2010 Mitchell Reservoir Report

Rivers and Reservoirs Monitoring Program

Alabama Department of Environmental Management

Field Operations Division
Environmental Indicators Section
Aquatic Assessment Unit
December 2012

Rivers and Reservoirs Monitoring Program

2010

Mitchell Reservoir

Coosa River Basin

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

December 2012

Table of Contents

LIST OF ACRONYMS

A&I	Agriculture and Industry water supply use classification
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

Mitchell Reservoir is an impoundment of the Coosa River located 10 miles east of Clanton, AL in Chilton and Coosa Counties. The 5,850 acre reservoir is situated between Lay Reservoir and Jordan Reservoir. Mitchell was completed in 1922 by the Alabama Power Company (APCO) to provide hydroelectric power to the area. In addition to power generation the reservoir provides recreational opportunities including boating, fishing, and swimming.

The Alabama Department of Environmental Management (ADEM) monitored Mitchell Reservoir as part of the 2010 assessment of the Alabama, Coosa, and Tallapoosa River (ACT) Basins 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 2012 Monitoring Strategy.

In 2010, the ADEM implemented specific water quality criteria for nutrient management at the lower and upper Mitchell Reservoir stations, which have been monitored by ADEM since 1990. This criteria represents the maximum growing season mean (April-October) chlorophyll *a* (chl *a*) concentration allowable while still fully supporting Mitchell Reservoir's Public Water Supply, Swimming, and Fish & Wildlife (PWS, S, F&W) use classifications.

The purpose of this report is to summarize data collected at four stations in Mitchell Reservoir during the 2010 growing season and to evaluate growing season trends in lake trophic status and nutrient concentrations using ADEM's fourteen-year 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 (Fig. 1). Specific location information can be found in Table 1. Mitchell Reservoir was sampled in the mainstem at the dam forebay and upper reservoir. Two tributary embayment stations were also monitored, Walnut Creek and Hatchet Creek.

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 (ADEM 2010), Surface Water Quality Assurance Project Plan (ADEM 2008), and Quality Management Plan (ADEM 2008).

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 APCO flow data and ADEM's previously collected data to help interpret the 2010 results.

Figure 1. Mitchell Reservoir with 2010 sampling locations.

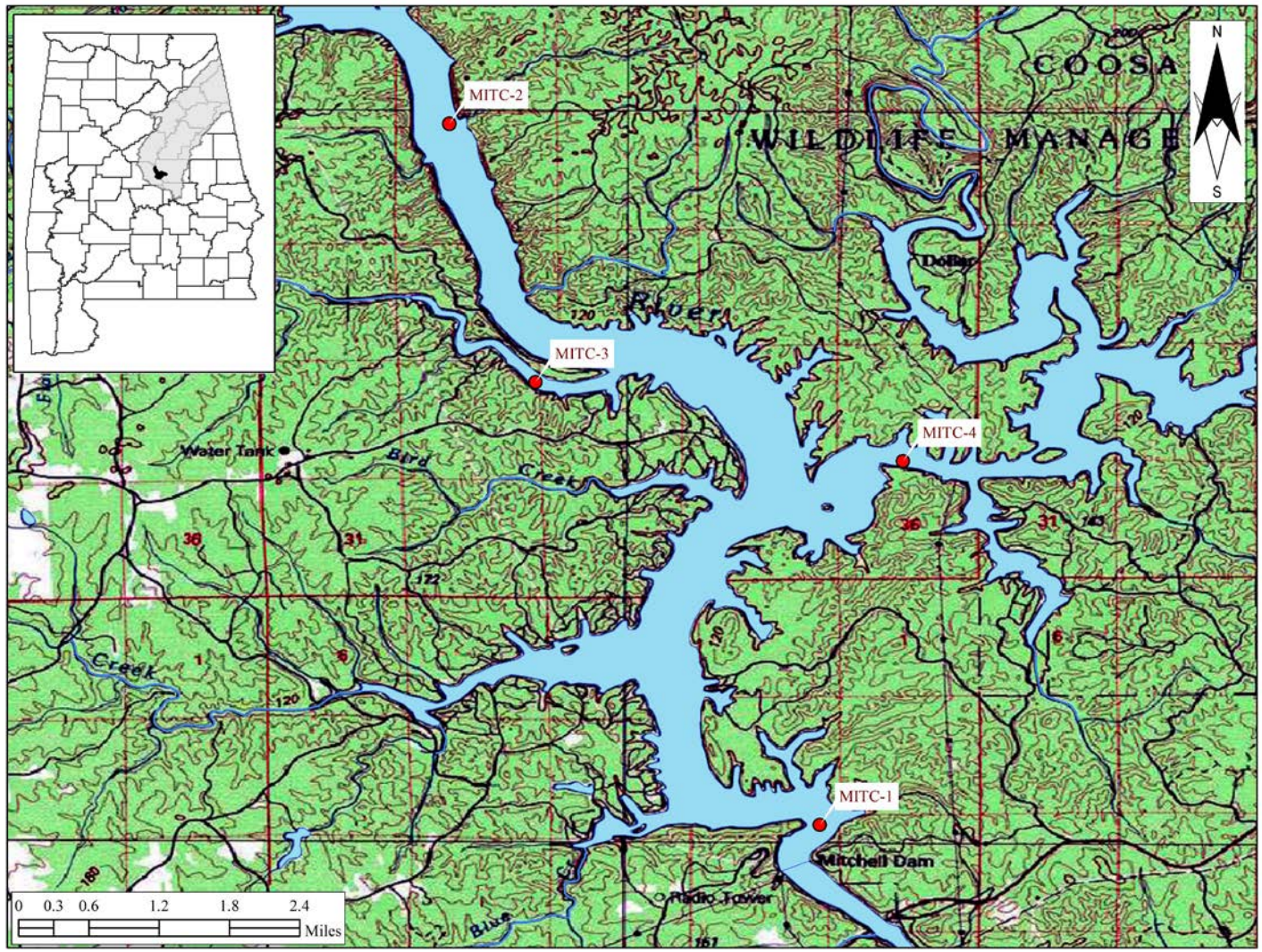


Table 1. Descriptions of the 2010 monitoring stations in Mitchell Reservoir.

HUC	County	Station Number	Report Designation	Waterbody	Station Description	Chl *a* Criteria	Latitude	Longitude
031501070803	Coosa	MITC-1*	Lower	Coosa R	Deepest point, main river channel, dam forebay.	14 ug/L	32.8106	-86.4420
031501070803	Coosa	MITC-2*	Upper	Coosa R	Deepest point, main river channel, downstream of Foshee Islands.	16 ug/L	32.8972	-86.4877
031501070802	Chilton	MITC-3	Walnut Ck	Walnut Ck	Deepest point, main creek channel, Walnut Creek embayment, approximately 0.5 miles upstream of lake confluence.		32.8653	-86.4771
031501070709	Coosa	MITC-4	Hatchet Ck	Hatchet Ck	Deepest point, main creek channel, Hatchet Ck embayment, approximately 0.5 miles upstream of lake confluence.		32.8555	-86.4317

*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 (Figs. 2 and 3). Monthly graphs for TN, TP, chl *a*, TSS, DO, and TSI are also provided (Figs. 4-8 and 11). 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 and 10. Summary statistics of all data collected during 2010 are presented in Appendix Table 1. The table contains the minimum, maximum, median, mean, and standard deviation of each parameter analyzed.

Stations with the highest concentrations of nutrients, chlorophyll, 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 that these stations may be potential candidates for reference waterbodies and watersheds.

In 2010 the mean growing season TN values in Mitchell Reservoir mainstem stations were similar (Fig. 2). Values in the upper reservoir have been variable in the years monitored, while those in the lower reservoir have shown an overall increase. Mean growing season TN values among tributary stations have increased each year sampled. Monthly TN concentrations were similar April-October in both locations. Monthly TN concentrations in the lower station were near historic means all months but May (Fig. 4).

In 2010 mean growing season TP values in mainstem Mitchell Reservoir stations were higher in the upper station than the lower (Fig. 2). Mean growing season TP values calculated in Mitchell Reservoir mainstem stations have declined overall from 1997-2010. Mean TP values in Hatchet and Walnut Creeks were lower in 2010 than 2005. Monthly TP concentrations measured in the lower and upper Mitchell Reservoir stations were below historic means April-October (Fig. 5). Historic low monthly TP concentrations were measured during September in both mainstem stations, as well as during July in the lower station and April in the upper station.

Specific water quality criteria for nutrient management have been established for the lower and upper stations on Mitchell Reservoir. The growing season mean chl *a* value calculated

in the lower station during 2010 was in compliance with the criteria limit (Fig. 3). However, the growing season mean chl *a* value calculated for the upper station exceeded the criteria limit. Mean growing season chl *a* values in the lower station, Hatchet Creek and Walnut Creek were the lowest since monitoring began. Mean growing season chl *a* values in the upper station in 2010 were higher than 2005 and 2008. Historic low monthly chl *a* concentrations were measured in the lower Mitchell Reservoir station April, June and July (Fig. 6). Monthly chl *a* concentrations in the upper station increased overall through the growing season.

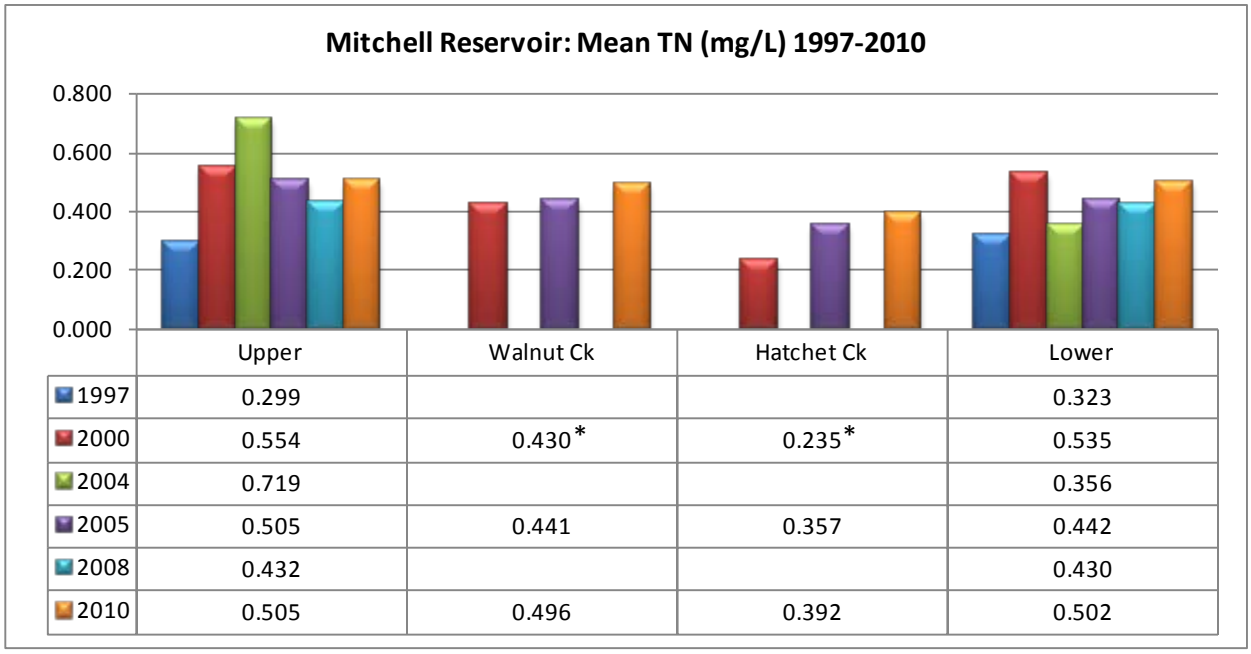
The mean growing season TSS values calculated in all Mitchell Reservoir stations during 2010 were the lowest measured since monitoring began in 1997 and have shown a general decrease in the years monitored (Fig. 3). Historic low monthly TSS concentrations were measured during April, June, July and August in the lower station and April, May, June and October in the upper station (Fig. 7).

AGPT results for the upper station have remained primarily nitrogen limited in the years monitored (Table 2). AGPT was not collected in 2010 for the lower station. In 2010, the MSC value in the upper station was below 5.0 mg/L, the value that Raschke et al. (1996) defined as protective of reservoir and lake systems.

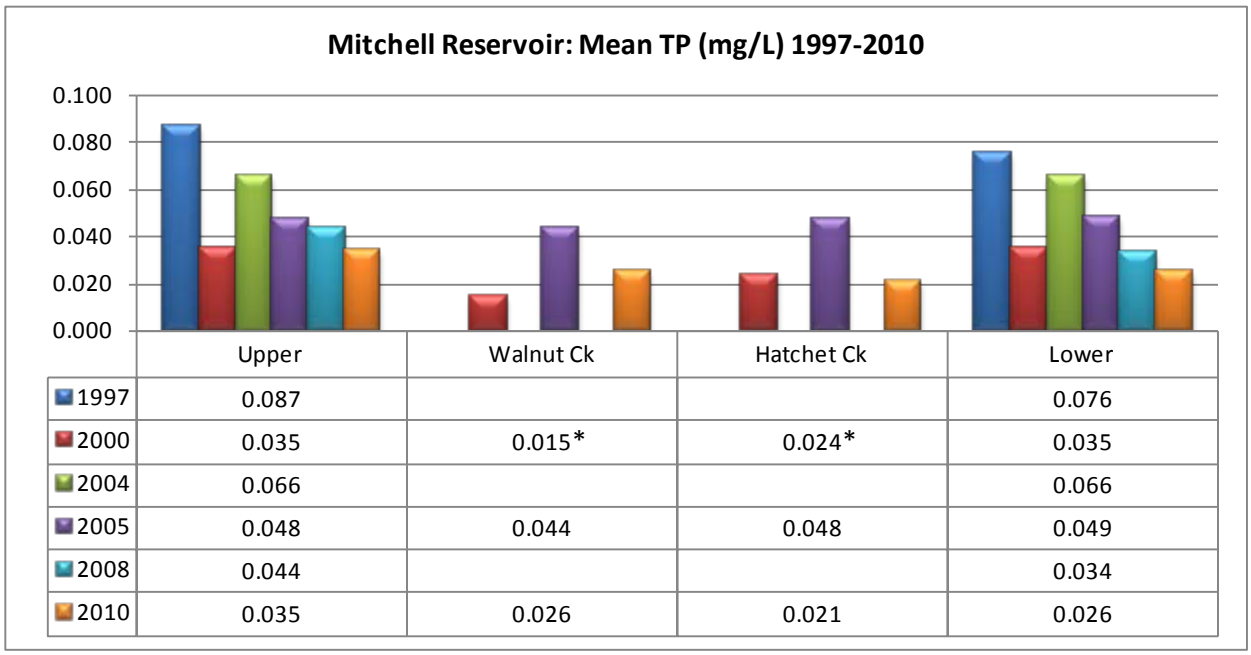
All measurements of dissolved oxygen (DO) concentrations in Mitchell Reservoir mainstem and tributary stations were above the ADEM Criteria (ADEM Admin. Code R. 335-6-10-.09) limit of 5.0 mg/L at 5.0 ft (1.5 m) (Fig. 8). Based on monthly DO profiles, chemoclines existed in the lower Mitchell Reservoir station April-September, with the water column completely deoxygenated below 16m in June-August (Fig. 9). Thermoclines were also present in the lower station April and May. Highest temperatures were measured in August in both mainstem stations (Fig. 9 and 10).

Monthly TSI values were calculated using chl *a* concentrations and Carlson's Trophic State Index. TSI values for all Mitchell Reservoir mainstem and tributary stations were mesotrophic in April and eutrophic May-October (Fig. 11).

Figure 2. Mean growing season TN and TP measured in Mitchell Reservoir, April-October, 1997-2010. Stations are illustrated from upstream to downstream as the graph is read from left to right.



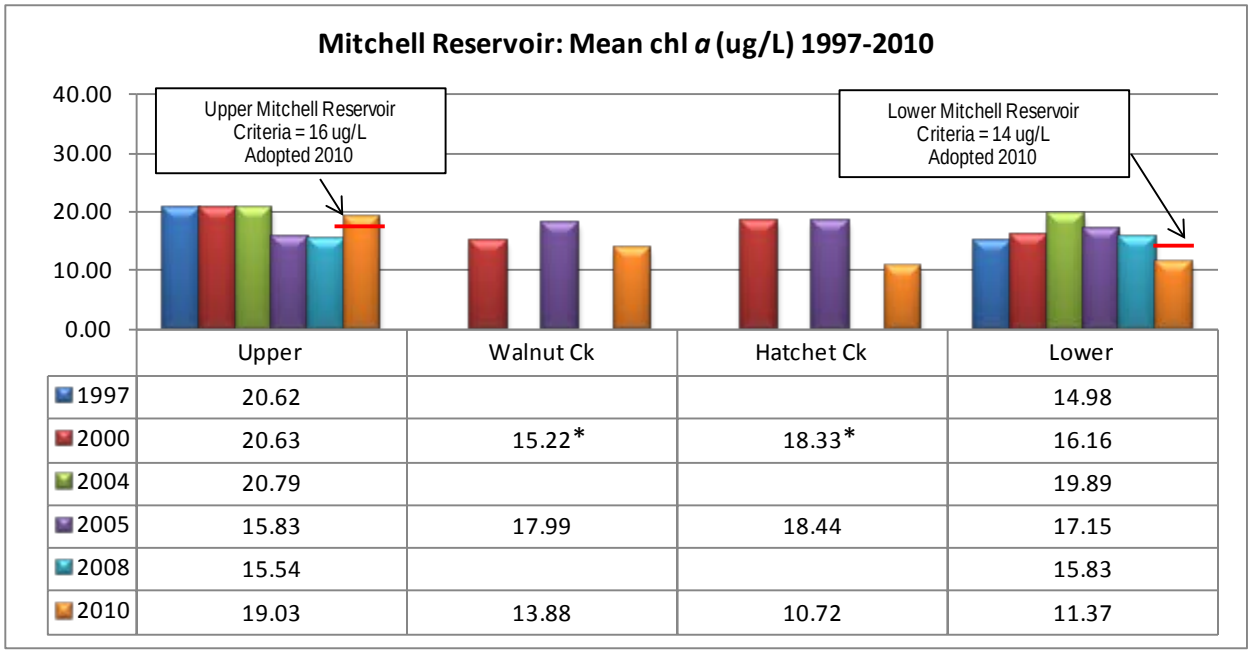
	Upper	Walnut Ck	Hatchet Ck	Lower
1997	0.299			0.323
2000	0.554	0.430*	0.235*	0.535
2004	0.719			0.356
2005	0.505	0.441	0.357	0.442
2008	0.432			0.430
2010	0.505	0.496	0.392	0.502



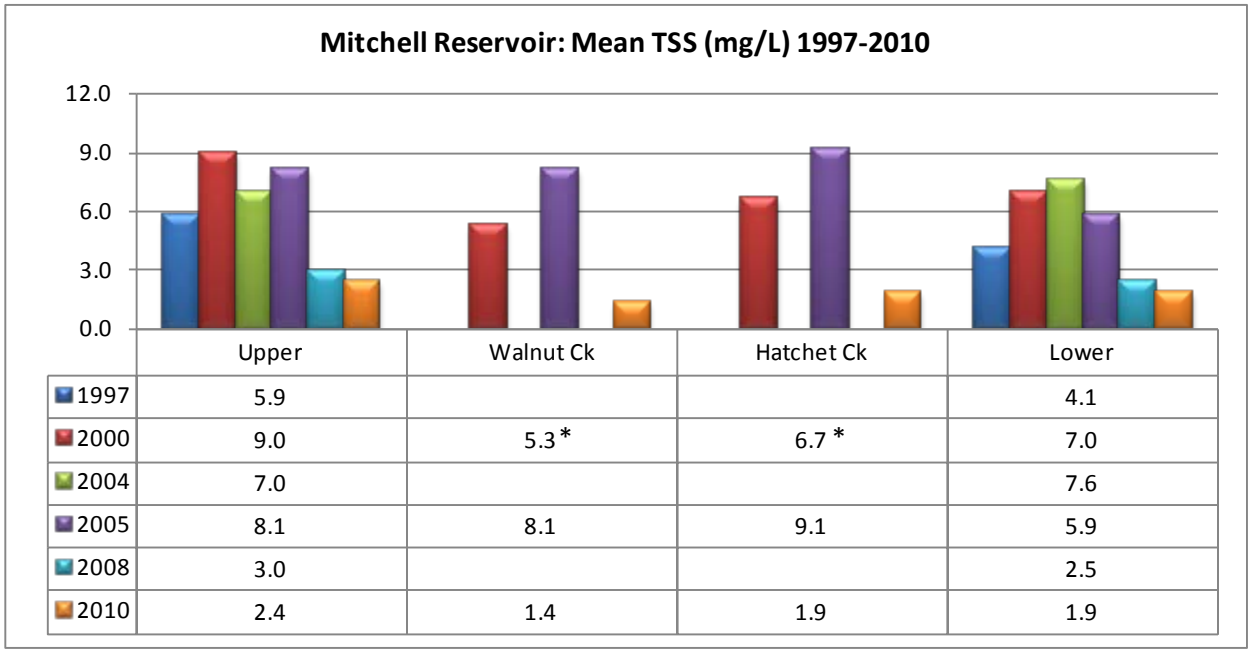
	Upper	Walnut Ck	Hatchet Ck	Lower
1997	0.087			0.076
2000	0.035	0.015*	0.024*	0.035
2004	0.066			0.066
2005	0.048	0.044	0.048	0.049
2008	0.044			0.034
2010	0.035	0.026	0.021	0.026

*Mean of April/June/August only.

Figure 3. Mean growing season chl *a* and TSS measured in Mitchell Reservoir, April-October, 1997-2010. 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 and upper stations.



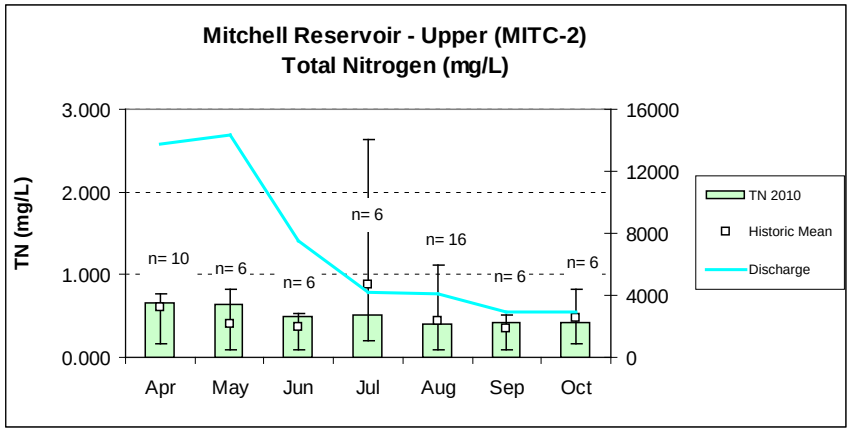
	Upper	Walnut Ck	Hatchet Ck	Lower
1997	20.62			14.98
2000	20.63	15.22*	18.33*	16.16
2004	20.79			19.89
2005	15.83	17.99	18.44	17.15
2008	15.54			15.83
2010	19.03	13.88	10.72	11.37



	Upper	Walnut Ck	Hatchet Ck	Lower
1997	5.9			4.1
2000	9.0	5.3*	6.7*	7.0
2004	7.0			7.6
2005	8.1	8.1	9.1	5.9
2008	3.0			2.5
2010	2.4	1.4	1.9	1.9

*Mean of April/June/August only.

Figure 4. Monthly TN concentrations measured in Mitchell Reservoir, April-October 2010 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2010) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.



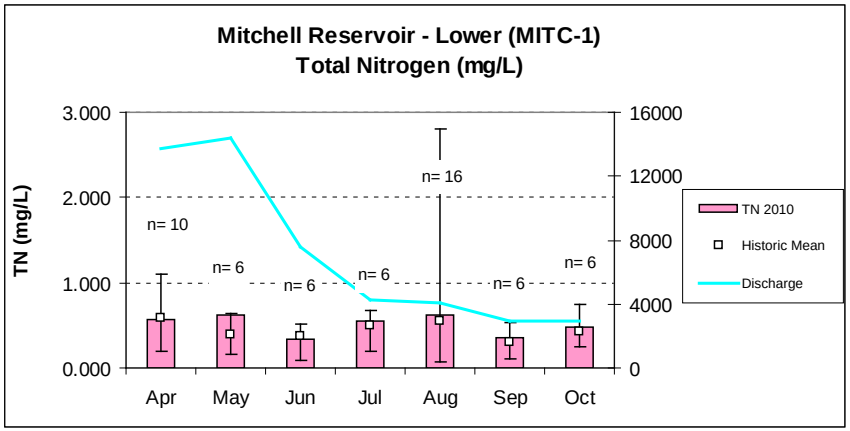
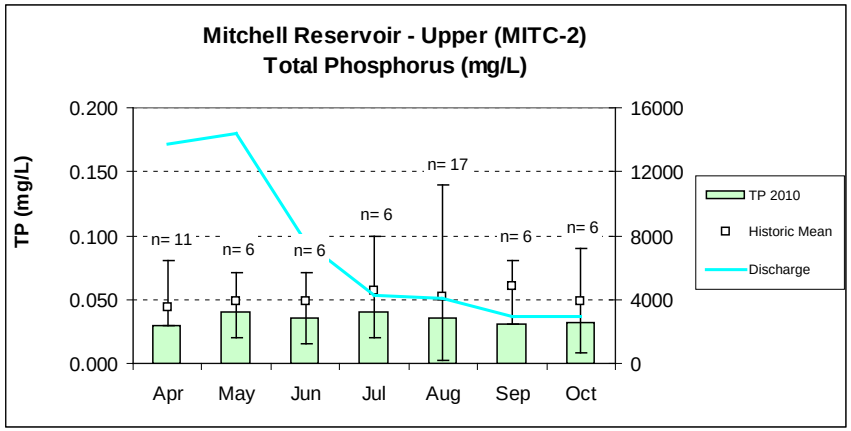


Figure 5. Monthly TP concentrations measured in Mitchell Reservoir, April-October 2010 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2010) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.



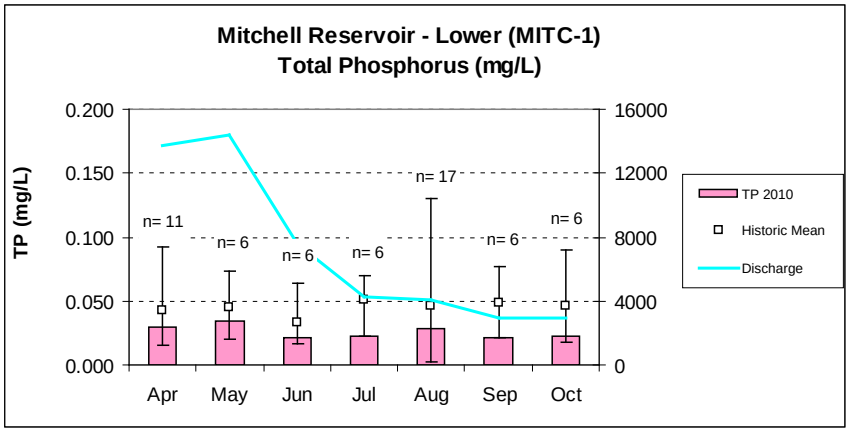
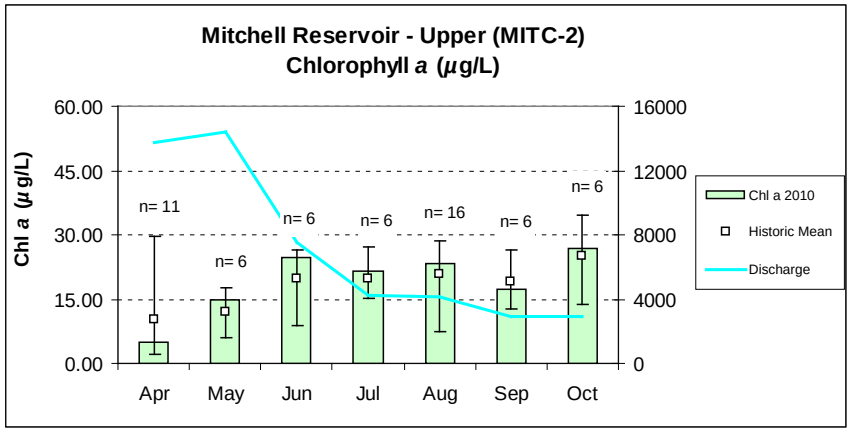


Figure 6. Monthly chl *a* concentrations measured in Mitchell Reservoir, April-October 2010 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2010) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.



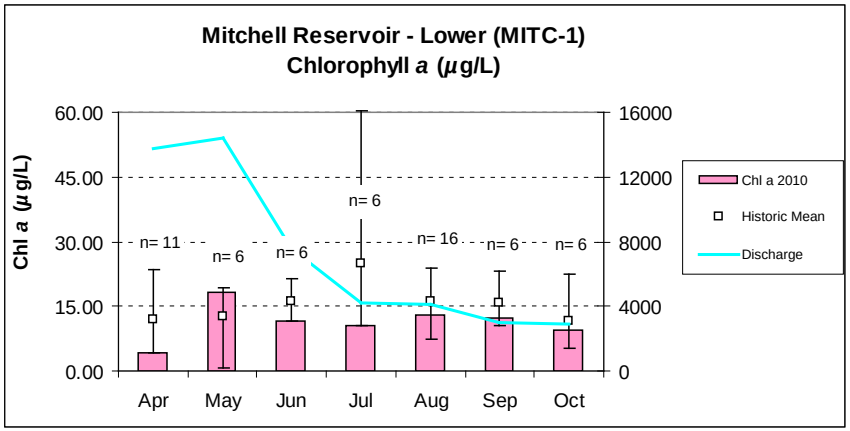
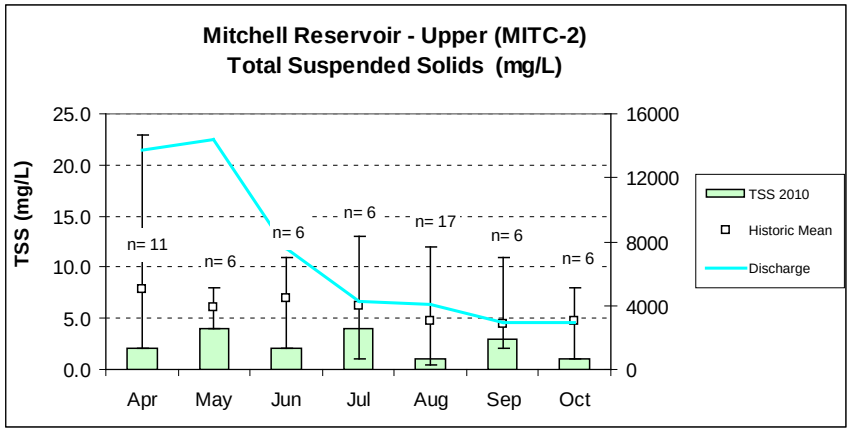


Figure 7. Monthly TSS concentrations measured in Mitchell Reservoir, April-October 2010 vs. average monthly discharge. Discharge provided by APCO. Each bar graph depicts monthly changes in each station. The historic mean (1990-2010) and min/max range are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.



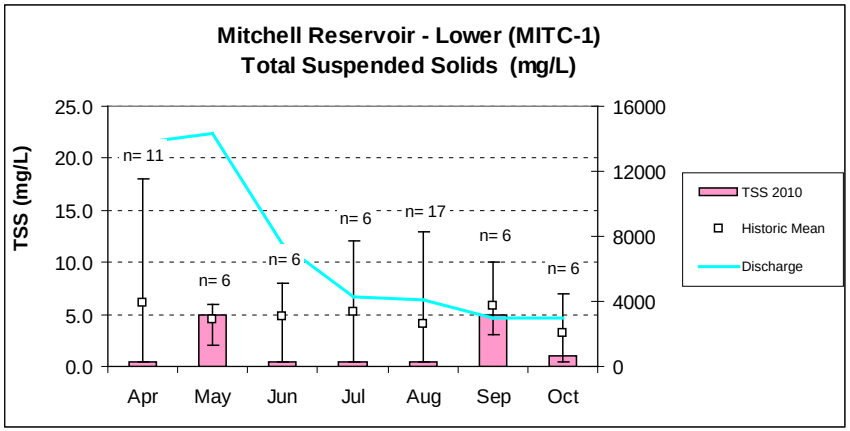
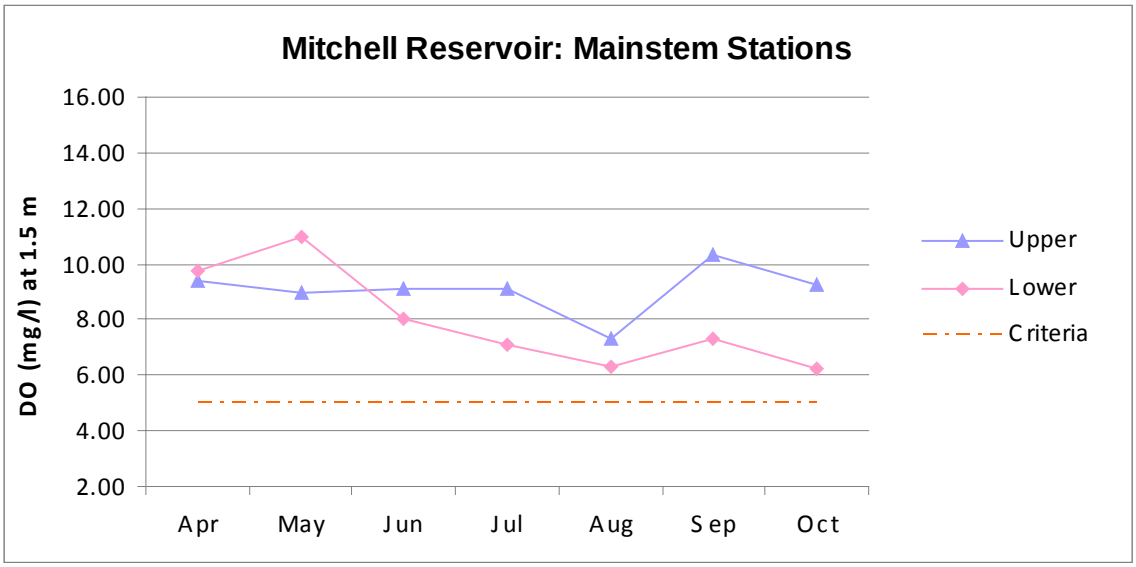


Table 2. Algal growth potential test results, Mitchell Reservoir, 1997-2010 (expressed as mean Maximum Standing Crop (MSC) dry weights of Selenastrum capricornutum in mg/L) and limiting nutrient status. MSC values below 5 mg/L are considered to be protective in reservoirs and lakes; values below 20 mg/L MSC are considered protective of flowing streams and rivers. (Raschke and Schultz 1987).

Station	Upper		Lower	
	MSC	Limiting Nutrient	MSC	Limiting Nutrient
August 1997	6.05	Nitrogen	7.17	Co-limiting
August 2000	4.17	None	2.01	None
August 2005	8.38	Nitrogen	2.12	Nitrogen
August 2010	2.49	Nitrogen	-	-

Figure 8. Monthly DO concentrations at 1.5 m (5 ft) for Mitchell Reservoir stations collected April-October 2010. ADEM Water Quality Criteria pertaining to reservoir waters require a DO concentration of 5.0 mg/L at this depth (ADEM 2010).



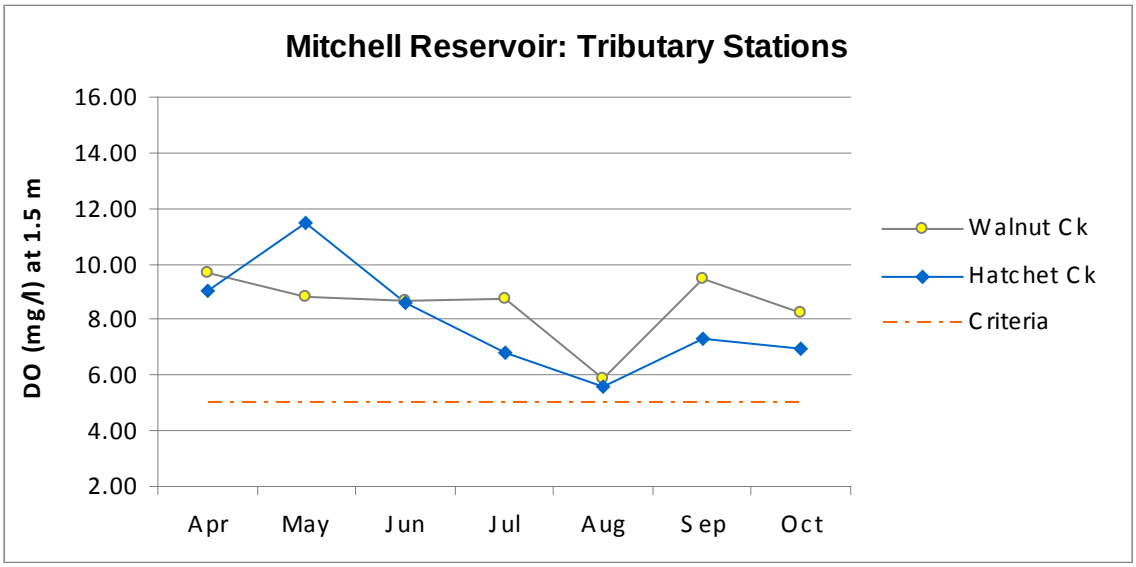


Figure 9. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the lower Mitchell Reservoir station, April-October 2010.

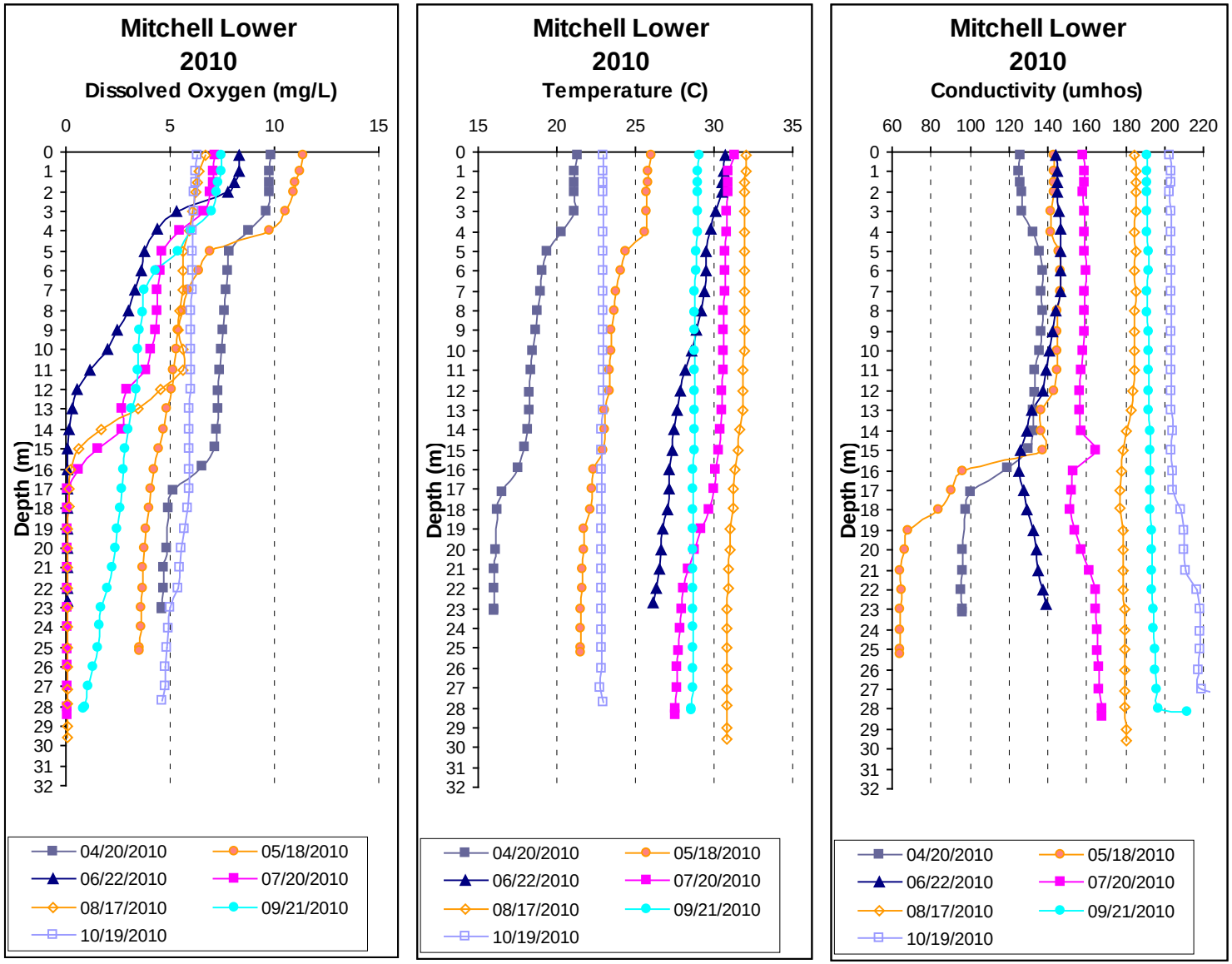


Figure 10. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the upper Mitchell Reservoir station, April-October 2010.

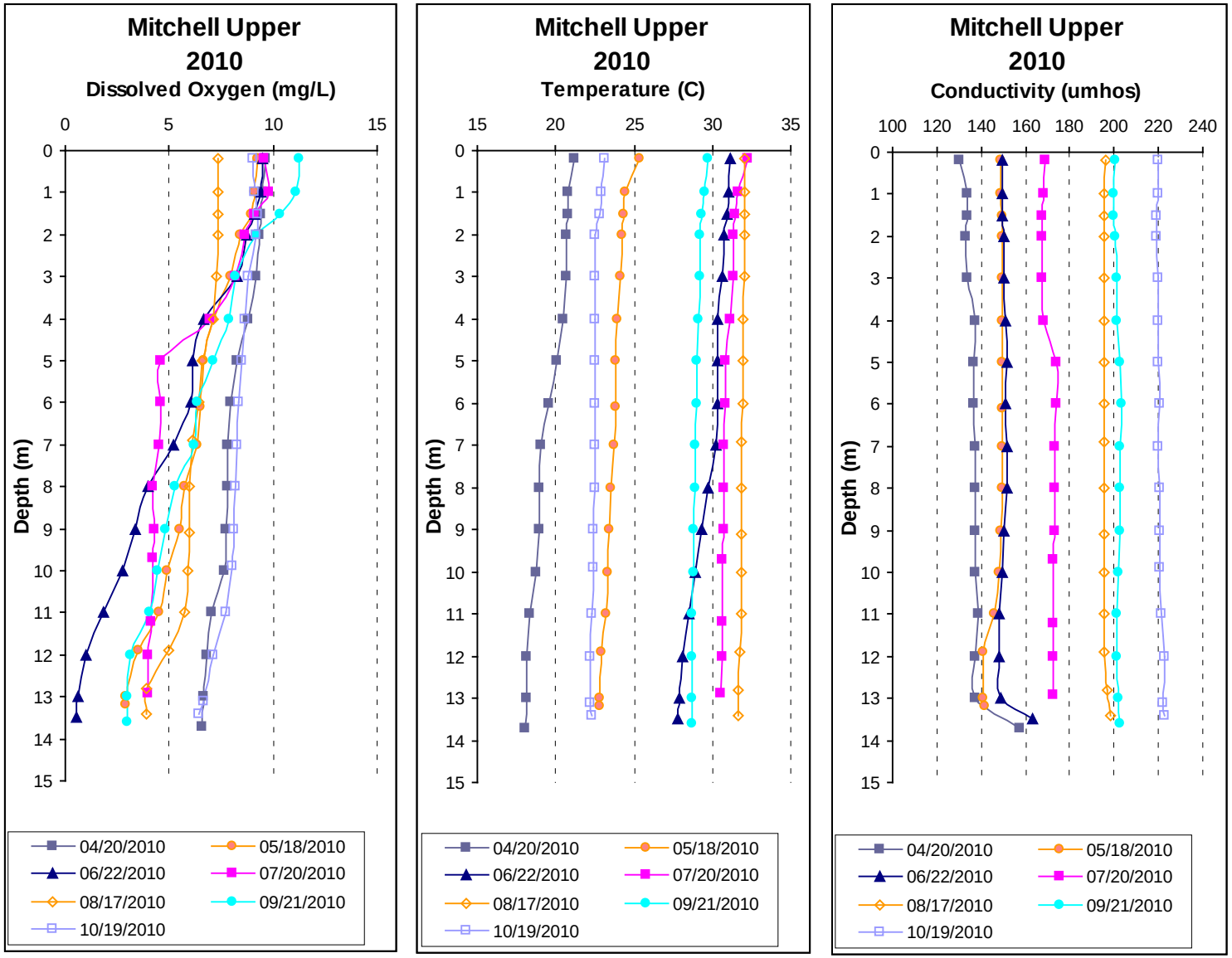
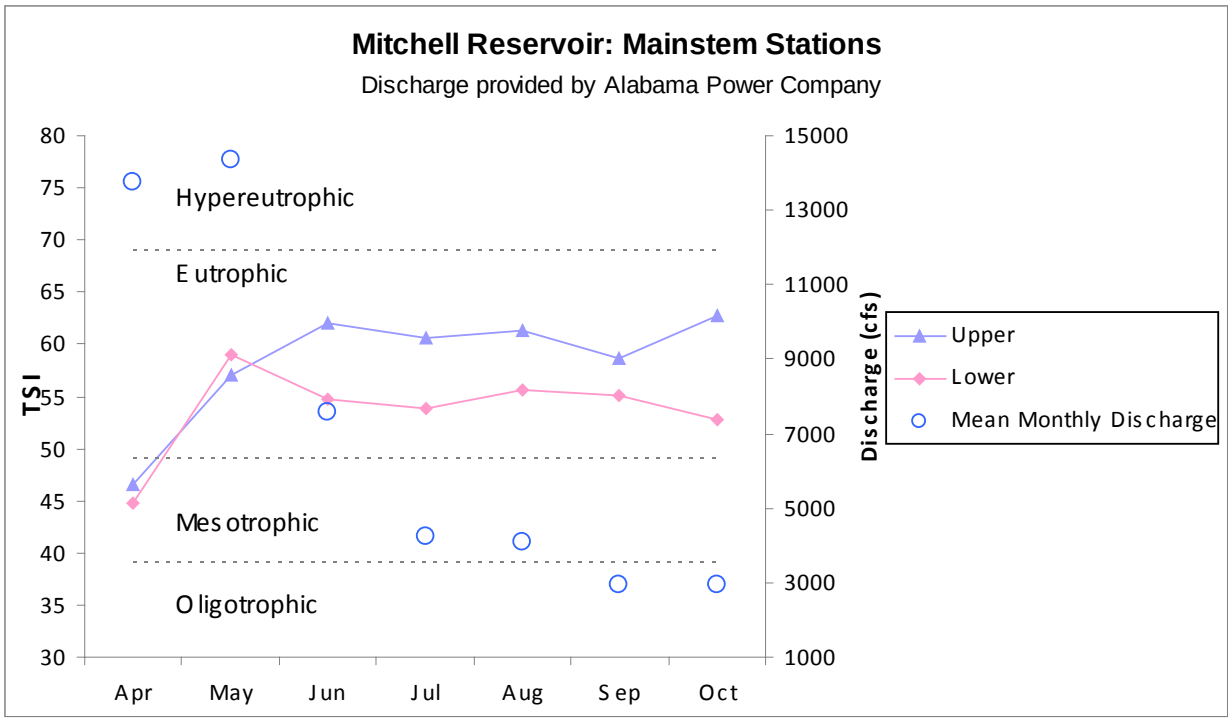
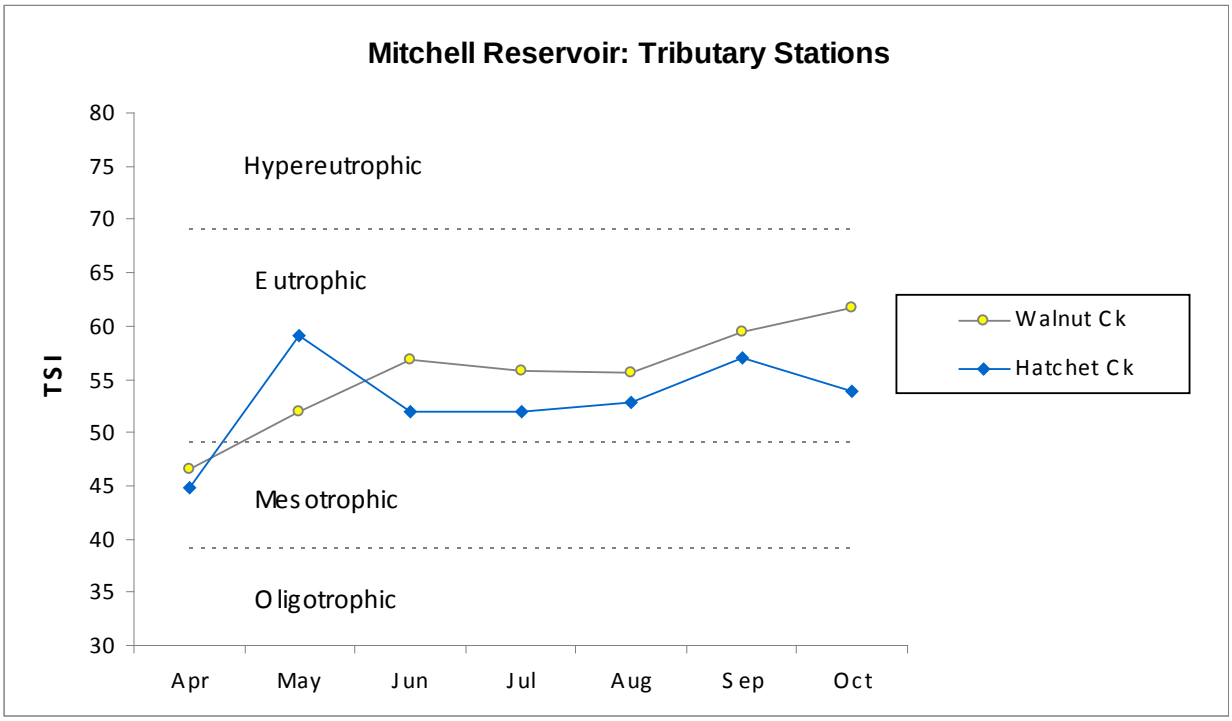


Figure 11. Monthly TSI values calculated for mainstem and tributary Mitchell Reservoir stations using chl *a* concentrations and Carlson's Trophic State Index calculation. Monthly discharge provided by APCO.





REFERENCES

ADEM. 2008. Quality Management Plan (QMP) For The Alabama Department Of Environmental, Alabama Department of Environmental Management (ADEM), Montgomery, AL. 58 pp.

ADEM. 2008. Quality Assurance Project Plan (QAPP) for Surface Water Quality Monitoring in Alabama. Alabama Department of Environmental Management (ADEM), Montgomery, AL. 78 pp.

ADEM. 2010 (as amended). Standard Operating Procedures #2041 *In Situ* Surface Water Quality Field Measurements-Temperature, Alabama Department of Environmental Management (ADEM), Montgomery, AL.

ADEM. 2010 (as amended). Standard Operating Procedures #2044 *In Situ* Surface Water Quality Field Measurements–Turbidity, Alabama Department of Environmental Management (ADEM), Montgomery, AL.

ADEM. 2010 (as amended). Standard Operating Procedures #2046 Photic Zone Measurement and Visibility Determination, Alabama Department of Environmental Management (ADEM), Montgomery, AL.

ADEM. 2010 (as amended). Standard Operating Procedures #2047 *In Situ* Surface Water Quality Field Measurements–By Datasonde, Alabama Department of Environmental Management (ADEM), Montgomery, AL.

ADEM. 2010 (as amended). Standard Operating Procedures #2061 General Surface Water Sample Collection, Alabama Department of Environmental Management (ADEM), Montgomery, AL.

ADEM. 2010 (as amended). Standard Operating Procedures #2062 Dissolved Reactive Phosphorus (DRP) Surface Water Sample Collection and Field Processing, Alabama Department of Environmental Management (ADEM), Montgomery, AL.

ADEM. 2010 (as amended). Standard Operating Procedures #2063 Water Column Chlorophyll *a* Sample Collection and Field Processing, Alabama Department of Environmental Management (ADEM), Montgomery, AL.

Alabama Department of Environmental Management Water Division (ADEM Admin. Code R. 335-6-10-.09). 2010. Specific Water Quality Criteria. Water Quality Program. Chapter 10. Volume 1. Division 335-6.

Alabama Department of Environmental Management Water Division (ADEM Admin. Code R. 335-6-10-.11). 2010. Water Quality Criteria Applicable to Specific Lakes. Water Quality Program. Chapter 10. Volume 1. Division 335-6.

American Public Health Association, American Water Works Association and Water Pollution Control Federation. 1998. Standard methods for the examination of water and wastewater. 20th edition. APHA, Washington, D.C.

Carlson, R.E. 1977. A trophic state index. Limnology and Oceanography. 22(2):361-369.

Lind, O.T. 1979. Handbook of common methods in limnology. The C.V. Mosby Co., St. Louis, Missouri. 199 pp.

Raschke, R.L. and D.A. Schultz. 1987. The use of the algal growth potential test for data assessment. Journal of Water Pollution Control Federation 59(4):222-227.

Raschke, R. L., H. S. Howard, J. R. Maudsley, and R. J. Lewis. 1996. The Ecological Condition of Small Streams in the Savannah River Basin: A REMAP Progress Report. EPA Region 4, Science and Ecosystem Support Division, Ecological Assessment Branch, Athens, GA.

U.S. Environmental Protection Agency. 1990. The lake and reservoir restoration guidance manual. 2nd edition. EPA-440/4-90-006. U.S.E.P.A. Office of Water. Washington, D.C. 326 pp.

Welch, E.B. 1992. Ecological Effects of Wastewater. 2nd edition. Chapman and Hall Publishers. London, England. 425 pp.

Wetzel, R.G. 1983. Limnology. 2nd edition. Saunders College Publishing. Philadelphia, Pennsylvania. 858 pp.

APPENDIX

Appendix Table 1. Summary of Mitchell Reservoir water quality data collected April-October, 2010. 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	Mean	SD
MITC-1	**Physical**							
	Turbidity (NTU)	7		2.1	4.8	2.7	3.0	1.0
	Total Dissolved Solids (mg/L)	7		74.0	134.0	92.0	100.3	22.4
	Total Suspended Solids (mg/L)	7	<	1.0	5.0	0.5	1.9	2.2
	Hardness (mg/L)	4		49.0	74.3	60.4	61.0	10.9
	Alkalinity (mg/L)	7		50.5	81.8	65.0	67.0	11.4
	Photic Zone (m)	7		3.51	5.31	4.56	4.54	0.68
	Secchi (m)	7		1.54	2.18	1.79	1.79	0.21
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.021	0.021	0.010	0.010	0.000
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7		0.003	0.104	0.012	0.027	0.036
	Total Kjeldahl Nitrogen (mg/L)	7		0.300	0.615	0.465	0.475	0.122
	Total Nitrogen (mg/L)[J]	7		0.336	0.618	0.550	0.502	0.118
	Dissolved Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.006	0.004	0.004	0.002
	Total Phosphorus (mg/L)	7		0.021	0.034	0.023	0.026	0.005
	CBOD-5 (mg/L)	7	<	2.0	2.6	1.0	1.4	0.7
	Chlorides (mg/L)	7		3.4	7.3	4.0	4.9	1.5
	Biological							
	Chlorophyll a (ug/L)	7		4.27	18.16	11.75	11.37	4.15
	E. coli (mpn/100mL)[J]	3		1	1	1	1	0
MITC-2	**Physical**							
	Turbidity (NTU)	7		2.5	4.2	2.9	3.2	0.7
	Total Dissolved Solids (mg/L)	7		86.0	140.0	108.0	106.6	19.5
	Total Suspended Solids (mg/L)	7		1.0	4.0	2.0	2.4	1.3
	Hardness (mg/L)	4		52.4	79.9	63.4	64.8	12.1
	Alkalinity (mg/L)	7		54.2	87.8	68.5	70.4	12.4
	Photic Zone (m)	7		3.88	5.20	4.42	4.50	0.49
	Secchi (m)	7		1.03	1.92	1.64	1.58	0.31
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.021	0.021	0.010	0.010	0.000
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.168	0.007	0.040	0.064
	Total Kjeldahl Nitrogen (mg/L)	7		0.393	0.555	0.480	0.465	0.060
	Total Nitrogen (mg/L)[J]	7	<	0.400	0.663	0.490	0.505	0.108
	Dissolved Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.006	0.004	0.004	0.002
	Total Phosphorus (mg/L)	7		0.029	0.040	0.035	0.035	0.004
	CBOD-5 (mg/L)	7	<	2.0	4.2	2.3	2.1	1.2
	Chlorides (mg/L)	7		3.6	8.2	4.4	5.3	1.8
	Biological							
	Chlorophyll a (ug/L)	7		5.07	26.70	21.36	19.03	7.37
	E. coli (mpn/100mL)[J]	3		1	1	1	1	0

Station	Parameter	N		Min	Max	Med	Mean	SD
MITC-3	**Physical**							
	Turbidity (NTU)	7		2.3	5.3	2.7	3.3	1.1
	Total Dissolved Solids (mg/L)	7		80.0	132.0	86.0	98.3	21.2
	Total Suspended Solids (mg/L)	7	<	1.0	4.0	1.0	1.4	1.3
	Hardness (mg/L)	4		41.4	77.6	60.2	59.8	15.1
	Alkalinity (mg/L)	7		43.5	85.9	63.4	64.2	14.8
	Photic Zone (m)	7		3.48	5.33	4.52	4.59	0.61
	Secchi (m)	7		1.36	2.38	1.68	1.75	0.34
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.021	0.021	0.010	0.010	0.000
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.347	0.020	0.100	0.140
	Total Kjeldahl Nitrogen (mg/L)	7		0.244	0.616	0.379	0.396	0.111
	Total Nitrogen (mg/L)[J]	7	<	0.310	0.726	0.408	0.496	0.170
	Dissolved Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.007	0.004	0.004	0.002
	Total Phosphorus (mg/L)	7		0.023	0.030	0.026	0.026	0.003
	CBOD-5 (mg/L)	7	<	2.0	2.8	2.3	1.9	0.9
	Chlorides (mg/L)	7		3.6	8.0	4.2	5.2	1.6
	Biological							
	Chlorophyll a (ug/L)	7		5.07	23.85	13.08	13.88	6.18
	E. coli (mpn/100mL)[J]	3		1	2	1	1	1
MITC-4	**Physical**							
	Turbidity (NTU)	7		2.3	4.2	2.8	3.0	0.7
	Total Dissolved Solids (mg/L)	7		70.0	136.0	82.0	92.3	23.0
	Total Suspended Solids (mg/L)	7	<	1.0	6.0	0.5	1.9	2.2
	Hardness (mg/L)	4		35.3	66.4	53.3	52.1	12.8
	Alkalinity (mg/L)	7		38.9	73.7	58.2	59.9	11.4
	Photic Zone (m)	7		4.15	5.81	5.33	5.14	0.70
	Secchi (m)	7		1.56	2.48	2.01	2.00	0.38
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.021	0.021	0.010	0.010	0.000
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.092	0.004	0.025	0.034
	Total Kjeldahl Nitrogen (mg/L)	7		0.175	0.479	0.350	0.368	0.103
	Total Nitrogen (mg/L)[J]	7	<	0.179	0.516	0.412	0.392	0.110
	Dissolved Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.008	0.004	0.004	0.002
	Total Phosphorus (mg/L)	7		0.017	0.035	0.019	0.021	0.006
	CBOD-5 (mg/L)	7	<	2.0	3.2	1.0	1.3	0.8
	Chlorides (mg/L)	7		2.8	6.2	4.0	4.3	1.2
	Biological							
	Chlorophyll a (ug/L)	7		4.27	18.16	9.61	10.72	4.50
	E. coli (mpn/100mL)[J]	3		1	1	1	1	0

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