

2006 Coffeeville Reservoir Report
Rivers and Reservoirs Monitoring Program



Field Operations Division
Environmental Indicators Section
Aquatic Assessment Unit
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Rivers and Reservoirs Monitoring Program

2006

Coffeeville Reservoir

Tombigbee River Basin

**Alabama Department of Environmental Management
Field Operations Division
Environmental Indicators Section
Aquatic Assessment Unit**

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Table of Contents

| | |
|------------------------------|-----------|
| LIST OF FIGURES | 4 |
| LIST OF TABLES | 5 |
| INTRODUCTION..... | 6 |
| METHODS | 6 |
| RESULTS | 11 |
| REFERENCES..... | 22 |
| APPENDIX..... | 24 |

LIST OF FIGURES

Figure 1a. Upper and mid Coffeerville Reservoir with 2006 sampling locations 8

Figure 1b. Lower Coffeerville Reservoir with 2006 sampling locations..... 9

Figure 2. Mean total nitrogen (TN), mean total phosphorus (TP), mean chlorophyll a (chl *a*) and mean total suspended solids (TSS) measured throughout Coffeerville Reservoir, April-October 2006. 13

Figure 3. Total nitrogen (TN), total phosphorus (TP), chlorophyll a (chl *a*) and total suspended solids (TSS) of the upper station in Coffeerville Reservoir, April-October 2006..... 14

Figure 4. Total nitrogen (TN), total phosphorus (TP), chlorophyll a (chl *a*) and total suspended solids (TSS) of the mid station in Coffeerville Reservoir, April-October 2006..... 15

Figure 5. Total nitrogen (TN), total phosphorus (TP), chlorophyll a (chl *a*) and total suspended solids (TSS) of the dam forebay station in Coffeerville Reservoir, April-October 2006..... 16

Figure 6. Mean chlorophyll *a* concentrations of mainstem Coffeerville Reservoir, 2001 through 2006..... 17

Figure 7. Depth profiles of dissolved oxygen (DO) and temperature (temp) in Coffeerville Reservoir, June-September 2006..... 18

Figure 8. DO concentrations at 5 ft (1.5m) for Coffeerville reservoir tributaries collected April-October 2006. 19

Figure 9. Monthly Trophic State Index (TSI) values for mainstem and tributary stations, April-October 2006..... 20

Figure 10. Trophic State Index values from critical period sampling (August sampling only) from 1992 to 2006..... 21

LIST OF TABLES

Table 1. Descriptions for the monitoring stations in 2006 for Coffeeville Reservoir 10

Table 2. Algal growth potential test results (expressed as mean Maximum Standing Crop (MSC) dry weights of *Selenastrum capricornutum* in mg/L) and limiting nutrient status..... 17

Appendix Table 1. Summary of water quality data collected April-October, 2006 25

INTRODUCTION

The U.S. Army Corps of Engineers began construction of Coffeerville Reservoir 1956. It was opened for navigation in 1960. The downstream-most impoundment in the Tombigbee River system, Coffeerville reservoir encompasses 8,800 acres of surface water and stretches a length of nearly one hundred miles from Demopolis to the city of Coffeerville.

The Alabama Department of Environmental Management (ADEM) intensively monitored Coffeerville Reservoir as part of the 2006 assessment of the Tombigbee River basin under the [\[Rivers and Reservoirs Monitoring Program \(RRMP\)\]](#). Implemented in 1990, the objectives of this program are to provide data that can be used to assess current water quality conditions, 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 2005 Monitoring Strategy.

Specific water quality criteria for nutrient management were implemented in 2005 at one location on Coffeerville which has been monitored by ADEM since the mid-80's ([Table 1](#)). These criteria represent the maximum growing season mean (Apr-Oct) chl *a* concentration allowable while still fully supporting the reservoir's designated uses.

The purpose of this report is to summarize data collected at twelve stations in Coffeerville reservoir during the 2006 growing season and to evaluate 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 (chlorophyll *a* (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 existing data and established criteria.

METHODS

Specific location information is listed in [Table 1](#). Coffeerville was sampled in the dam forebay, the mid reservoir and upper reservoir. Five tributary embayment stations were sampled in the upper (Sucarnoochee Creek, Chickasaw Bogue) and mid (Tuckabum, Horse, Wahalak Creeks) reservoir ([Fig. 1a](#)). In the lower reservoir, four tributary embayment stations were sampled (Bashi, Tallawampa, Okatuppa, and Turkey Creeks) ([Fig. 1b](#)).

Water quality assessments were 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 (SOP), Surface Water Quality Assurance Project Plan (QAPP), and [Quality Management Plan (QMP)].

Mean annual TN, TP, chl *a*, and TSS were calculated to evaluate water quality conditions at each station. For mainstem stations, monthly concentrations of these parameters were graphed with the closest available USGS flow data and ADEM's previously collected data to help interpret 2006 results.

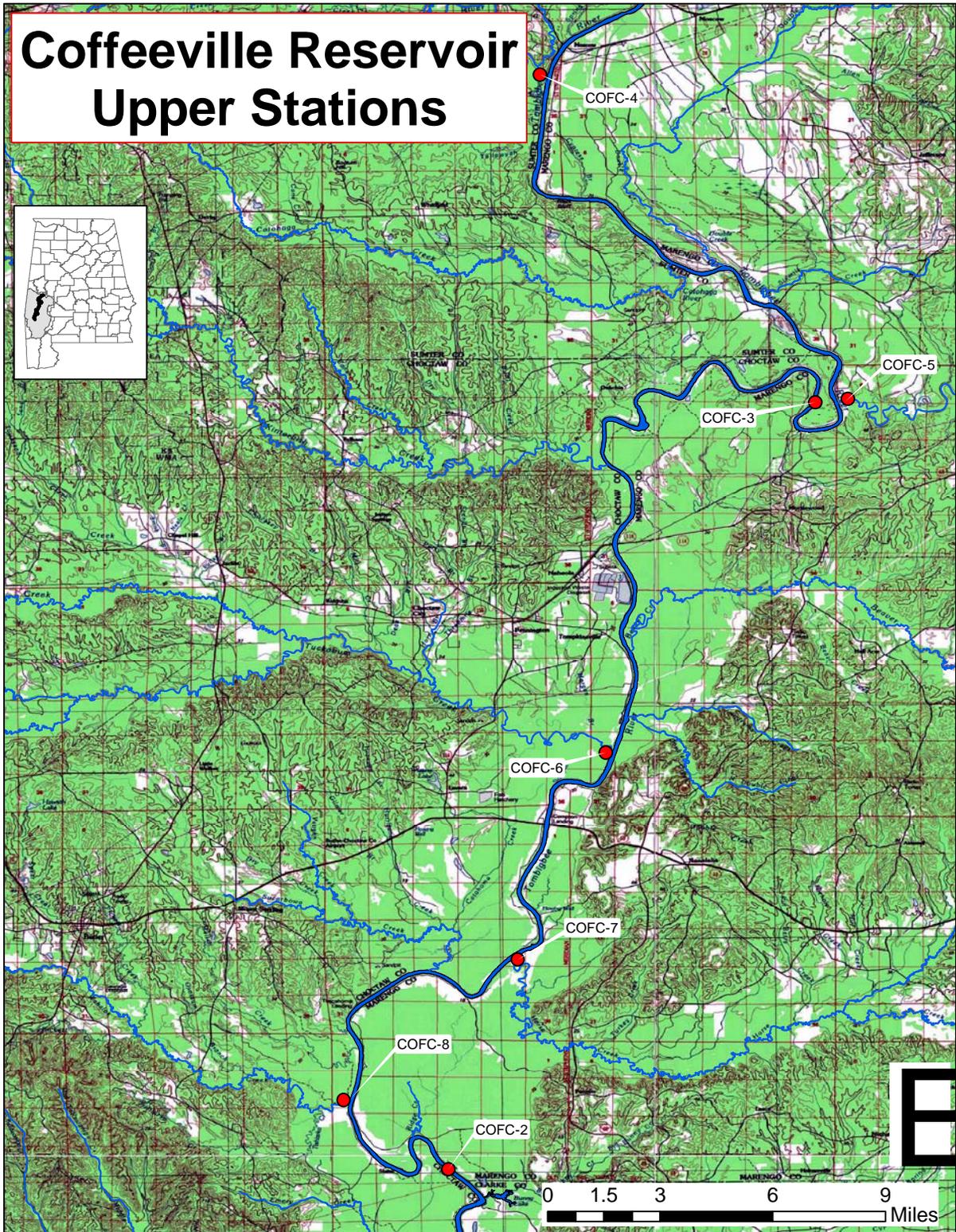


Figure 1a. Coffeeville Reservoir with 2006 upper and mid reservoir sampling locations. A description of each sampling location is provided in Table 1.

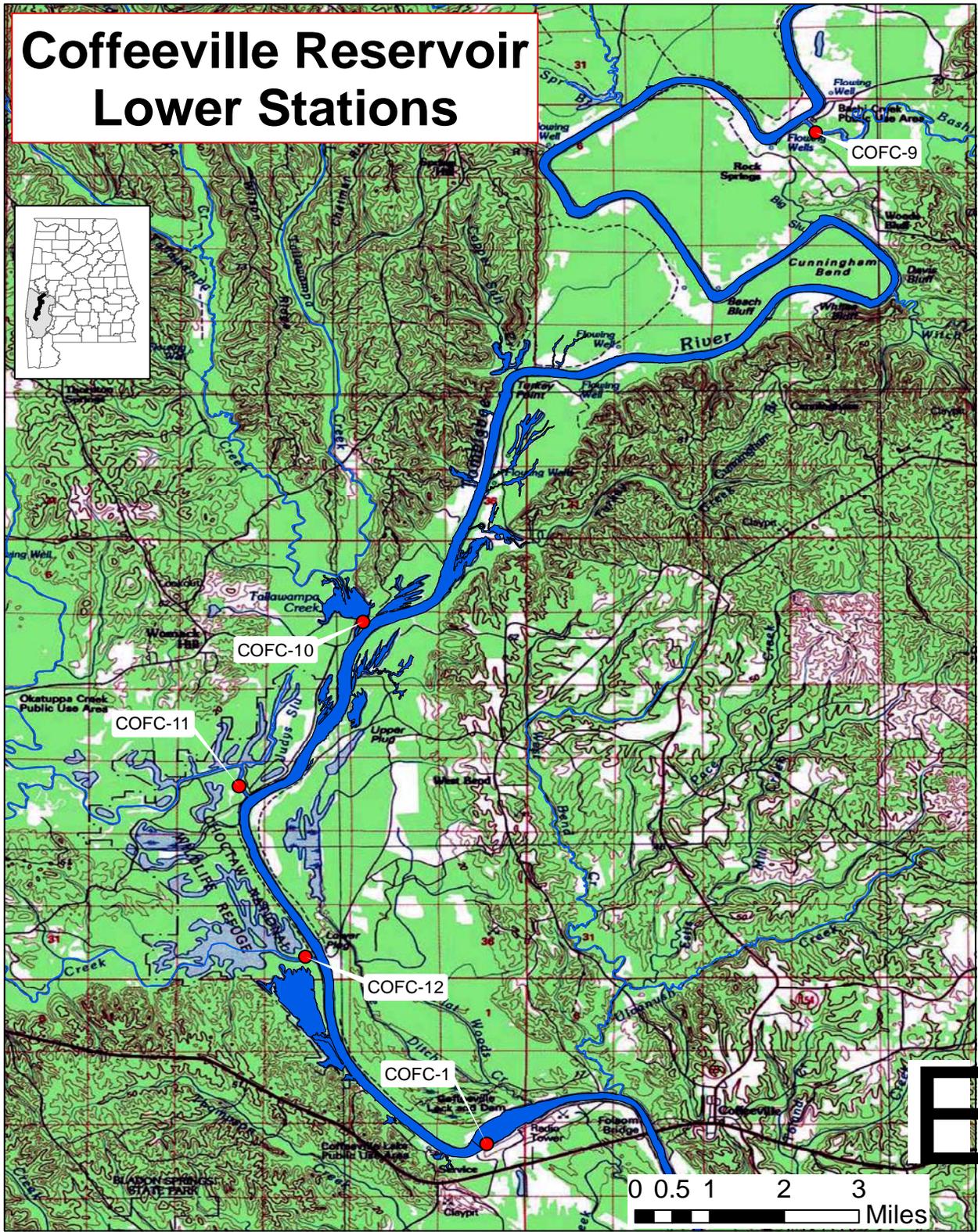


Figure 1b. Lower Coffeeville Reservoir with 2006 sampling locations. A description of each sampling location is provided in Table 1.

Table 1. Descriptions of the 2006 monitoring stations in Coffeerville Reservoir.

| Sub-watershed | County | Station Number | Report Designation | Waterbody Name | Station Description | Chl <i>a</i> Criteria | Latitude | Longitude |
|------------------------------------|---------|----------------|--------------------|--------------------|--|-----------------------|----------|-----------|
| Coffeerville Reservoir | | | | | | | | |
| Lower Tombigbee (0315-0201) | | | | | | | | |
| 0909 | Choctaw | COFC-1** | Lower | Tombigbee R | Lower reservoir. Deepest point, main river channel, dam forebay. | 10 ug/L | 31.7529 | -88.1338 |
| 0905 | Choctaw | COFC-2 | Mid | Tombigbee R | Mid reservoir. Deepest point, main river channel, approx. 1.5 miles upstream of Big Bunny Creek confluence. | | 31.9946 | -88.0796 |
| 0408 | Choctaw | COFC-3 | Upper | Tombigbee R | Upper reservoir. Deepest point, main river channel, approx. two miles downstream of Chickasaw Bogue Creek confluence. | | 32.2924 | -87.9380 |
| 0109 | Marengo | COFC-5 | Chickasaw Bogue Cr | Chickasaw Bogue Cr | Deepest point, main creek channel, Chickasaw Bogue Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 32.2937 | -87.9254 |
| 0506 | Choctaw | COFC-6 | Tuckabum Cr | Tuckabum Cr | Deepest point, main creek channel, Tuckabum Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 32.1565 | -88.0189 |
| 0604 | Marengo | COFC-7 | Horse Cr | Horse Cr | Deepest point, main creek channel, Horse Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 32.0761 | -85.0528 |
| 0904 | Choctaw | COFC-8 | Wahalak Cr | Wahalak Cr | Deepest point, main creek channel, Wahalak Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 32.0217 | -88.1200 |
| 1001 | Choctaw | COFC-9 | Bashi Cr | Bashi Cr | Deepest point, main creek channel, Bashi Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 31.9544 | -88.0701 |
| 0704 | Choctaw | COFC-10 | Tallawampa Cr | Tallawampa Cr | Deepest point, main creek channel, Tallawampa Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River.. | | 31.8569 | -88.1577 |
| 0807 | Choctaw | COFC-11 | Okatuuppa Cr | Okatuuppa Cr | Deepest point, main creek channel, Okatuppa Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 31.8242 | -88.1818 |
| 0908 | Choctaw | COFC-12 | Turkey Cr | Turkey Cr | Deepest point, main creek channel, Turkey Creek embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 31.7902 | -88.1689 |
| Lower Tombigbee (0315-0202) | | | | | | | | |
| 0703 | Sumter | COFC-4 | Sucarnooche Cr | Sucarnooche Cr | Deepest point, main creek channel, Sucarnoochee River embayment, approx. 0.5 miles upstream of confluence with Tombigbee River. | | 32.4196 | -88.0444 |

**Growing season mean Chl *a* criteria implemented at this station in 2005

RESULTS

Summary statistics of all data collected during 2006 are presented in [Appendix Table 1](#). The table contains the min, max, median, average, and standard deviation of each parameter analyzed. Mean concentrations of TN, TP, chl *a*, and TSS are presented in [Fig. 2](#). Monthly concentrations of these parameters are also presented for the Upper ([Fig. 3](#)), Mid ([Fig. 4](#)), and Lower ([Fig. 5](#)) stations. [Fig. 6](#) compares the mean concentrations of chl *a* at each mainstem station, 2001-2006.

Mainstem Stations: Comparison of mean concentrations of TN and chl *a* data collected in 2001 and 2006 indicated higher concentrations of these parameters in 2006 ([Fig. 2](#), ADEM 2003). The pattern of decreasing TN and chl *a* concentrations from upstream to downstream remained consistent during both years. Mean concentrations of TP and TSS were similar among all mainstem stations and were lower in 2006 than in 2001. AGPT results indicated nitrogen limited conditions at all three stations in 2006 ([Table 2](#)). In 2001, similar results were obtained for both mid and lower reservoir, but phosphorus was the limiting nutrient at the upper station.

Dissolved oxygen concentrations were stratified at the mid station, June through August; the upper and lower stations were well-mixed throughout the sampling period ([Fig. 7](#)). Monthly TSI values were calculated using chl *a* concentrations and the Carlson's TSI ([Fig. 9](#)). TSI values indicated mesotrophic to eutrophic conditions throughout the entire sampling period. Based on August data collected since 1992, conditions at the lower station have ranged from mesotrophic (1999, 2001) to highly eutrophic (1995) ([Fig. 10](#)).

Upper Reservoir Tributaries: Sucarnoochee Creek was characterized by the highest mean TSS concentration of any Coffeeville tributary station in both 2001 and 2006 ([Fig. 2](#), ADEM 2003). Mean TN and chl *a* concentrations at Sucarnoochee Creek were higher in 2006 than in 2001. The reduced light availability caused by the high TSS concentrations could contribute to the relatively low mean chl *a* concentrations measured at this location. By contrast, the 2006 mean chl *a* concentrations at Chickasaw Bogue were approximately half those measured in 2001. Comparison of mean 2001 and 2006 TP and TSS concentrations measured at Chickasaw Bogue showed lower values in 2006. Dissolved oxygen profiles for tributary stations are presented in [Fig. 8](#). Monthly TSI values calculated using chl *a* concentrations and the Carlson's TSI are presented in [Fig. 9](#).

Mid Reservoir Tributaries: Tuckabum Creek was characterized by the highest mean TP and the lowest mean TN concentrations while Horse Creek was characterized by the lowest chl *a* concentration of any tributary station (Fig. 2, ADEM 2003). Wahalak Creek displayed the second highest mean TP, chl *a* and TSS concentrations of any Coffeerville tributary. Dissolved oxygen concentrations were <5.0 mg/l at 5 ft at Horse Creek during June-September and at Wahalak Creek during June-August (Fig. 8). TSI values for Horse Creek were the lowest overall of Coffeerville tributaries (Fig. 9).

Lower Reservoir Tributaries: Mean chl *a* concentrations at the lower reservoir tributaries were generally higher than in tributaries located in the upper and mid reservoir (Fig. 2, ADEM 2003). Bashi Creek was characterized by the highest mean chl *a* concentration. Mean TP concentrations were slightly lower in this region of the reservoir. Mean TN and TSS were variable. Of the tributaries in the lower reservoir, Bashi Creek (June) and Okatuppa Creek (July) were <5.0 mg/l at a depth of 5.0 ft in June and July, respectively (Fig. 8). Monthly TSI values indicated eutrophic to hypereutrophic conditions for the lower reservoir tributaries during most of the sampling period. Turkey Creek was mesotrophic in May (Fig. 9).

Figure 2. Mean total nitrogen (TN), mean total phosphorus (TP), mean chlorophyll a (chl *a*) and mean total suspended solids (TSS) measured throughout Coffeeverille Reservoir, April-October 2006. Bar graphs consist of multiple stations, illustrated from upstream to downstream as the graph is read from left to right. Bars are shaded to indicate the upper (light blue), mid (medium blue), and lower (dark blue) regions of the reservoir.

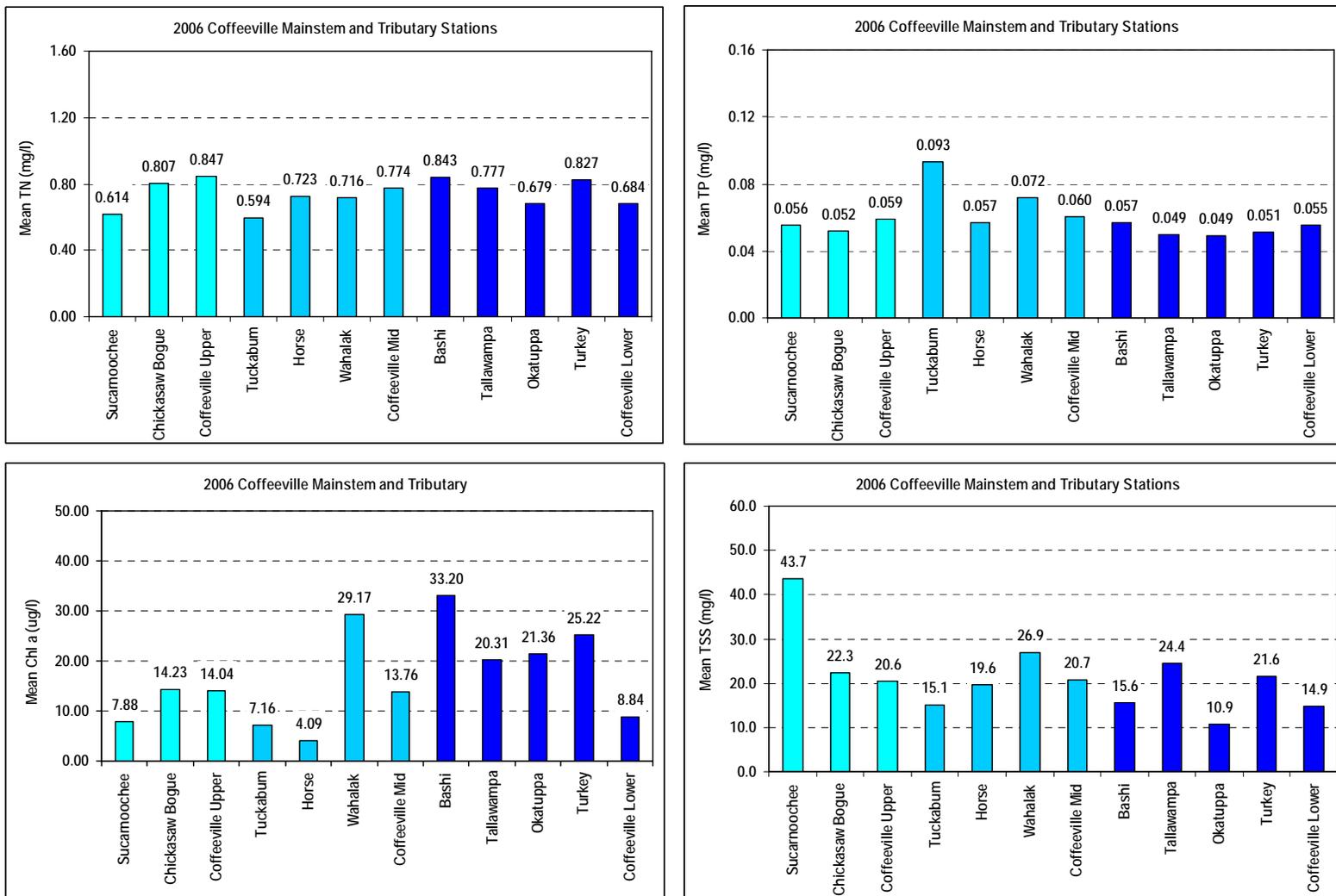


Figure 3. Total nitrogen (TN), total phosphorus (TP), chlorophyll a (chl *a*) and total suspended solids (TSS) of the upper station in Coffeeville Reservoir, April-October 2006. Each bar graph depicts monthly changes in the variables at the upper station. The historic mean and min/max range are also displayed for comparison. Nutrients and TSS were plotted vs. discharge (USGS Tombigbee R gage at Demopolis Lock and Dam near Demopolis, AL).

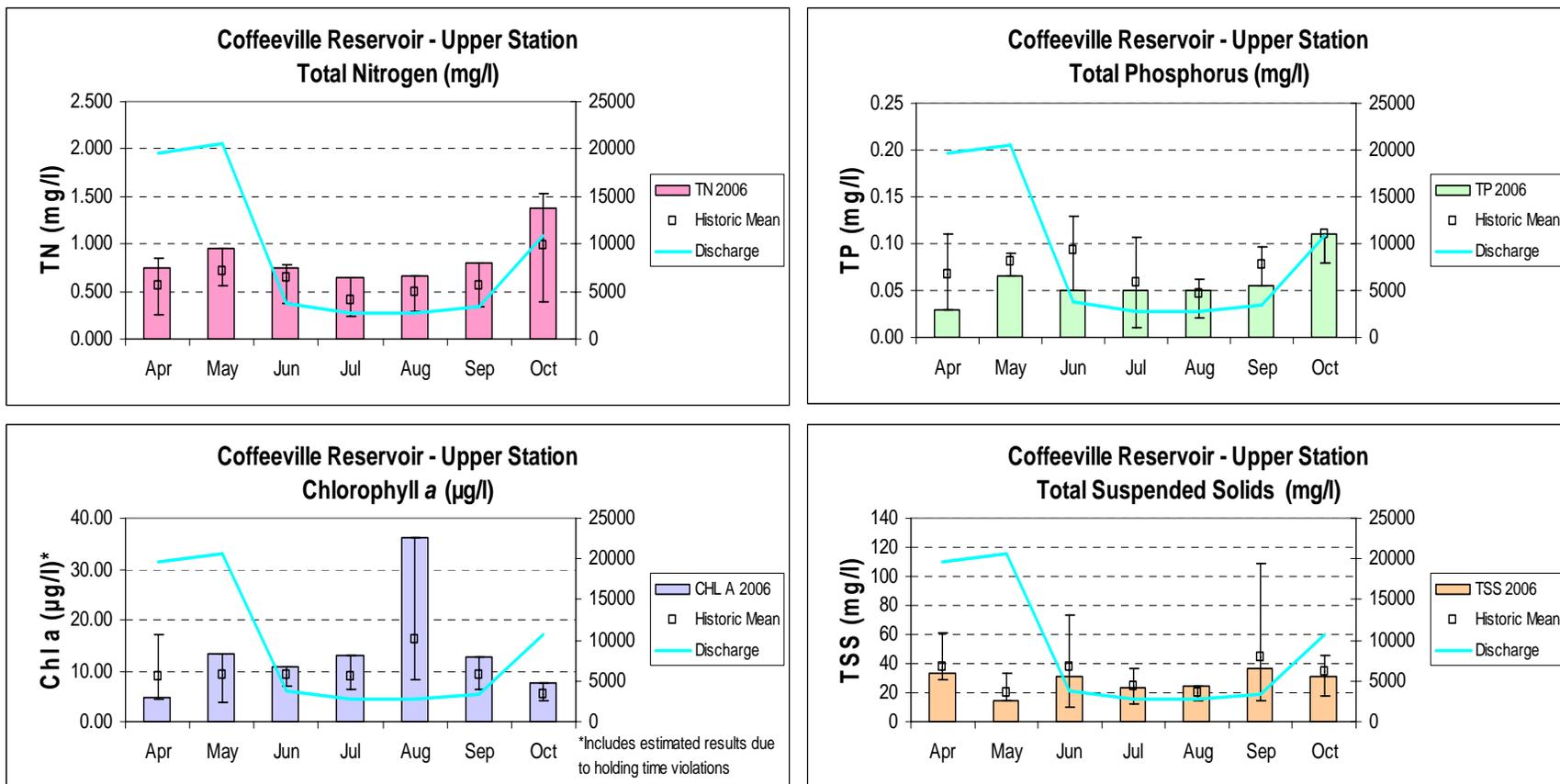


Figure 4. Total nitrogen (TN), total phosphorus (TP), chlorophyll a (chl *a*) and total suspended solids (TSS) of the mid station in Coffeerville Reservoir, April-October 2006. Each bar graph depicts monthly changes in the variables at the mid-reservoir station. The historic mean and min/max range are also displayed for comparison. Nutrients and TSS were plotted vs. discharge (USGS Tombigbee R gage at Demopolis Lock and Dam near Demopolis, AL).

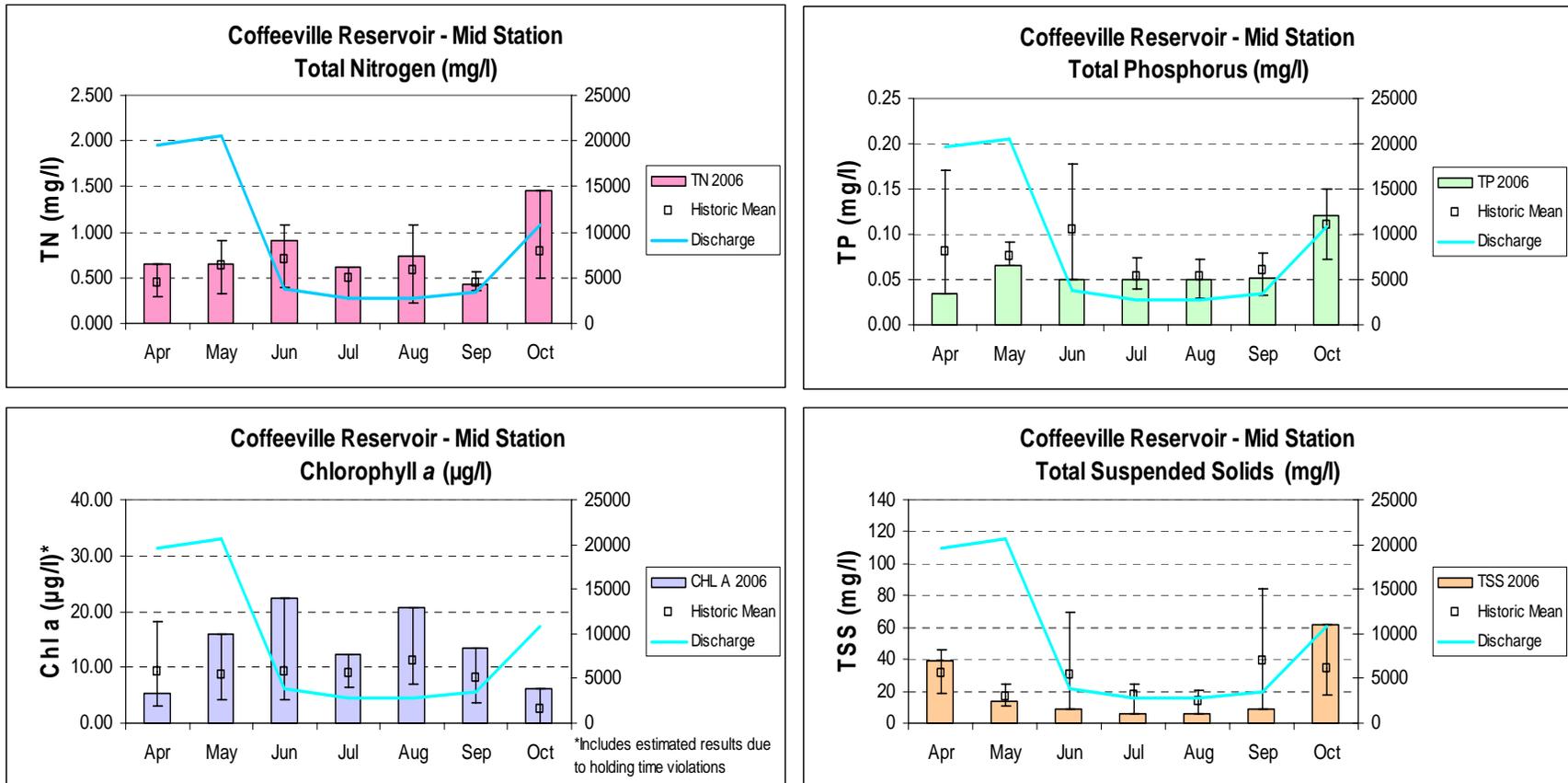


Figure 5. Total nitrogen (TN), total phosphorus (TP), chlorophyll a (chl *a*) and total suspended solids (TSS) of the dam forebay station in Coffeerville Reservoir, April-October 2006. Each bar graph depicts monthly changes in the variables at the lower reservoir station. The historic mean and min/max range are also displayed for comparison. Nutrients and TSS were plotted vs. discharge (USGS Tombigbee R gage at Demopolis Lock and Dam near Demopolis, AL).

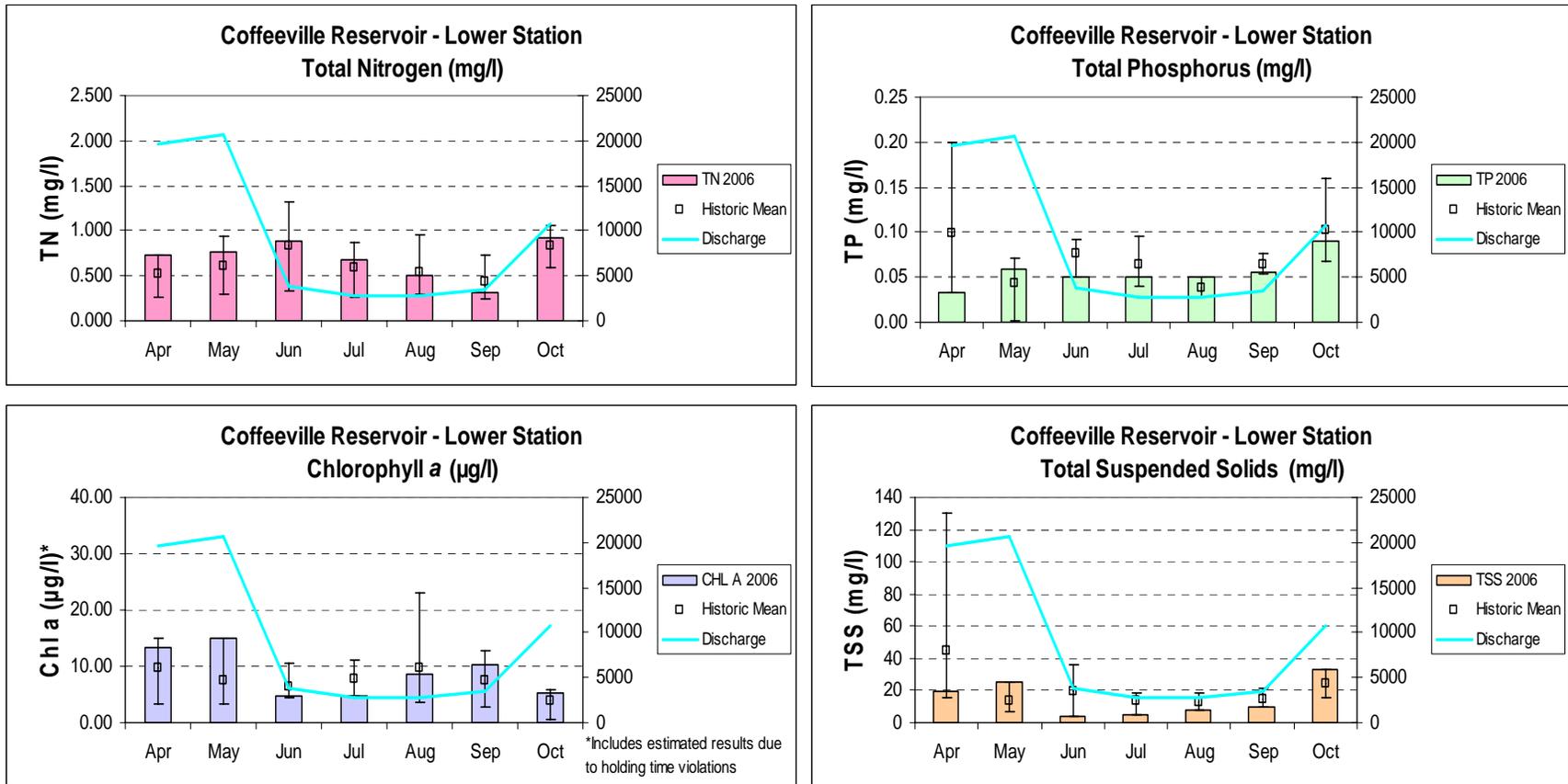


Figure 6. Mean chlorophyll *a* (chl *a*) concentrations of mainstem Coffeerville Reservoir, 2001 through 2006. Chl *a* criteria only applies to the growing season mean of lower station.

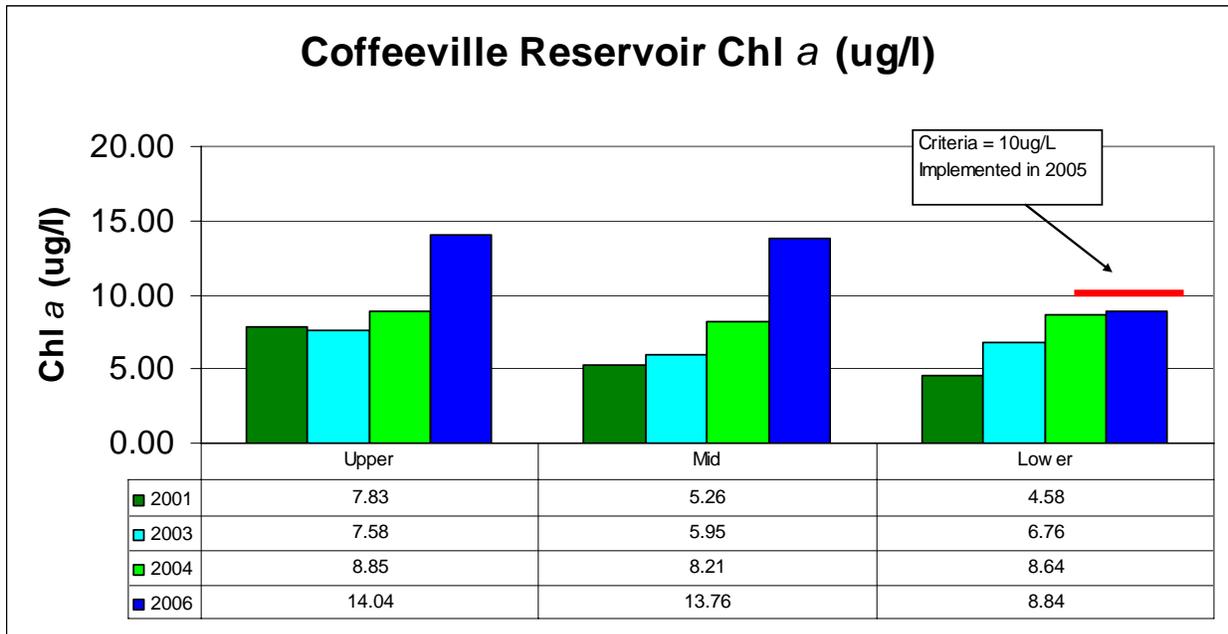


Table 2. Algal growth potential test results (expressed as mean Maximum Standing Crop (MSC) dry weights of *Selenastrum capricornutum* in mg/L) and limiting nutrient status. Mean standing crop (MSC) values below 5 mg/l are considered to be protective in reservoirs and lakes; MSC values below 20 mg/l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

| Station | 2001 Control mean MSC | 2001 Limiting Nutrient | 2006 Control mean MSC | 2006 Limiting Nutrient |
|---------|--------------------------|---------------------------|--------------------------|---------------------------|
| Upper | 7.63 | Phosphorus | 5.16 | Nitrogen |
| Mid | 7.63 | Nitrogen | 7.17 | Nitrogen |
| Lower | 13.58 | Nitrogen | 4.19 | Nitrogen |

Figure 7. Depth profiles of dissolved oxygen (DO) and temperature (Temp) in Coffeerville Reservoir, June-September 2006. Although profiles were measured April-October, these select months were chosen as they represent the warmest water temperatures and most stratified dissolved oxygen concentrations. ADEM Water Quality Criteria pertaining to non-wadeable river and reservoir waters require a DO concentration of 5.0 mg/l at 5.0ft (1.5m) (ADEM Admin. Code R. 335-6-10-.09). Under extreme natural conditions such as drought, the DO concentration may be as low as 4.0 mg/l.

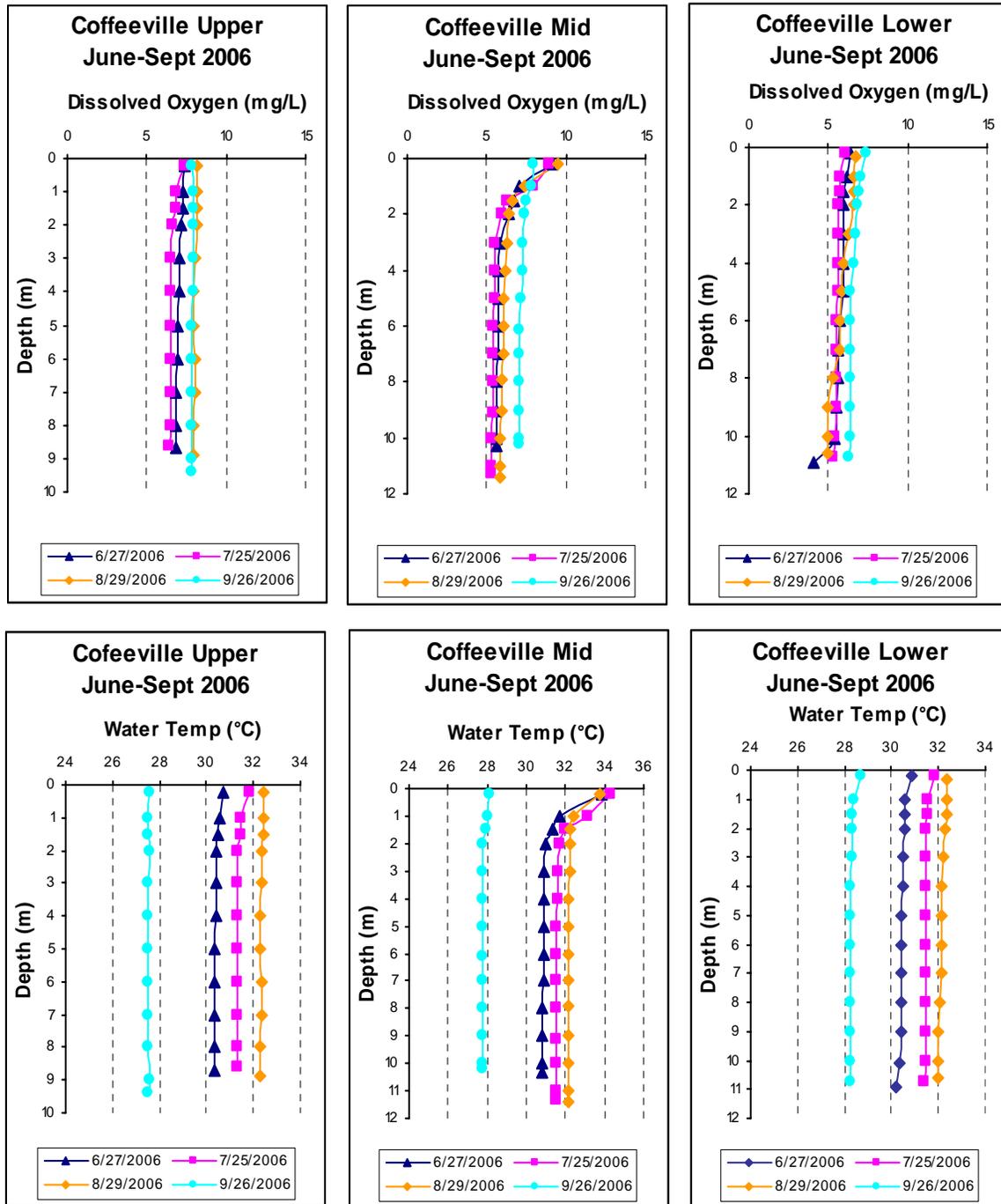


Figure 8. Dissolved oxygen (DO) concentrations at 5 ft (1.5m) for Coffeerville reservoir tributaries collected April-October 2006. For tributary embayments, which are typically not as deep as mainstem stations and usually maintain a mixed water column throughout the season, profiles were collected but only the monthly DO concentrations at a depth of 5ft (1.5m) are graphed. ADEM Water Quality Criteria pertaining to reservoir waters require a DO concentration of 5.0 mg/l at this depth (ADEM 2005).

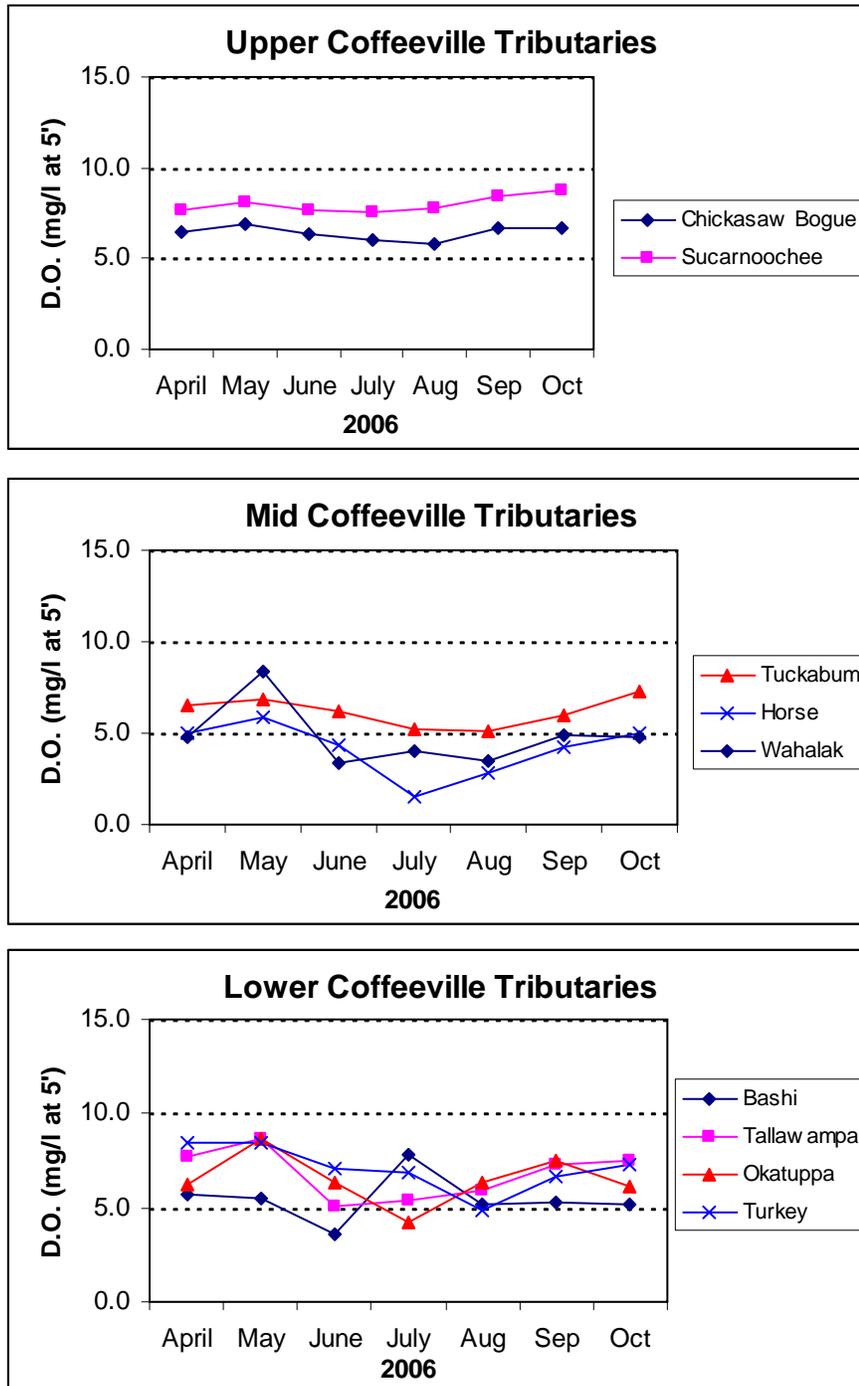


Figure 9. Monthly Trophic State Index (TSI) values for mainstem and tributary stations using chl *a* concentrations and the Carlson's TSI calculation, April-October 2006.

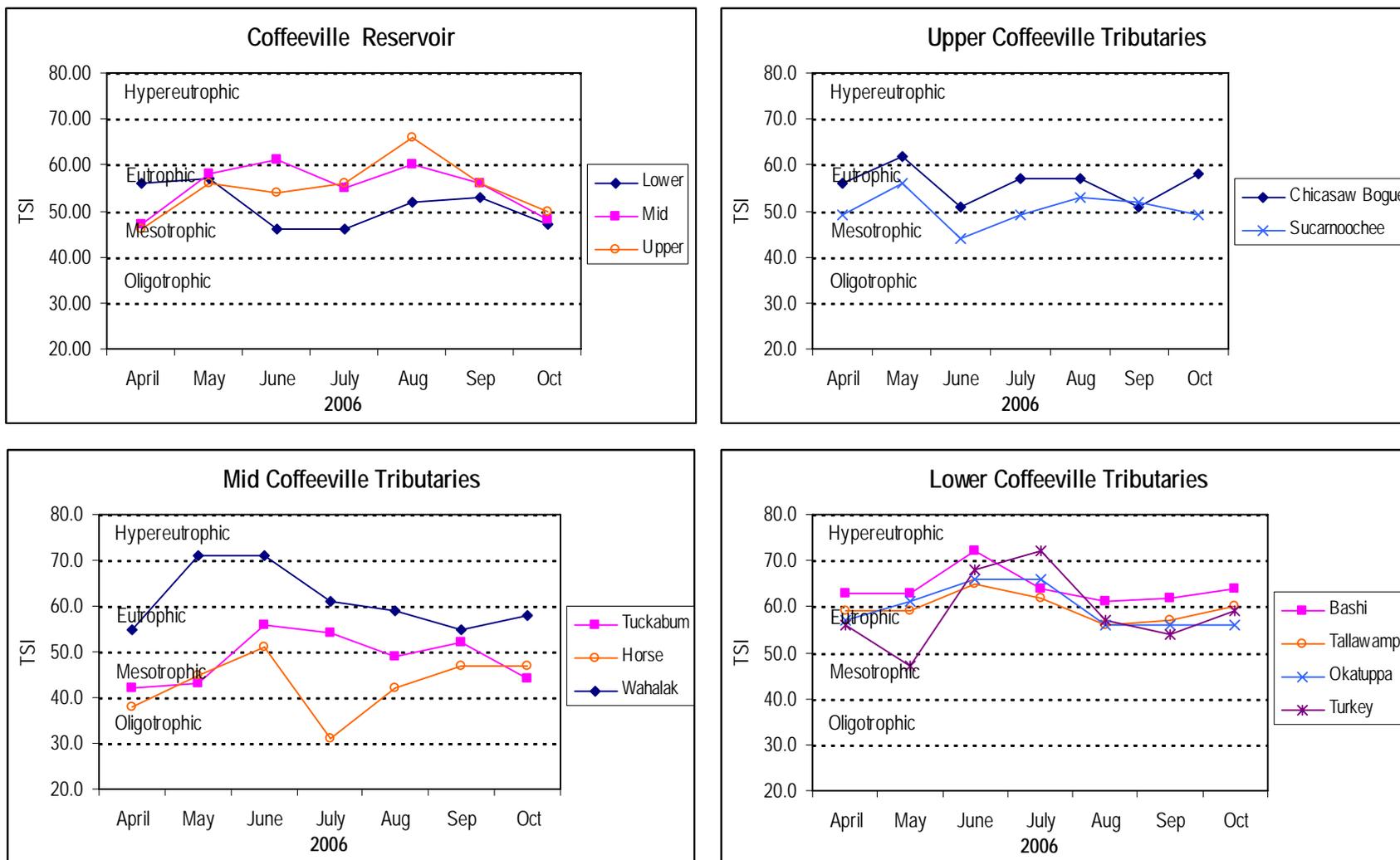
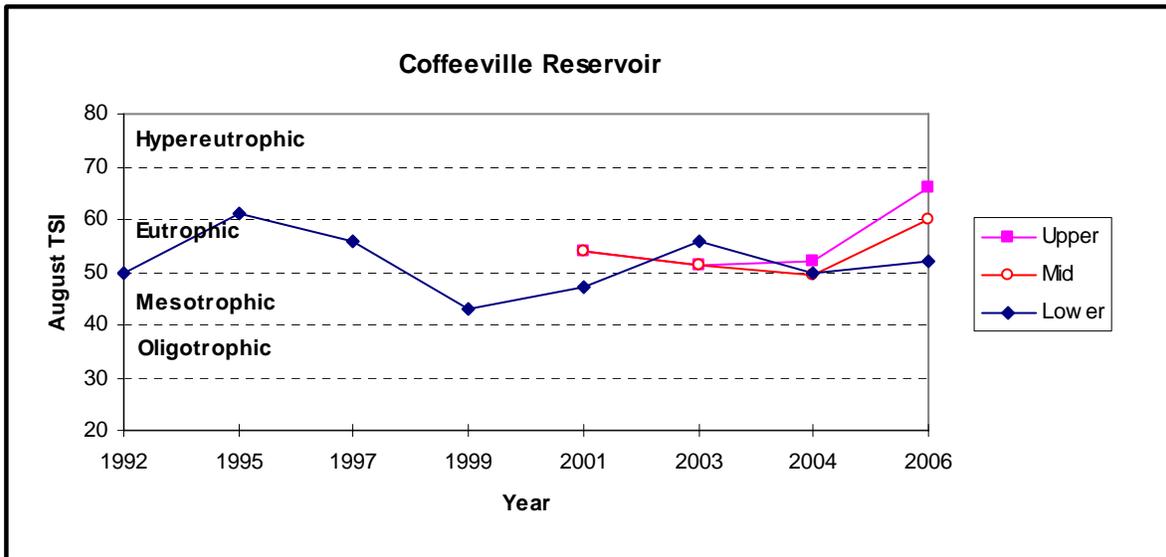


Figure 10. Trophic State Index (TSI) values from critical period sampling (August sampling only) from 1992 to 2006.



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APPENDIX

Appendix Table 1. Summary of water quality data collected April-October, 2006. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median (Med), average (Ave), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

| Station | Parameter | N | Min | Max | Median | Avg | SD |
|-----------------------------|--------------------------------------|---|---------|-------|--------|-------|-------|
| COFC-1 | Alkalinity (mg/L) | 7 | 40.5 | 66.9 | 56.7 | 53.3 | 9.5 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 117.0 | 238.0 | 149.0 | 162.0 | 43.1 |
| | Total Suspended Solids (mg/L) | 7 | 4.0 | 33.0 | 10.0 | 14.9 | 11.1 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.022 | 0.008 | 0.010 | 0.005 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.471 | 0.160 | 0.205 | 0.188 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.294 | 0.716 | 0.500 | 0.479 | 0.153 |
| | Total Nitrogen (mg/L) | 7 | 0.310 | 0.920 | 0.730 | 0.684 | 0.215 |
| | Total Phosphorus (mg/L) | 7 | < 0.033 | 0.100 | 0.050 | 0.055 | 0.017 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.022 | 0.007 | 0.010 | 0.008 |
| | Chlorophyll a (mg/L)J | 7 | 4.70 | 14.95 | 8.54 | 8.84 | 4.18 |
| | Turbidity (NTU) | 7 | 6 | 35 | 13 | 14 | 10 |
| | Secchi (m) | 7 | 0.33 | 1.13 | 0.86 | 0.83 | 0.26 |
| Fecal Coliform (col/100 mL) | 1 | | | | 1 | | |
| COFC-2 | Alkalinity (mg/L) | 7 | 42.2 | 428.0 | 56.0 | 109.0 | 140.9 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 91.0 | 212.0 | 168.0 | 166.3 | 38.6 |
| | Total Suspended Solids (mg/L) | 7 | 6.0 | 62.0 | 9.0 | 20.7 | 21.6 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.025 | 0.008 | 0.014 | 0.008 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.030 | 0.456 | 0.190 | 0.231 | 0.196 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.203 | 0.997 | 0.554 | 0.542 | 0.282 |
| | Total Nitrogen (mg/L) | 7 | 0.420 | 1.450 | 0.650 | 0.774 | 0.330 |
| | Total Phosphorus (mg/L) | 7 | < 0.035 | 0.121 | 0.050 | 0.060 | 0.028 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.006 | 0.023 | 0.012 | 0.015 | 0.007 |
| | Chlorophyll a (mg/L)J | 7 | 5.34 | 22.40 | 13.35 | 13.76 | 6.60 |
| | Turbidity (NTU) | 7 | 7 | 45 | 17 | 20 | 14 |
| | Secchi (m) | 7 | 0.20 | 0.92 | 0.60 | 0.62 | 0.24 |
| Fecal Coliform (col/100 mL) | 1 | | | | 1 | | |
| COFC-3 | Alkalinity (mg/L) | 7 | 43.1 | 64.9 | 50.3 | 51.8 | 7.9 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 103.0 | 194.0 | 135.0 | 148.0 | 41.8 |
| | Total Suspended Solids (mg/L) | 7 | 10.0 | 46.0 | 14.0 | 20.6 | 13.6 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.070 | 0.008 | 0.016 | 0.024 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.014 | 0.424 | 0.102 | 0.206 | 0.190 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.378 | 0.946 | 0.633 | 0.639 | 0.180 |
| | Total Nitrogen (mg/L) | 7 | 0.650 | 1.370 | 0.750 | 0.847 | 0.253 |
| | Total Phosphorus (mg/L) | 7 | < 0.030 | 0.110 | 0.050 | 0.059 | 0.025 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.023 | 0.006 | 0.010 | 0.009 |
| | Chlorophyll a (mg/L)J | 7 | 4.81 | 36.20 | 12.82 | 14.04 | 10.28 |
| | Turbidity (NTU) | 7 | 10 | 40 | 13 | 18 | 11 |
| | Secchi (m) | 7 | 0.40 | 1.09 | 0.60 | 0.63 | 0.24 |
| Fecal Coliform (col/100 mL) | 1 | | | | 2 | | |
| COFC-4 | Alkalinity (mg/L) | 7 | 9.6 | 36.4 | 29.9 | 28.7 | 9.0 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 60.0 | 101.0 | 84.0 | 82.4 | 12.5 |
| | Total Suspended Solids (mg/L) | 7 | 19.0 | 73.0 | 30.0 | 43.7 | 23.1 |

| Station | Parameter | N | Min | Max | Median | Avg | SD |
|-----------------------------|--------------------------------------|-----|---------|-------|--------|-------|-------|
| COFC-4 | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.020 | 0.008 | 0.011 | 0.006 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.342 | 0.046 | 0.095 | 0.116 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.150 | 1.112 | 0.498 | 0.509 | 0.310 |
| | Total Nitrogen (mg/L) | 7 | 0.230 | 1.450 | 0.540 | 0.614 | 0.394 |
| | Total Phosphorus (mg/L) | 7 | < 0.047 | 0.100 | 0.050 | 0.056 | 0.010 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.006 | 0.021 | 0.012 | 0.013 | 0.005 |
| | Chlorophyll a (mg/L)J | 7 | 3.92 | 13.88 | 6.41 | 7.88 | 3.24 |
| | Turbidity (NTU) | 7 | 17 | 55 | 25 | 29 | 13 |
| | Secchi (m) | 3 | 0.33 | 0.62 | 0.00 | 0.19 | 0.25 |
| Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 49 | --- | |
| COFC-5 | Alkalinity (mg/L) | 7 | 64.5 | 124.3 | 104.4 | 102.9 | 19.1 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 110.0 | 229.0 | 161.0 | 162.7 | 37.1 |
| | Total Suspended Solids (mg/L) | 7 | 13.0 | 36.0 | 21.0 | 22.3 | 8.4 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.036 | 0.008 | 0.013 | 0.011 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.024 | 0.005 | 0.008 | 0.010 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.150 | 1.446 | 0.751 | 0.786 | 0.416 |
| | Total Nitrogen (mg/L) | 7 | 0.160 | 1.450 | 0.770 | 0.807 | 0.395 |
| | Total Phosphorus (mg/L) | 7 | < 0.031 | 0.100 | 0.050 | 0.052 | 0.011 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.019 | 0.004 | 0.007 | 0.006 |
| | Chlorophyll a (mg/L)J | 7 | 7.85 | 23.50 | 14.20 | 14.23 | 5.29 |
| | Turbidity (NTU) | 7 | 13 | 25 | 15 | 17 | 5 |
| | Secchi (m) | 7 | 0.30 | 0.92 | 0.55 | 0.59 | 0.19 |
| Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 4 | --- | |
| COFC-6 | Alkalinity (mg/L) | 7 | 30.3 | 57.7 | 45.1 | 45.0 | 9.1 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 60.0 | 140.0 | 93.0 | 97.2 | 25.0 |
| | Total Suspended Solids (mg/L) | 7 | 9.0 | 21.0 | 14.0 | 15.1 | 4.3 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.071 | 0.008 | 0.025 | 0.030 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.102 | 0.053 | 0.052 | 0.035 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.394 | 0.715 | 0.487 | 0.541 | 0.115 |
| | Total Nitrogen (mg/L) | 7 | 0.450 | 0.750 | 0.540 | 0.594 | 0.120 |
| | Total Phosphorus (mg/L) | 7 | < 0.053 | 0.333 | 0.053 | 0.093 | 0.106 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.015 | 0.008 | 0.008 | 0.005 |
| | Chlorophyll a (mg/L)J | 7 | 3.20 | 13.30 | 6.76 | 7.16 | 3.91 |
| | Turbidity (NTU) | 7 | 10 | 23 | 18 | 16 | 5 |
| | Secchi (m) | 7 | 0.46 | 0.95 | 0.70 | 0.68 | 0.16 |
| Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 40 | --- | |
| COFC-7 | Alkalinity (mg/L) | 7 | 13.5 | 41.0 | 29.5 | 28.3 | 10.3 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 50.0 | 161.0 | 78.0 | 91.0 | 41.6 |
| | Total Suspended Solids (mg/L) | 7 | 12.0 | 27.0 | 20.0 | 19.6 | 5.7 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.094 | 0.076 | 0.056 | 0.036 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.030 | 0.136 | 0.092 | 0.083 | 0.042 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.334 | 0.829 | 0.734 | 0.638 | 0.191 |
| | Total Nitrogen (mg/L) | 7 | 0.390 | 0.920 | 0.780 | 0.723 | 0.183 |
| | Total Phosphorus (mg/L) | 7 | < 0.051 | 0.100 | 0.051 | 0.057 | 0.009 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.017 | 0.004 | 0.006 | 0.006 |
| | Chlorophyll a (mg/L)J | 7 | 1.00 | 7.83 | 4.45 | 4.09 | 2.42 |
| | Turbidity (NTU) | 7 | 16 | 35 | 22 | 24 | 7 |
| | Secchi (m) | 7 | 0.35 | 0.81 | 0.48 | 0.52 | 0.16 |

| Station | Parameter | N | Min | Max | Median | Avg | SD |
|---------|--------------------------------------|---|---------|--------|--------|-------|-------|
| COFC-7 | Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 250 | --- |
| COFC-8 | Alkalinity (mg/L) | 7 | 35.9 | 79.4 | 62.2 | 58.9 | 15.7 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 78.0 | 261.0 | 120.0 | 138.0 | 59.2 |
| | Total Suspended Solids (mg/L) | 7 | 16.0 | 44.0 | 26.0 | 26.9 | 8.6 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.120 | 0.033 | 0.046 | 0.040 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.133 | 0.031 | 0.051 | 0.047 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.293 | 1.150 | 0.551 | 0.665 | 0.313 |
| | Total Nitrogen (mg/L) | 7 | 0.370 | 1.160 | 0.630 | 0.716 | 0.315 |
| | Total Phosphorus (mg/L) | 7 | < 0.051 | 0.129 | 0.069 | 0.072 | 0.028 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.016 | 0.007 | 0.008 | 0.005 |
| | Chlorophyll a (mg/L)J | 7 | 11.75 | 64.50 | 17.50 | 29.17 | 23.04 |
| | Turbidity (NTU) | 7 | 13 | 48 | 29 | 28 | 12 |
| | Secchi (m) | 7 | 0.36 | 0.78 | 0.45 | 0.48 | 0.14 |
| | Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 50 | --- |
| COFC-9 | Alkalinity (mg/L) | 7 | 37.9 | 63.4 | 53.5 | 50.7 | 10.0 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 92.0 | 181.0 | 144.0 | 140.0 | 26.9 |
| | Total Suspended Solids (mg/L) | 7 | 12.0 | 21.0 | 16.0 | 15.6 | 3.1 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.010 | 0.027 | 0.005 | 0.008 | 0.008 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.305 | 0.015 | 0.069 | 0.109 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.301 | 1.227 | 0.770 | 0.774 | 0.337 |
| | Total Nitrogen (mg/L) | 7 | 0.400 | 1.530 | 0.780 | 0.843 | 0.389 |
| | Total Phosphorus (mg/L) | 7 | < 0.009 | 0.129 | 0.025 | 0.046 | 0.040 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.012 | 0.002 | 0.005 | 0.004 |
| | Chlorophyll a (mg/L)J | 7 | 23.10 | 67.30 | 28.30 | 33.20 | 15.28 |
| | Turbidity (NTU) | 7 | 10 | 23 | 16 | 17 | 5 |
| | Secchi (m) | 7 | 0.31 | 0.90 | 0.66 | 0.60 | 0.21 |
| | Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 20 | --- |
| COFC-10 | Alkalinity (mg/L) | 7 | 32.3 | 65.1 | 52.4 | 51.1 | 9.9 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 28.0 | 2349.0 | 155.0 | 451.0 | 838.5 |
| | Total Suspended Solids (mg/L) | 7 | 5.0 | 52.0 | 19.0 | 24.4 | 16.8 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.015 | 0.008 | 0.008 | 0.000 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.291 | 0.020 | 0.084 | 0.114 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.277 | 0.946 | 0.803 | 0.692 | 0.239 |
| | Total Nitrogen (mg/L) | 7 | 0.480 | 1.140 | 0.830 | 0.777 | 0.243 |
| | Total Phosphorus (mg/L) | 7 | < 0.029 | 0.100 | 0.050 | 0.049 | 0.010 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.015 | 0.002 | 0.005 | 0.005 |
| | Chlorophyll a (mg/L)J | 7 | 12.80 | 33.80 | 17.80 | 20.31 | 7.13 |
| | Turbidity (NTU) | 7 | 11 | 21 | 17 | 17 | 3 |
| | Secchi (m) | 6 | 0.41 | 1.07 | 0.65 | 0.57 | 0.33 |
| | Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 5 | --- |
| COFC-11 | Alkalinity (mg/L) | 7 | 40.5 | 69.6 | 56.4 | 54.1 | 9.2 |
| | Hardness (mg/L) | 0 | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 54.0 | 321.0 | 133.0 | 147.4 | 82.9 |
| | Total Suspended Solids (mg/L) | 7 | 6.0 | 16.0 | 11.0 | 10.9 | 3.1 |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.021 | 0.008 | 0.009 | 0.005 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.402 | 0.040 | 0.095 | 0.139 |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.355 | 0.943 | 0.561 | 0.581 | 0.220 |
| | Total Nitrogen (mg/L) | 7 | 0.430 | 1.030 | 0.650 | 0.679 | 0.212 |
| | Total Phosphorus (mg/L) | 7 | < 0.031 | 0.100 | 0.050 | 0.049 | 0.009 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < 0.004 | 0.020 | 0.002 | 0.006 | 0.007 |

| Station | Parameter | N | Min | Max | Median | Avg | SD | |
|---------|--------------------------------------|---|-------|-------|--------|-------|-------|-------|
| COFC-11 | Chlorophyll a (mg/L)J | 7 | 12.82 | 37.90 | 15.49 | 21.36 | 10.81 | |
| | Turbidity (NTU) | 7 | 8 | 20 | 13 | 13 | 5 | |
| | Secchi (m) | 7 | 0.46 | 1.15 | 0.71 | 0.81 | 0.24 | |
| | Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 1 | --- | |
| COFC-12 | Alkalinity (mg/L) | 7 | 41.7 | 69.4 | 61.5 | 56.7 | 10.4 | |
| | Hardness (mg/L) | 0 | | | | | | |
| | Total Dissolved Solids (mg/L) | 7 | 97.0 | 211.0 | 142.0 | 147.4 | 41.7 | |
| | Total Suspended Solids (mg/L) | 7 | 19.0 | 25.0 | 20.0 | 21.6 | 2.6 | |
| | Ammonia Nitrogen (mg/L) | 7 | 0.015 | 0.027 | 0.008 | 0.014 | 0.008 | |
| | Nitrate+Nitrite Nitrogen (mg/L) | 7 | 0.003 | 0.450 | 0.035 | 0.118 | 0.178 | |
| | Total Kjeldahl Nitrogen (mg/L) | 7 | 0.323 | 1.210 | 0.594 | 0.710 | 0.309 | |
| | Total Nitrogen (mg/L) | 7 | 0.480 | 1.370 | 0.610 | 0.827 | 0.347 | |
| | Total Phosphorus (mg/L) | 7 | < | 0.031 | 0.100 | 0.050 | 0.051 | 0.012 |
| | Dissolved Reactive Phosphorus (mg/L) | 7 | < | 0.004 | 0.015 | 0.002 | 0.004 | 0.005 |
| | Chlorophyll a (mg/L)J | 7 | 5.34 | 70.50 | 15.30 | 25.22 | 23.41 | |
| | Turbidity (NTU) | 7 | 15 | 26 | 20 | 20 | 4 | |
| | Secchi (m) | 7 | 0.35 | 0.68 | 0.60 | 0.54 | 0.13 | |
| | Fecal Coliform (col/100 mL) | 1 | --- | --- | --- | 4 | --- | |

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