370	0.081
	Total Kjeldahl Nitrogen (mg/L)	7	< 0.324	0.414	0.162	0.198	0.095
	Total Nitrogen (mg/L)	7	< 1.155	2.363	0.544	0.568	0.126
	Dis Reactive Phosphorus (mg/L)[J]	7	0.004	0.012	0.005	0.007	0.003
	Total Phosphorus (mg/L)	7	0.010	0.034	0.022	0.022	0.008
	CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7	2.7	4.5	3.6	3.6	0.6
	Biological						
	Chlorophyll a (mg/m³)	7	2.67	10.70	6.94	7.11	2.52
	E. coli (MPN/DL)	4	4	42	9	16	17

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