

The State of Texas Clean Rivers Program

**Targeted Monitoring in the Cypress Basin:  
Nutrient Study In Lake O' the Pines**

**FINAL REPORT**

Prepared for

**Northeast Texas Municipal Water District  
Hughes Springs, Texas**

for submission to

**Texas Natural Resource Conservation Commission  
Austin, Texas**

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## TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1.0	Introduction	1
2.0	Project Description	1
2.1	Lake Characterization	3
2.1.1	Bathymetric Mapping	3
2.1.2	Hydrographic Characteristics	3
2.1.3	Diurnal Dissolved Oxygen/Temperature Profiles	6
2.2	Nutrient Monitoring	6
2.2.1	Water Column Nutrient Parameters	6
2.2.2	Sediment Nutrient Parameters	6
2.3	Biological Sampling	6
2.3.1	Phytoplankton Samples	6
2.3.2	Net Production Of Periphyton	7
2.3.3	Primary Production	7
2.4	Data Quality Objectives	7
3.0	Results	7
3.1	Lake Characterization	7
3.1.1	Bathymetric Mapping	7
3.1.2	Hydrographic Characteristics	18
3.1.3	Diurnal Dissolved Oxygen/Temperature Profiles	18
3.2	Nutrient Monitoring	18
3.2.1	Water Column Nutrient Parameters	18
3.2.2	Sediment Nutrient Parameters	30
3.3	Biological Sampling	30
3.3.1	Phytoplankton Samples	30
3.3.2	Net Production Of Periphyton	30
3.3.3	Primary Production	30
4.0	Conclusions	35
5.0	Literature Cited	36

## LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Cypress Basin – Lake O’ the Pines Study	2
2	Monitoring Station Locations and Bathymetric Mapping Transect Line Locations, Lake O’ the Pines Nutrient Study, August 2-8, 1998.	5
3	Lake Depths (feet) Along Transects Adjusted to Conservation Pool, Lake O’ the Pines Nutrient Study Bathymetric Survey, August 2-8, 1998.	9
4	Secchi Depths (Meters) Along Transects, Lake O’ the Pines Nutrient Study Bathymetric Survey, August 2-8, 1998.	13
5	Surface Dissolved Oxygen (Mg/l) Along Transects, Lake O’ the Pines Nutrient Study Bathymetric Survey, August 2-8, 1998.	14
6	Bottom Dissolved Oxygen (Mg/l) Along Transects, Lake O’ the Pines Nutrient Study Bathymetric Survey, August 2-8, 1998.	15
7	Vegetation Map, Lake O’ the Pines Nutrient Study, August 2-8, 1999.	16
8	Monthly Temperature, Dissolved Oxygen, and pH Profiles for the Dam Station (10296). 5 August 1998 – 18 August 1999.	19
9	Monthly Temperature, Dissolved Oxygen, and pH Profiles for the Longview Intake Station (16156). 5 August 1998 – 18 August 1999.	20
10	Monthly Temperature, Dissolved Oxygen, and pH Profiles for the NETMWD Intake Station (10297). 5 August 1998 – 18 August 1999.	21
11	Monthly Temperature, Dissolved Oxygen, and pH Profiles for the Hurricane Creek Station (16452). 5 August 1998 – 18 August 1999.	22
12	Monthly Temperature, Dissolved Oxygen, and pH Profiles for the Alley Creek Station (16450). 14 August 1998 – 18 August 1999.	23
13	Monthly Temperature, Dissolved Oxygen, and pH Profiles for the Arms/Copeland Creeks Station (16449). 5 August 1998 – 18 August 1999.	24
14	Monthly Temperature, Dissolved Oxygen, and pH Profiles for the Brushy Creek Station (16449). 5 August 1998 – 18 August 1999.	25

## LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Lake O' the Pines Nutrient Study Sampling Stations.	4
2	Lake O' the Pines Nutrient Study Field, Water Nutrient, and Sediment Parameters	4
3	Data Quality Objectives	8
4	Field Measurements at the Fourteen Bathymetric Measurement Transect Stations During the 4-6 August 1998 Study.	10
5	Observation of Vegetation at Lake O' the Pines During the 4-6 August 1998 Bathymetric Mapping Study.	17
6	Lake O' the Pines Nutrient Study Diurnal Dissolved Oxygen and Temperature Profiles. 19-20 February, 26-27 May, 12-13 July, and 16-17 August 1999.	26
7	Lake O' the Pines Nutrient Study Water Column Nutrient Parameters for the Dam and Longview Intake Stations. 14 August 1998 to 18 August 1999.	29
8	Physical Characteristics of the Sediment Cores at Lake O' the Pines, 30-31 August 1999.	31
9	Lake O' the pines Nutrient Study Sediment Parameter Results. 31 August 1999.	32
10	Lake O' the Pines Nutrient Study Primary productivity Results. 16 March, 24 May, 13 July, and 21 August 1999.	33

## LIST OF APPENDICES

A	Bathymetric Mapping Survey Data. 2-8 August 1998.	37
B	Hydrographic Profile Data.	50
C	Diurnal Variation in Dissolved Oxygen and Temperature Profile Data.	62
D	Primary Productivity Data.	77

## **1.0 Introduction**

Lake O' the Pines was placed into operation on 11 December 1959 by the United States Army Corps of Engineers, Fort Worth District, as a part of a comprehensive flood control plan in the Red River Basin (USACOE, 1994). The reservoir is located in the Cypress Basin, on Big Cypress Creek between Lake Bob Sandlin to the west and Caddo Lake to the east (Figure 1). In addition to the primary purpose of flood control, the reservoir provides other public benefits including the development of public use facilities, the conservation of fish and wildlife, and the provision of domestic and industrial water supplies (USACOE, 1994). At the water supply pool level of 228.5 feet mean sea level, the reservoir has a storage capacity of 18,700 acre-feet of water from an 850 square mile drainage area.

Although Lake O' the Pines (Segment 0403) has not been placed on the State of Texas Clean Water Act Section 303(d) list for depressed dissolved oxygen levels, data collected by the Cypress Creek Basin Clean Rivers Program indicates that the shallow, upper portion of the Lake, D.O. measurements below the segment standard occurred in 18.75 percent of surface water quality measurements taken during the five year period of 1994 to 1999. Big Cypress Creek below Lake Bob Sandlin (Segment 0404) has been listed for intermittent but chronic depressed dissolved oxygen levels. One industrial, and eight municipal wastewater treatment facilities located within the Lake O' the Pines watershed provide nutrient loads to its aquatic system. In addition, this watershed is a site of intensive agricultural activity in the form of poultry production operations. Poultry operations effects upon the Lake O' the Pines watershed were studied by the Texas Natural Resource Conservation Commission from November 1997 to August 1998 (TNRCC, 1999). Nutrient loading within a water body stimulates algal production and subsequent bacterial decomposition, which utilizes available dissolved oxygen and reduces its ambient level.

Lake O' the Pines is a primary drinking water source for numerous municipalities within the area and is a regional recreation resource. Concerns have arisen that elevated levels of nutrients entering the reservoir could contribute to increased eutrophication, thus generating taste and odor problems. This study was intended to summarize one year of basic information about Lake O' the Pines, its present nutrient load, and trophic condition for use in system analysis and model building for the Lake O' the Pines System within the scope of the Lake O' the Pines Watershed TMDL program.

The Lake O' the Pines Nutrient Study has taken place through a cooperative program directed by Northeast Texas Municipal Water District (NETMWD) as a part of the Targeted Monitoring tasks in the Cypress Basin Clean Rivers Program. Program participants assisting NETMWD in planning, data collection, analysis, and reporting include Paul Price Associates, Inc. (PPA), Texas Natural Resource Conservation Commission (TNRCC), the Caddo Lake Institute (CLI) and its affiliates, and Steering Committee members.

## **2.0 Project Description**

The field study has focused on obtaining (1) the limnological data necessary to understand basic lake processes, (2) data on nutrient levels, and (3) biological activity in the lake over an annual

cycle. This information will ultimately be used to support the development of a nutrient budget of sufficient accuracy to assess the eutrophication risk of Lake O' the Pines relative to other Figure 1. Cypress Basin.

reservoirs within Cypress Basin and the surrounding area. This information was also intended to provide a background on which to assess data collected on nutrient loadings throughout the Lake O' the Pines watershed.

Eight stations were selected (four within the main lake and four within large coves) to be sampled during this study (Figure 2; Table 1). Sampling of specific stations has occurred on a monthly basis during Fiscal Year 1999 for field and water nutrient parameters, and once for sediment parameters (Table 2). Each individual sampling program is discussed in its respective project descriptions below.

## **2.1 Lake Characterization**

### **2.1.1 Bathymetric Mapping**

Bathymetric mapping was performed during the week of 2-8 August 1998 when fourteen transects were established at approximately 1 mile intervals beginning at the dam and moving upstream to approximately 1 mile above State Highway 155 (Figure 2). From that point, the lake was impassible due to low lake levels and dense aquatic vegetation. Along each transect, depths and vertical profile data (temperature, conductivity, dissolved oxygen, pH, and depth) were taken at three to six equidistant points. Hydrographic characteristic profiles and depths were measured using a YSI 600-XLM Multiparameter probe calibrated according to the TNRCC Surface Water Quality Monitoring Procedures Manual (TNRCC, 1997) and a 20 cm standard Secchi disk.

A Global Positioning Satellite System was employed in an attempt to develop a bathymetric map of Lake O' the Pines to a resolution at least comparable to that on a USGS 7.5 minute Quadrangle map. GPS coordinates were recorded at each bathymetric mapping point and placed on a map to show where the corresponding depths were recorded. Only four of the 14 transects (1,2,6 and 7) were plotted, however, due to problems with the GPS unit memory. The remaining points were estimated from compass bearings to shoreline features and plotted on a map of the reservoir. These transects were not revisited to obtain GPS coordinates because the Texas Water Development Board was in the process of performing a volumetric survey of the Lake utilizing equipment with a higher level of accuracy and precision (TWDB, 1999).

During bathymetric mapping, data were also collected to map the distribution and abundance of submerged and emergent rooted vegetation. The presence/absence of rooted vegetation was established using direct observation. Relative densities of vegetation stands were established using a line-intercept method following the established bathymetric transects. Vegetation mapping was updated quarterly during regular monitoring field trips by visual inspection.

### **2.1.2 Hydrographic Characteristics**

Hydrographic characteristics of Lake O' the Pines were initially documented along the 14 transects by measuring field parameters (dissolved oxygen, temperature, conductivity, pH, depth, and Secchi depth) in vertical profiles at 1.0 m intervals during the 2-8 August 1998 bathymetric mapping survey. Between September and November 1998, field parameter profiles were taken at the dam (10296) and Longview Intake (16156). Profiles were subsequently measured monthly

beginning in December 1998 at all eight stations listed in Table 1. Field parameter profiles and  
 Table 1.

Lake O' the Pines Nutrient Study Sampling Stations

Station Number	Station Location
Lake Stations	
10296	Lake O' the Pines Midlake Near Dam
16156	Lake O' the Pines Near Longview Intake
10297	Lake O' the Pines Near NETMWD Intake
10300	Lake O' the Pines Adjacent to Lone Star Landing
Cove Stations	
16448	Lake O' the Pines in Brushy Creek Cove
16449	Lake O' the Pines in Arms/Copeland Creek Cove
16450	Lake O' the Pines in Alley Creek Cove
16452	Lake O' the Pines in Hurricane Creek Cove

Table 2.

Lake O' the Pines Nutrient Study Field, Water Nutrient, and Sediment Parameters.

Field Parameters	Storet Code
Dissolved Oxygen (mg/L)	00300
Temperature (°c)	00010
Secchi Depth (m)	00078
pH (s.u.)	00400
Conductivity (umhos)	00094
<b>Water Column</b>	
<b>Nutrient Parameters</b>	
Total Phosphorus (mg/L)	00665
Ortho-phosphorus (mg/L)	00671
Total Kjeldahl Nitrogen (mg/L)	00625
Ammonia Nitrogen(mg/L)	00610
Nitrate plus Nitrite(mg/L)	00593
Total Organic Carbon	00680
Chlorophyll <i>a</i> (mg/m3)	32211
Pheophytin <i>a</i> (mg/m3)	32218
<b>Sediment Parameters</b>	
Total Organic Carbon	81951
Total Phosphorus	00668
Total Kjeldahl Nitrogen	00603



Figure 2. Monitoring Station and Bathymetric Transect Locations.

depths were measured using a YSI 600-XLM Multiparameter probe calibrated according to the TNRCC Surface Water Quality Monitoring Procedures Manual (TNRCC, 1997), and a 20 cm standard Secchi disk.

### **2.1.3 Diurnal Dissolved Oxygen/Temperature Profiles**

Diurnal Dissolved Oxygen/Temperature Profiles were collected four times at each of the eight stations on 19-20 February, 26-27 May, 12-13 July, and 16-17 August 1999. The four diurnal sampling studies were conducted in conjunction with the routine nutrient sampling and primary productivity studies to allow for the data to be temporally related. In addition, the diurnal studies were conducted during periods of clear, calm weather to maximize the photosynthetic signal. Vertical profiles of field parameters were taken at all eight stations twice during the first collection event but were subsequently collected four times over a 24-hour period during the last three events. Diurnal data was collected in attempt to capture the maximum diurnal variation at each sampled location using a YSI 600-XLM Multiparameter probe calibrated according to the TNRCC Surface Water Quality Monitoring Procedures Manual (TNRCC, 1997).

## **2.2 Nutrient Monitoring**

### **2.2.1 Water Column Nutrient Parameters**

Water column nutrient parameters listed in Table 2 were collected from the surface and near bottom on a monthly basis from August 1998 to August 1999. The water samples were collected from the two downstream stations located in the main basin of Lake O' the Pines (10296 and 16156) using a horizontal closing water bottle and following the procedures outlined in Chapter 5 of the TNRCC Surface Water Quality Monitoring Procedures Manual (TNRCC, 1997) for the collection of routine water chemistry.

### **2.2.2 Sediment Nutrient Parameters**

Sediment nutrient parameters listed in Table 2 were measured in single core samples collected at each of the eight hydrographic stations on 30-31 August 1999 using an AMS 24" X 1" soil recovery probe and plastic liner. The single core samples collected at each location were frozen on dry ice and transported to the lab for analysis in 2 cm thick sections taken from the surface and from 5 cm, 10 cm, and 20 cm depths.

## **2.3 Biological Sampling**

### **2.3.1 Phytoplankton Samples**

Phytoplankton Samples were to have been collected monthly with a closing water bottle from the surface mixed layer at each hydrographic station, preserved in the field, and returned to the lab for identification, enumeration and biovolume estimation using a Palmer-Maloney counting chamber. However, collections were made with a plankton net having a mesh size too large for phytoplankton. These samples were preserved in a 10% buffered formalin solution and have been stored at the lab. Sample analysis has not been performed.

### **2.3.2 Net Production of Periphyton**

Net production of periphyton was measured once at three locations (10296, 16156, and 10297) by incubating glass slide substrates *in situ* using 10-slide periphytometers. A total of six periphytometers (two at each station) were set out at the three stations listed above on 30 September 1998. On 6 October 1998 four slides were retrieved from each location. Only one periphytometer was found at each location however. Each sample was preserved in glass jars fixed in a 10% buffered formalin solution and returned to the East Texas Baptist University Lab. By the end of the 25 day period only 2 of the six periphytometers were retrieved with four being lost. The remaining quarterly net production studies were abandoned due to the lack of equipment. The recovered slides have not been processed.

### **2.3.3 Primary Production**

Primary production was measured during four separate studies at two main Lake (10296 and 16156) and two cove stations (16449 and 16452) at the same time the Daily Dissolved Oxygen Variation/Temperature Profiles (Section 2.3.2 above) were being measured. An oxygen-based light and dark bottle technique was used based on the procedures outlined in Standard Methods for the Examination of Water and Wastewater Part 1002 I – Plankton Metabolic Rate Measurements (American Public Health Association, 1985). In the oxygen-based light and dark bottle technique, the increase in dissolved oxygen concentration in the light bottle during incubation is a measure of net production while the loss of oxygen in the dark bottle is an estimate of respiration.

## **2.4 Data Quality Objectives**

The data quality objectives and performance measurement criteria are described within Section A-7 of the Cypress Creek Basin Clean Rivers Program Quality Assurance Project Plan. One aspect of the data quality objectives is completeness. Completeness of the data is basically a relationship of how much of the data is available for use compared to the total potential data. Ideally, 100% of the data should be available. However, the possibility of unavailable data due to accidents, insufficient sample volume, broken or lost samples, etc. is to be expected. Therefore, it will be a general goal of the project(s) that 90% data completion is achieved. Table 3 lists the data completeness information obtained during this study.

## **3.0 Results**

### **3.1 Lake Characterization**

#### **3.1.1 Bathymetric Mapping**

Table 4 presents the profile measurements (temperature, dissolved oxygen, pH, conductivity, and Secchi depth) taken at the fourteen transects during August 1998. At the time of the survey, Lake O' the Pines was down 1.7 feet from the conservation pool level of 228.5 feet mean sea level to

226.8 feet msl and the depths presented in Figure 3 and Table 4 have been adjusted accordingly to show the depths if the reservoir was at conservation pool level. In general, the bathymetry of the lake is typical of a man-made storage reservoir in Texas, in that it is deeper toward the dam, within the historic stream channel, than it is either upstream or within the

Table 3.  
Data Quality Objectives

Parameter	Possible Samples	Samples Obtained	Percent Completeness
Bathymetric Map GPS	66	21	31.8
Bathymetric Profiles	66	66	100
Bathymetric Station Sediment Characteristics	66	0	0
GPS Vegetation Boundaries	4	0	0
Vegetation Relative Densities	4	4	100
Vegetation Samples	5	0	0
Hydrographic Profiles	96	78	81.3
Diurnal Dissolved Oxygen	128	112	87.5
Water Column Nutrients	48	48	100
Sediment Nutrients and Characteristics	8	8	100
Phytoplankton	96	0	0
Net Production of Periphyton	120	0	0
Primary Production	184	182	98.9

Figure 3. Lake Depths Adjusted to Conservation Pool Level of 228.5 Feet MSL

Table 4.  
Field Measurements at the Fourteen Bathymetric Measurement Transect Stations  
During the 2-8 August 1998 Study.

Transect	Station #	Measured Depth (m)	Depth (m)*	Depth (ft)*	Surface Temperature (°C)	D.O. at Surface (mg/L)	D.O. at Bottom (mg/L)	Surface pH (s.u.)	Surface Conductivity (µmhos)	Secchi (m)
1	1	1.68	2.1	6.8	30.8	3.52	3.52	6.9	161	0.85
	2	8.0	8.4	27.5	31.0	5.59	0.17	7.1	157	0.73
	3	8.4	8.8	28.8	31.2	5.9	0.2	7.3	140	0.71
	4	6.7	7.1	23.2	31.2	6.7	0.2	7.4	137	0.81
	5	5.9	6.3	20.6	31.2	5.9	0.5	7.1	140	0.71
2	1	0.65	1	3.4	31.7	6.3	6.2	7.1	141	>0.65
	2	4.4	4.8	15.7	31.3	5.6	0.5	7.1	141	0.75
	3	6.8	7.2	23.5	31.3	5.9	0.2	7.1	141	0.94
	4	9.3	9.7	31.8	31.5	6.7	0.2	7.4	141	0.78
	5	5.8	6.2	20.3	31.8	6.8	0.2	7.4	140	0.85
3	1	1.2	1.6	5.1	31.4	5.8	5.6	7.0	142	0.82
	2	6.0	6.4	20.9	31.4	5.5	1.9	7.1	144	0.73
	3	6.8	7.2	23.5	31.7	6.7	0.2	7.2	143	0.71
	4	7.6	8	26.1	31.5	7.2	0.2	7.5	143	0.74
	5	7.4	7.8	25.5	31.4	6.1	0.2	7.2	143	0.92
	6	2.8	3.2	10.4	31.9	5.9	3.9	7.1	143	0.78
4	1	5.4	5.8	18.9	30.8	5.7	4.3	7.0	145	0.75
	2	5.5	5.9	19.3	30.8	5.9	0.2	7.2	144	0.71
	3	6.6	7	22.9	30.8	5.7	4.2	7.1	145	0.91
	4	7.9	8.3	27.1	30.8	5.8	0.1	7.1	143	0.86
5	1	3.4	3.8	12.4	30.6	6.1	5.4	7.1	144	0.75
	2	5.2	5.6	18.3	30.7	6.1	0.2	7.2	144	0.71
	3	6.1	6.5	21.2	30.5	5.5	0.2	7.0	143	0.86
	4	4.7	5.1	16.6	30.6	4.9	4.0	7.0	145	0.79
6	1	2.6	3	9.8	32.0	7.6	5.0	7.9	145	0.91
	2	3.6	4	13.1	32.3	7.7	1.4	8.0	145	0.85
	3	6.0	6.4	20.9	32.2	7.5	0.2	7.7	145	0.71
	4	6.4	6.8	22.2	30.4	5.4	4.2	7.0	144	0.54
	5	4.4	4.8	15.6	30.6	5.9	5.4	7.1	144	0.70
	6	5.3	5.7	18.6	30.6	5.5	2.7	7.1	144	0.75
7	1	1.8	2.2	7.1	32.2	8.5	8.2	8.5	143	0.95
	2	4.9	5.3	17.3	31.9	8.6	0.2	8.5	145	0.78
	3	5.7	6.1	19.9	32.0	7.7	0.4	8.2	145	0.85
	4	3.1	3.5	11.4	32.2	7.9	5.2	8.0	145	0.65
	5	4.2	4.6	15	31.9	7.5	0.2	7.7	145	0.71
8	1	1.0	1.4	4.5	33.7	9.6	8.3	8.7	148	0.96
	2	4.4	4.8	15.6	32.0	9.5	0.3	8.7	147	0.75
	3	4.7	5.1	16.6	31.7	9.3	4.2	8.6	147	0.68
	4	3.3	3.7	12	33.1	8.1	0.2	8.0	146	0.74
9	1	0.8	1.2	3.8	29.5	7.1	7.0	7.0	150	0.75
	2	2.0	2.4	7.8	29.5	6.1	5.7	7.0	150	0.99
	3	3.5	3.9	12.7	29.5	6.2	1.5	7.0	152	0.87
	4	3.8	4.2	13.7	29.8	6.7	0.2	7.0	151	0.91
	5	3.8	4.2	13.7	30.0	6.3	3.8	7.0	151	0.77

\* depths adjusted for conservation pool elevation, with a correction factor of 1.7'

Table 4 (Concluded)  
 Field Measurements at the Fourteen Bathymetric Measurement Transect Stations  
 During the 2-8 August 1998 Study.

Transect	Station #	Measured Depth (m)	Depth (m)*	Depth (ft)*	Surface Temperature (°C)	D.O. at Surface (mg/L)	D.O. at Bottom (mg/L)	Surface pH (s.u.)	Surface Conductivity (µS/cm)	Secchi (m)
10	1	2.6	3	9.7	29.9	6.4	5.9	7.0	152	0.81
	2	3.3	3.7	12	29.5	7.1	5.3	7.0	152	0.81
	3	3.1	3.5	11.4	29.3	6.2	5.6	7.0	152	0.80
	4	2.2	2.6	8.4	29.1	6.9	6.8	7.0	152	0.70
	5	2.6	3	9.7	29.3	6.5	6.1	7.0	152	0.68
11	1	1.0	1.4	4.5	32.6	8.4	5.7	7.6	149	0.80
	2	2.4	2.8	9.1	32.8	8.6	4.0	8.1	148	0.77
	3	2.0	2.4	7.8	32.3	8.6	4.6	8.1	147	0.79
	4	3.6	4	13	32.0	7.9	4.3	7.5	149	0.68
12	1	1.5	1.9	6.1	29.3	3.5	3.9	6.5	163	0.82
	2	1.6	2	6.5	29.0	5.2	4.5	6.6	162	0.91
	3	1.8	2.2	7.1	28.6	5.4	4.7	6.6	160	0.82
	4	3.0	3.4	11.1	29.0	5.6	4.8	6.6	156	0.94
	5	1.5	1.9	6.1	28.9	5.4	4.3	6.6	154	0.98
13	1	4.1	4.5	14.7	29.3	4.2	3.7	6.5	150	0.76
	2	2.1	2.5	8.1	28.6	4.3	3.9	6.6	166	0.68
	3	0.8	1.2	3.8	28.0	4.1	4.0	6.5	163	0.57
14	1	0.6	1	3.2	27.7	4.0	4.0	6.8	263	0.45
	2	1.6	2	6.5	28.2	4.1	2.7	6.9	251	0.55
	3	3.6	4	13	29.2	3.7	0.2	6.8	210	0.64
	4	0.8	1.2	3.8	28.2	4.7	4.3	6.7	221	0.42
	5	1.3	1.7	5.5	28.6	5.0	0.2	6.7	191	0.55



tributary coves. Appendix A presents the raw data collected during the August 1998 mapping study.

Surface temperatures were very high during August with most locations having values in the range of 33 – 34 °C (Table 4). Temperature differences of 3 – 4 °C from the surface to bottom were seen at a few sites. Temperatures typically fell sharply (~ 1°C) between 0.3 m and 1.0 m, corresponding with the Secchi disk range observations shown on Figure 4. Specific conductance was typically uniform from surface to bottom with values of about 140 µS/cm while pH ranged from 6.0 to 7.5 with some vertical differences noted (Table 4). Dissolved oxygen at the surface was generally in the 5.0 – 7.0 mg/l range with levels below 5.0 mg/l observed within the shallower and vegetated areas of the lake (Figure 5).

Within the deeper areas (depths of 3 meters or greater) of the Lake predominantly associated with the old river channel and near the dam, a zone of anoxia was observed at the bottom but was generally limited to between 10 centimeters and one meter above the bottom substrate (Figure 6).

With respect to vegetation mapping of the reservoir, the initial survey was performed with the bathymetric survey. Figure 7 presents a map of the vegetation observed near State Highway 155 during the August 1998 survey. Table 5 presents the legend for Figure 7. During this survey, aquatic vegetation was most prevalent upstream from transect 13, located downstream from State Highway 155 (See Figure 2 for transect location). Only one area of emergent elephant ears (*Collocasia esculenta*) was observed in a small cove near the north end of transect 3 at Hurricane Creek (downstream from area shown on map).

Between September and November, most emergent vegetation had been frozen by several fall storms and had died back. No map was developed for these sampling periods. In November, visual inspection of the area around SH 155 appeared essentially free of the emergent vegetation which had covered the small islands and shoreline during the summer months. Some Hydrilla was observed below the water surface, but densities were severely reduced due to the freezing temperatures. Similar observations were observed during the January survey. During May, vegetation observations revealed that Hydrilla and other aquatic macrophytes had increased in densities and reached surface levels.

Aquatic vegetation at Lake O' the Pines was visually inspected again during August, 1999. Hydrilla and other macrophytes had apparently reached full seasonal growth. Macrophyte coverage in the lake upstream and downstream from the SH 155 bridge appeared to be greater than during the summer of 1998, although lake levels and rainfall amounts were similar between the 1998 and 1999 summer time periods. No map was produced for this inspection. Vegetation in other parts of the lake appeared similar to that found between the two years.

Figure 4. Secchi Depths in Meters along Transects

Figure 5. Surface Dissolved Oxygen

Figure 6. Bottom Dissolved Oxygen.

Figure 7. Vegetation Map.

Table 5. Figure 7 Legend  
 Observations of Vegetation at Lake O' the Pines During  
 the 2-8 August 1998 Bathymetric Mapping Study.

Map #	Vegetation Description
1	Immediately downstream from Transect 13, vegetation began to be observed surrounding a small exposed island adjacent to the boat lane. The vegetation extended out 10 to 15 feet from the island and was predominantly Hydrilla ( <i>Hydrilla verticillata</i> ) with Pondweed ( <i>Potamogeton</i> ) sp. observed in small stands.
2	Between the shoreline and the boat lane, small Hydrilla stands were observed out to 10 feet from the shoreline.
3	Within the small cove containing the County Park Boat Ramp, elephant ears ( <i>Collocacia esculenta</i> ), Hydrilla, and yellow waterlilies ( <i>Nymphaea mexicana</i> ) were observed.
4	Along the south bank of the reservoir between the cove County Park cove and the State Highway 155 embankment, elephant ears, pondweed, and water lilies were observed in low densities to between 25 and 50 feet from the bank. Small amounts of Hydrilla were also observed in this area.
5	Between the shoreline vegetation and the boat lane, Hydrilla was observed but was very sparse.
6	Adjacent to the boat lane on the south side, the Hydrilla became very dense.
7	Large shallow area with very dense Hydrilla north of the boat lane.
8	Large shallow area with very sparse Hydrilla extending north of the dense stand.
9	Dense Hydrilla was found along the north shore upstream from the State Highway 155 embankment out to 10 feet from the bank.
10	Very dense stand of water lilies on the north side of the point and were consistently out to 25 feet from the bank with Hydrilla observed where the lilies were not growing. Behind the small island to the east and south, water lilies were observed covering the water all the way to the shoreline. Hydrilla was observed in low densities in the deeper water behind the island.
11	Within this area, the water was very shallow and numerous (counted 14) small islands have emerged. Water lilies and Hydrilla were observed surrounding all of them.
12	Large shallow area with very dense attached filamentous algae
13	Upstream from the intake pump station, Hydrilla and water cress ( <i>Nasturtium</i> sp.) were found on the banks out to 10 feet from shore
14	Thick stands of Hydrilla 10 to 20 feet wide was observed lining the boat lane.
15	Very little vegetation was observed along the boat lane but Hydrilla was sparse out to 5 feet. No vegetation was observed outside of this area to the banks.
16	South and west of the boat lane dense Hydrilla was observed extending to the large island and approximately half way to the south shore.
17	The south bank upstream from the State Highway embankment was lined with elephant ears, pondweed, and water lilies were observed in low densities to between 25 and 50 feet from the bank. Small amounts of Hydrilla were also observed in this area.
18	Surrounding the large charted island was numerous smaller exposed areas due to the low water levels. All exposed areas were surrounded by water lilies along the shallower banks with moderately dense Hydrilla found deeper.

### **3.1.2 Hydrographic Characteristics**

Profiles of dissolved oxygen, pH, and temperature are plotted by station and by sampling date in Figures 8-14 and Appendix B. Conductivity values were not plotted but are included in Appendix B. The Lone Star Boat Ramp station (10300) is not included because shallow depths in this reach of the lake did not allow for profiles to be obtained. Data from this station is included in Appendix B. In general, dissolved oxygen and temperature indicated that stratification was occurring during the August-September 1998 period and beginning in April-May 1999. The fall/winter sampling data indicate that the lake is well mixed. Conductivity and pH levels, vary slightly by month but typically remain vertically consistent at each station.

### **3.1.3 Diurnal Variation in Dissolved Oxygen / Temperature Profiles**

The results from the four diurnal dissolved oxygen and temperature profile surveys is presented in Table 6 and Appendix C. Profiles were taken at all eight stations during the four surveys. As expected lower dissolved oxygen and temperatures were observed during the morning profiles. During the first diurnal survey, samples were collected twice during the 24-hour period. The three subsequent sampling events were sampled four times throughout the 24-hour period as described in the 1997 TNRCC SWQM Procedures Manual.

The surface water temperatures ranged from 11.7 to 15.9 °C) during the February 1999 study. Recent storms and wind had mixed the lake from top to bottom as indicated by the profile data (Appendix C). When only the surface (0.3 m depth) values are considered, the mean dissolved oxygen drop was 0.5 mg/l for all eight stations with all dissolved oxygen concentrations ranging from 8.7 – 10.2 mg/l. Surface water temperatures in May were warmer (24.3 – 28.4 °C) with lower dissolved oxygen concentrations ranging from 4.9 to 9.2 mg/l. The average 24-hour drop in dissolved oxygen at the surface was 2.7 mg/l with the low reading typically occurring during the 10:00 to 12:00 time range. Only one dissolved oxygen measurement below 5.0 mg/l was observed during this study which occurred at the Lone Star Boat Ramp Station at 10:15 (4.9 mg/l). Surface temperatures in July ranged from 28.1 to 33.3 °C with dissolved oxygen concentrations ranging from 2.4 to 8.8 mg/l. The average 24-hour drop in dissolved oxygen was 1.2 with the typical low period being from 10:00 to 12:00. The Lone Star Boat Ramp station exhibited very low dissolved oxygen values (2.4 – 3.0 mg/l) during all four sample times during this July study. During August the surface temperatures ranged from 28.2 to 33.4 °C with dissolved oxygen concentrations ranging from 3.2 to 8.3 mg/l. The average 24-hour drop in dissolved oxygen was 2.4 mg/l with the lowest concentrations occurring during the 05:00 to 10:00 time period. Again, the Lone Star Boat Ramp station exhibited low dissolved oxygen concentrations ranging from 3.2 to 5.6 mg/l and three of the measurements below 5.0 mg/l.

## **3.2 Nutrient Monitoring**

### **3.2.1 Water Column Nutrient Parameters**

The water quality nutrient parameter results are presented in Table 7. Total phosphorus, Nitrate-Nitrite nitrogen, and Total Kjeldahl nitrogen peaks were observed between December and April. Ammonia-nitrogen and Chlorophyll a were observed to generally decline during these months

although levels were sporadic throughout the sampling period. All ortho-phosphate results were reported at levels lower than the minimum analytical levels with the

















Table 6.  
 Lake O' the Pines Nutrient Study Diurnal Dissolved Oxygen and Temperature Profiles.  
 19-20 February, 26-27 May, 12-13 July, and 16-17 August 1999.

Station	Station ID	Time	Surface Dissolved Oxygen (mg/l)	Temperature (°C)
<b>19-20 February 1999</b>				
Dam	10296	15:57	9.8	14.9
		6:55	9.1	13.4
Longview Intake	16156	16:34	10.2	15.4
		7:30	9.3	13.6
NETMWD Intake	10297	17:19	10.0	15.9
		9:02	9.22	12.9
Lone Star Boat Ramp	10300	18:30	9.2	14.4
		4:20	8.7	11.7
Hurricane Creek	16452	15:30	9.4	14.4
		6:40	9.4	13.5
Alley Creek	16450	15:41	9.6	14.8
		8:03	8.7	13.5
Brushy Creek	16448	16:18	9.7	15.7
		7:14	9.7	13.9
Arms/Copeland Creeks	16449	16:52	9.9	15.5
		7:14	9.6	13.5
<b>26-27 May 1999</b>				
Dam	10296	18:00	8.7	27.5
		0:35	7.7	26.6
		7:05	6.1	25.6
		12:05	5.3	25.5
Longview Intake	16156	17:10	9.2	27.6
		23:40	8.6	26.4
		6:20	7.4	25.9
		11:10	6.7	25.9
NETMWD Intake	10297	16:30	7.7	27.9
		22:55	5.0	26.0
		5:45	5.6	25.7
		10:35	5.5	26.1
Lone Star Boat Ramp	10300	16:00	7.7	25.2
		22:30	5.9	25.5
		5:30	5.4	24.6
		10:15	<b>4.9</b>	24.3
Hurricane Creek	16452	18:20	9.2	28.4
		1:00	7.9	27.3
		7:25	6.5	26.6
		12:25	6.6	27.0
Alley Creek	16450	18:40	8.9	27.6
		23:25	8.2	27.1
		6:10	7.0	26.5
		11:00	6.4	26.5



Table 6. (Continued)

Station	Station ID	Time	Surface Dissolved Oxygen (mg/l)	Temperature (°C)
Brushy Creek	16448	15:45	8.9	27.4
		0:15	7.8	26.7
		6:50	7.1	26.3
		11:50	6.4	26.2
Arms/Copeland Creeks	16449	17:25	9.1	27.2
		23:50	8.0	26.4
		6:30	7.2	26.0
		11:25	6.4	25.9
<b>12-13 July 1999</b>				
Dam	10296	12:00	7.5	30.2
		17:55	8.0	32.3
		23:50	8.0	31.0
		6:45	7.7	29.7
Longview Intake	16156	11:15	7.0	30.0
		17:15	8.3	30.6
		0:46	8.3	30.3
		6:05	6.4	29.5
NETMWD Intake	10297	10:15	5.4	29.7
		16:30	7.3	33.3
		20:15	6.3	31.1
		5:15	7.2	30.5
Lone Star Boat Ramp	10300	9:45	<b>2.4</b>	28.4
		16:15	<b>3.3</b>	28.9
		22:00	<b>3.0</b>	29.0
		5:00	<b>2.6</b>	28.1
Hurricane Creek	16452	12:20	7.0	31.1
		18:15	7.9	33
		0:15	7.7	31.4
		7:05	7.1	30.2
Alley Creek	16450	12:50	7.3	31.3
		18:40	8.8	32.9
		1:05	8.2	31.5
		7:35	7.7	30.3
Brushy Creek	16448	11:35	7.5	29.8
		17:35	8.2	33.1
		23:25	8.2	31.4
		6:25	7.5	29.6
Arms/Copeland Creeks	16449	11:00	7.6	29.9
		17:00	8.8	31.6
		22:55	8.3	30.8
		5:50	7.1	29.4
<b>16-17 August 1999</b>				
Dam	10296	12:05	6.2	31.1
		17:55	7.3	32.6
		23:55	6.3	31.5

**Table 6. (Concluded)**

<b>Station</b>	<b>Station ID</b>	<b>Time</b>	<b>Surface Dissolved Oxygen (mg/l)</b>	<b>Temperature (°C)</b>
		6:20	<b>4.9</b>	30.4
Longview Intake	16156	11:30	6.5	31.3
		17:15	8.4	33.4
		23:15	7.3	31.2
		5:45	5.5	30.6
NETMWD Intake	10297	10:35	6.7	30.2
		16:30	8.1	31.7
		22:25	7.0	31.8
		4:50	5.5	30.4
Lone Star Boat Ramp	10300	10:10	<b>3.2</b>	28.2
		16:10	5.6	29.3
		22:00	<b>3.6</b>	28.4
		4:30	<b>3.8</b>	27.5
Hurricane Creek	16452	12:30	7.0	31.2
		18:15	6.7	32.6
		0:20	6.4	31.6
		6:40	5.0	30.6
Alley Creek	16450	12:50	7.2	32.3
		18:40	7.5	32.9
		0:45	6.9	31.3
		7:05	<b>4.3</b>	30.7
Brushy Creek	16448	11:50	6.9	32
		17:35	8.3	33.2
		23:25	7.1	32.1
		6:05	5.0	31
Arms/Copeland Creeks	16449	11:10	7.1	31.3
		17:00	8.3	33.1
		23:00	7.5	31.5
		5:30	5.5	30.7

Table 7.  
 Lake O' the Pines Nutrient Study Water Column Nutrient Parameters  
 from the Dam and Longview Intake Stations.  
 14 August 1998 to 18 August 1999.

Ammonia -N mg/l					Chlorophyll -mg/m3				
Station	Dam		Longview		Station	Dam		Longview	
Station ID	10296		16156		Station ID	10296		16156	
	Surface	Bottom	Surface	Bottom		Surface	Bottom	Surface	Bottom
08/14/98	0.12	0.17	0.086	0.12	8/14/1998	16.0	10.6	20.0	16.0
09/30/98	0.12	0.14	0.049	0.15	9/30/1998	14.0	7.1	12.0	11.0
11/11/98	0.15	0.17	0.10	0.05	11/11/1998	12.0	14.0	17.0	21.0
12/16/98	0.020	0.023	<0.02	0.050	12/16/1998	<2	<2	4.0	<2
01/18/99	0.11	0.11	0.11	0.13	1/18/1999	8.0	<2	5.3	8.6
02/13/99	0.073	0.091	0.11	0.12	2/13/1999	10.7	5.3	9.3	<2
03/15/99	0.073	0.052	0.12	0.11	3/15/1999	1	2.7	5.3	8.0
04/10/99	0.12	0.13	0.14	0.13	4/10/1999	5.3	5.3	26.0	16.0
05/18/99	0.12	0.200	0.12	0.16	5/18/1999	10	<2	13	6.7
06/16/99	0.1	0.130	0.04	0.2	6/16/1999	10	8	16	6.7
07/14/99	0.052	0.110	0.052	0.11	7/14/1999	15	8	12	8
08/18/99	0.089	0.135	0.08	0.118	8/18/1999	13	17	<2	<2
Nitrate-Nitrite N mg/l					Pheophyton mg/m3				
08/14/98	<0.04	<0.04	<0.04	<0.04	8/14/1998	4.5	5.5	2.4	5.5
09/30/98	<0.02	0.122	<0.02	0.13	9/30/1998	<2.0	12.0	3.0	8.0
11/11/98	0.0532	0.204	0.0378	0.0261	11/11/1998	2.9	<2.0	3.2	130
12/16/98	0.092	0.111	0.145	0.0857	12/16/1998	3.3	5.6	2.5	4.3
01/18/99	0.629	0.173	0.910	0.304	1/18/1999	4.1	14	5.9	<2.0
02/13/99	0.148	0.181	0.197	0.268	2/13/1999	<2.0	4.5	<2.0	5.2
03/15/99	0.133	0.134	0.147	0.151	3/15/1999	13.0	16.0	5.9	6.9
04/10/99	0.0642	0.0816	0.0527	0.155	4/10/1999	9.6	7.7	<2.0	<2.0
05/18/99	0.035	0.036	<0.02	<0.02	5/18/1999	<2.0	5.1	<2.0	2.7
06/16/99	<0.02	<0.02	<0.02	<0.02	6/16/1999	2.6	<2.0	<2.0	<2.0
07/14/99	<0.02	<0.02	<0.02	<0.02	7/14/1999	<2.0	<2.0	<2.0	<2.0
08/18/99	<0.02	<0.02	<0.02	<0.02	8/18/1999	<2.0	<2.0	20.0	9.9
Total Kjeldahl N mg/l					Total Phosphorus -mg/L				
08/14/98	0.62	0.53	0.6	0.68	8/14/1998	<0.2	<0.2	<0.2	<0.2
09/30/98	1.5	0.89	0.79	0.68	9/30/1998	<0.1	<0.1	<0.1	<0.1
11/11/98	0.93	0.55	0.51	0.36	11/11/1998	0.03	0.03	0.02	0.03
12/16/98	0.50	0.46	0.53	0.47	12/16/1998	0.4	0.4	0.4	0.4
01/18/99	0.56	0.48	0.64	0.51	1/18/1999	0.3	0.3	0.5	0.5
02/13/99	0.71	0.52	0.53	1.5	2/13/1999	<0.1	0.2	<0.1	<0.1
03/15/99	0.62	0.6	2.3	0.73	3/15/1999	0.1	<0.1	<0.1	<0.1
04/10/99	0.33	0.14	0.54	0.45	4/10/1999	<0.1	<0.1	<0.1	<0.1
5/18/1999	0.45	0.5	0.45	0.5	5/18/1999	<0.1	<0.1	0.1	0.1
6/16/1999	0.59	0.21	0.29	0.56	6/16/1999	<0.1	0.2	<0.1	0.1
7/14/1999	0.55	0.44	0.5	0.82	7/14/1999	<0.1	<0.1	<0.1	<0.1
8/18/1999	0.421	0.438	0.427	0.106	8/18/1999	<0.1	<0.1	<0.1	<0.1

exception of the 24 May 1999 bottom sample at the Dam (10296) station. This result was reported at 0.02 mg/l which was at the minimum analytical level.

### **3.2.2 Sediment Nutrient Parameters**

The qualitative and quantitative sediment parameter results are presented in Tables 8 and 9, respectively. The qualitative results generally show that the sediments at the eight stations are light to medium gray silt and sand. Dark black sediments were observed at the Longview Intake Station from the surface down to 0.5 inches and shell fragments were observed at the NETMWD Intake Station. No odors were found at any of the eight stations.

## **3.3 Biological Sampling**

### **3.3.1 Phytoplankton Samples**

Although phytoplankton samples were collected during the monthly water quality nutrient samples, these were collected using a plankton tow with 80 micron mesh size instead of the recommended closing water bottle. These samples are currently stored at the ETBU lab and awaiting analysis.

### **3.3.2 Net Production of Periphyton**

The periphyton samples collected during the only periphytometer study are currently stored at the ETBU lab and awaiting analysis.

### **3.3.3 Primary Production**

The results from the primary production studies are presented in Table 10 and Appendix D. In general, the levels of net primary production typically appeared highest within the middle (1m) depth zone when compared by depth zones. In July, the dam station appeared to have an inversion of primary productivity where the lowest depth (3 m) exhibited the highest level of productivity.

During the March 16, 1999 study, dissolved oxygen levels stayed the same or increased during the four hour incubation period within seven of the 12 dark reactions. This indicates that the reaction chambers were not entirely light inhibiting. These reactions occurred at the Hurricane Creek, Dam, and Longview Intake Stations. Within the light reaction chambers, a decrease in dissolved oxygen was observed in five bottles one bottle lost.

Table 8.  
Physical Characteristics of the Sediment Cores at Lake O' the Pines,  
30-31 August 1999.

<b>Date</b>	<b>Time</b>	<b>Station ID</b>	<b>Station</b>	<b>Core Length (inches)</b>	<b>Distinct # of Color Layers</b>	<b>Color</b>	<b>Odor</b>	<b>Grain Size</b>	<b>Detritus/ Organisms</b>
08/30/99	18:20	10300	Lone Star Boat Ramp	15	3	0-1" – Light Gray 1-9" – Very Light Gray 9-15" – Sandy Brown	None Observed	Uniform Fine Silt	None Observed
08/30/99	19:00	10297	NETMWD Intake	12	1	Uniform Light Gray	None Observed	Fine Silt with Shell Fragments	Shell Fragments at Surface
08/30/99	19:45	16449	Arms/ Copeland Cr.	15	1	Uniform Medium Gray	None Observed	Silt and Sand	None Observed
08/30/99	20:30	16450	Alley Creek	13	2	0-5" - Light Gray 5-13" - Medium Gray	None Observed	Silt and Sand	None Observed
08/31/99	11:30	16156	Longview Intake	8	2	0-0.5" - Dark Black 0.5-8" - Sandy Brown	None Observed	Silt and Sand	None Observed
08/31/99	11:45	16448	Brushy Creek	15	3	0-1" - Light Gray 1-9" - Dark Gray 9-15" - Sandy Brown	None Observed	Sand	None Observed
08/31/99	12:10	10296	Dam	9	1	Uniform Medium gray	None Observed	Silt	None Observed
08/31/99	12:30	16452	Hurricane Creek	16	2	0-8" - Medium to Dark Gray 8-16" - Light Gray	None Observed	Silt	None Observed

Table 9.  
 Lake O' the Pines Nutrient Study Sediment Parameter Results.  
 31 August 1999 – 1 September 2000.

Station	Core Depth (cm)	TOC* (mg/kg)	Nitrate-Nitrite* (mg/kg)	TKN* (mg/kg)	TP* (mg/kg)	Total Solids (%)
Dam (10296)	Surface	5400	<0.719	127	59	55.6
	5 cm	<1230	<0.492	59	40	81.3
	10cm	17500	<0.5	208	100	80
	20cm	12100	<0.483	275	66	82.9
Longview Intake (16156)	Surface	28200	<0.868	462	100	46.1
	5 cm	16700	<0.477	228	63	83.9
	10cm	8640	<0.494	344	98	81
	20cm	7870	<0.525	381	110	76.2
NETMWD Intake (10297)	Surface	123000	<8.21	1790	950	4.87
	5 cm	8810	<0.503	211	49	79.5
	10cm	10500	<0.526	422	150	76.1
	20cm	7110	<0.474	150	280	84.4
Lone Star Boat Ramp (10300)	Surface	10600	<0.532	795	140	75.2
	5 cm	19600	<0.522	407	200	76.6
	10cm	19100	<0.508	243	150	787
	20cm	17400	<0.535	559	140	74.8
Hurricane Creek (16452)	Surface	12400	<0.621	424	98	64.4
	5 cm	25800	<0.492	266	62	81.3
	10cm	10600	<0.472	196	83	84.7
	20cm	<1160	<0.464	399	31	86.2
Alley Creek (16450)	Surface	84300	<2.25	3560	510	17.8
	5 cm	47200	<0.858	2420	490	46.6
	10cm	40100	<0.729	1340	320	54.9
	20cm	16400	<0.547	550	270	73.1
Brushy Creek (16448)	Surface	32500	<1.63	878	230	24.6
	5 cm	13500	<0.538	657	90	74.3
	10cm	8280	<0.473	146	100	84.5
	20cm	7880	<0.450	94.7	34	88.8
Arms/Copeland Creeks (16449)	Surface	9950	<0.995	381	200	40.2
	5 cm	2550	<0.510	177	140	78.4
	10cm	13400	<0.535	281	280	74.7
	20cm	14000	<0.559	284	210	71.5

\* Reported on a Dry Weight Basis

Table 10.  
Lake O' the Pines Nutrient Study Primary Productivity Results.  
16 March, 24 May, 13 July, and 21 August 1999.

Station	Depth (m)	Net Production (mg carbon fixed / m <sup>3</sup> / 4 hours)	Light Bottle Dissolved Oxygen Gain/Loss (mg/l / 4 hours)	Gross Production (mg carbon fixed / m <sup>3</sup> / 4 hours)	Dark Bottle Dissolved Oxygen Gain/Loss (mg/l / 4 hours)
<b>March 16, 1999</b>					
Hurricane Creek (16452)	0.5	487.5	1.3	37.5	-1.2
	1.0	590.6	1.6	581.3	0.0
	2.0	159.4	0.425	131.3	-0.1
Dam (10296)	0.5	243.8	0.65	187.5	-0.2
	1.0	131.3	0.35	168.8	0.1
	2.0	-9.4	-0.025	112.5	0.3
Longview Intake (16156)	0.5	187.5	0.5	187.5	0.0
	1.0	206.3	0.55	206.3	0.0
	2.0	103.1	0.275	318.8	0.6
Arms/Copeland (16449)	0.5	-121.9	-0.325	75.0	0.5
	1.0	-515.6	-1.375	337.5	2.3
	2.0	-459.4	-1.225	18.7	1.3
<b>May 24, 1999</b>					
Hurricane Creek (16452)	0.5	215.6	-0.575	206.3	0.0
	1.0	150.0	0.4	112.5	-0.1
	3.0	103.1	0.275	37.5	-0.2
Dam (10296)	0.5	56.3	0.15	75.0	0.0
	1.0	112.5	0.3	131.3	0.0
	3.0	-103.1	-0.275	0.0	0.3
Longview Intake (16156)	0.5	65.6	0.175	168.8	0.3
	1.0	75.0	0.2	112.5	0.1
	3.0	-56.2	-0.15	206.3	0.7
Arms/Copeland (16449)	0.5	-56.2	-0.15	168.8	0.6
	1.0	56.3	0.15	131.3	0.2
	3.0	28.1	0.075	131.3	0.3
<b>July 13, 1999</b>					
Hurricane Creek (16452)	0.5	56.2	0.15	93.8	0.1
	1.0	206.3	0.55	262.5	0.2
	3.0	18.7	0.05	112.5	0.3
Dam (10296)	0.5	-487.5	-1.3	-37.5	1.2
	1.0	-9.4	-0.025	56.2	0.2
	3.0	337.5	0.9	318.8	-0.1
Longview Intake (16156)	0.5	37.5	0.1	131.3	0.3
	1.0	112.5	0.3	225.0	0.3
	3.0	37.5	0.1	168.8	0.4
Arms/Copeland (16449)	0.5	84.4	0.225	112.5	0.1
	1.0	103.1	0.275	131.3	0.1
	3.0	9.4	0.025	131.3	0.3

Table 10. (Concluded)

Station	Depth (m)	Net Production (mg carbon fixed / m <sup>3</sup> / 4 hours)	Light Bottle Dissolved Oxygen Gain/Loss (mg/l / 4 hours)	Gross Production (mg carbon fixed / m <sup>3</sup> / 4 hours)	Dark Bottle Dissolved Oxygen Gain/Loss (mg/l / 4 hours)
<b>August 21, 1999</b>					
Hurricane Creek (16452)	0.5	234.4	0.625	281.3	0.1
	1.0	168.8	0.45	243.8	0.2
	3.0	0.0	0	56.3	0.2
Dam (10296)	0.5	84.4	0.225	262.5	0.5
	1.0	375.0	1.0	431.3	0.1
	3.0	37.5	0.1	75.0	0.1
Longview Intake (16156)	0.5	234.4	0.625	318.8	0.2
	1.0	131.3	0.35	300.0	0.5
	3.0	0.0	0	75.0	0.2
Arms/Copeland (16449)	0.5	328.1	0.875	356.3	0.1
	1.0	168.8	0.45	262.5	0.3
	3.0	46.9	0.125	112.5	0.2



## **4.0 Conclusions**

This report is not intended to be a self contained assessment on the conditions in Lake O' the Pines but to summarize a one-year database compiled for use in system analysis and model building for the Lake O' the Pines system. Therefore only the obtained data was presented with minimal discussion and conclusions. This information will be analyzed during subsequent project development.

## 5.0 Literature Cited

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**Appendix A.**  
**Bathymetric Mapping Survey Data.**  
**2-8 August 1998.**

**Appendix A.**  
**Bathymetric Mapping Survey Data.**  
**2-8 August 1998.**

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
1	1	1.68	2.1	6.8	30.8	3.52	6.9	161	0.85
	2	1.037	1.4	4.6	31	5.59	7.1	157	0.73
	2	1.1	1.5	4.8	30.6	3.5	6.8	142	
	2	2	2.4	7.8	30.6	4	6.8	137	
	2	3	3.4	11.1	30.1	0.78	6.6	141	
	2	4	4.4	14.4	30.1	0.5	6.6	142	
	2	5	5.4	17.6	30.1	0.36	6.6	144	
	2	6	6.4	20.9	29.8	0.2	6.8	151	
	2	7	7.4	24.2	29	0.18	6.9	157	
	2	8	8.4	27.5	27.6	0.17	7.0	170	
	3	0.3	0.7	2.2	31.2	5.9	7.3	140	0.71
	3	1	1.4	4.5	30.7	3.92	7.1	140	
	3	2	2.4	7.8	30.3	1.99	6.8	140	
	3	3	3.4	11.1	30.2	1.2	6.7	140	
	3	4	4.4	14.4	30.1	0.23	6.7	143	
	3	5	5.4	17.6	30	0.2	6.8	146	
	3	6	6.4	20.9	29.6	0.2	6.9	157	
	3	7	7.4	24.2	28.9	0.2	6.9	160	
	3	8	8.4	27.5	27.6	0.2	7.0	171	
	4	0.29	0.7	2.2	31.2	6.7	7.4	137	0.81
	4	1	1.4	4.5	30.9	5.35	7.2	138	
	4	2	2.4	7.8	30.4	2.5	6.9	138	
	4	3	3.4	11.1	30.3	1.8	6.8	137	
	4	4	4.4	14.4	30.2	1.3	6.7	139	
	4	5	5.4	17.6	30.1	0.4	6.7	143	
	4	6	6.4	20.9	29.4	0.2	6.9	159	

	5	0.3	0.7	2.2	31.2	5.9	7.1	140	0.71
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
1	5	1	1.4	4.5	30.7	5.2	7.1	139	
	5	2	2.4	7.8	30.5	3.4	6.8	141	
	5	3	3.4	11.1	30.3	2.5	6.8	140	
	5	4	4.4	14.4	30.2	1.8	6.7	140	
	5	5	5.4	17.6	30.2	1.3	6.7	141	
	5	5.9	6.3	20.6	29.8	0.5	6.7	164	
2	1	0.3	0.7	2.2	31.7	6.3	7.1	141	>0.65
	1	0.65	1.0	3.4	31.7	6.2	7.2	142	
	2	0.3	0.7	2.2	31.3	5.6	7.1	141	0.75
	2	1	1.4	4.5	31.1	5.2	7.0	142	
	2	2	2.4	7.8	30.8	4.5	6.9	142	
	2	3	3.4	11.1	30.6	3.7	6.8	142	
	2	4	4.4	14.4	30.5	3.14	6.8	142	
	2	4.4	4.8	15.7	30.4	0.5	6.8	152	
	3	0.3	0.7	2.2	31.3	5.9	7.1	141	0.94
	3	1	1.4	4.5	31	5.3	7.0	141	
	3	2	2.4	7.8	30.7	4.6	6.9	140	
	3	3	3.4	11.1	30.7	4.4	6.9	140	
	3	4	4.4	14.4	30.6	4.1	6.8	140	
	3	5	5.4	17.6	30.4	2.1	6.7	140	
	3	6	6.4	20.9	29.5	0.3	6.9	158	
	3	6.78	7.2	23.5	28.2	0.2	7.0	168	
	4	0.3	0.7	2.2	31.5	6.7	7.4	141	0.78
	4	1	1.4	4.5	31.2	6	7.2	140	
4	2	2.4	7.8	31	5.5	7.1	140		
4	3	3.4	11.1	30.8	5.1	7.0	140		
4	4	4.4	14.4	30.7	4.3	6.9	140		
4	5	5.4	17.6	30.4	2.4	6.7	142		
4	6	6.4	20.9	29.2	0.5	6.8	163		

	4	7	7.4	24.2	28.5	0.2	6.9	165	
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
2	4	8	8.4	27.5	27.4	0.2	6.9	170	
	4	9	9.4	30.8	26.9	0.2	7.0	176	
	4	9.3	9.7	31.8	26.5	0.2	7.0	230	
	5	0.3	0.7	2.2	31.8	6.8	7.4	140	0.85
	5	1	1.4	4.5	31.6	6.8	7.4	142	
	5	2	2.4	7.8	31.5	6.7	7.4	142	
	5	3	3.4	11.1	31.3	6.2	7.3	142	
	5	4	4.4	14.4	30.8	5.4	7.1	140	
	5	5	5.4	17.6	29.6	0.5	6.8	150	
	5	5.8	6.2	20.3	29.2	0.2	6.8	159	
3	1	0.3	0.7	2.2	31.4	5.8	7.0	142	0.82
	1	1	1.4	4.5	31	5.8	7.0	142	
	1	1.2	1.6	5.1	30.8	5.6	7.0	142	
	2	0.3	0.7	2.2	31.4	5.5	7.1	144	0.73
	2	1	1.4	4.5	30.5	4.7	7.0	142	
	2	2	2.4	7.8	30.4	5	7.0	143	
	2	3	3.4	11.1	30.3	5.1	6.9	143	
	2	4	4.4	14.3	30.3	5.3	7.0	143	
	2	5	5.4	17.6	30.3	4.7	6.9	143	
	2	6	6.4	20.9	29.5	1.9	6.8	149	
	3	0.3	0.7	2.2	31.7	6.7	7.2	143	0.71
	3	1	1.4	4.5	30.6	5.5	7.1	144	
	3	2	2.4	7.8	30.4	5	7.1	143	
	3	3	3.4	11.1	30.3	4.5	7.0	144	
	3	4	4.4	14.3	30.3	4.8	7.0	144	
3	5	5.4	17.6	30.3	4.8	7.0	143		
3	6	6.4	20.9	30.2	4.8	7.0	143		
3	6.8	7.2	23.5	28.3	0.2	6.9	174		
4	0.3	0.7	2.2	31.5	7.2	7.5	143	0.74	

	4	1	1.4	4.5	30.9	6.3	7.4	143	
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
3	4	2	2.4	7.8	30.4	5.1	7.3	143	
	4	3	3.4	11.1	30.3	4.8	7.2	143	
	4	4	4.4	14.3	30.3	4.7	7.1	143	
	4	5	5.4	17.6	30.3	4.7	7.1	144	
	4	6	6.4	20.9	30.2	4.4	7.0	144	
	4	7	7.4	24.2	28.9	0.2	6.8	167	
	4	7.6	8.0	26.1	28.4	0.2	6.9	175	
	5	0.3	0.7	2.2	31.4	6.1	7.2	143	0.92
	5	1	1.4	4.5	30.4	5.1	7.1	143	
	5	2	2.4	7.8	30.2	4.4	7.0	143	
	5	3	3.4	11.1	30.2	4.1	7.0	144	
	5	4	4.4	14.3	30.2	4.1	7.0	143	
	5	5	5.4	17.6	30.2	4.2	6.9	144	
	5	6	6.4	20.9	30.1	4.3	6.9	144	
	5	7	7.4	24.2	28.9	0.2	6.8	172	
	5	7.4	7.8	25.5	28.4	0.2	6.9	182	
	6	0.3	0.7	2.2	31.9	5.9	7.1	143	0.78
	6	1	1.4	4.5	30.7	5	7.1	144	
	6	2	2.4	7.8	30.4	4.1	7.0	143	
	6	2.8	3.2	10.4	30.4	3.9	6.9	142	
4	1	0.3	0.7	2.2	30.8	5.7	7.0	145	0.75
	1	1	1.4	4.5	30.5	5.1	7.0	145	
	1	2	2.4	7.8	30.4	4.8	7.0	145	
	1	3	3.4	11.1	30.4	4.5	6.9	145	
	1	4	4.4	14.3	30.4	4.5	6.9	145	
	1	5	5.4	17.6	30.4	4.5	6.9	145	
	1	5.4	5.8	18.9	30.4	4.3	6.9	145	
	2	0.3	0.7	2.2	30.8	5.9	7.2	144	0.71
	2	1	1.4	4.5	30.5	5.4	7.1	145	

	2	2	2.4	7.8	30.5	5.2	7.1	145	
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
4	2	3	3.4	11.1	30.4	5	7.0	145	
	2	4	4.4	14.3	30.4	4.9	7.0	145	
	2	5	5.4	17.6	30.4	4.8	7.0	145	
	2	5.5	5.9	19.3	30.4	0.2	6.9	145	
	3	0.3	0.7	2.2	30.8	5.7	7.1	145	0.91
	3	1	1.4	4.5	30.4	4.9	7.1	145	
	3	2	2.4	7.8	30.4	5	7.0	145	
	3	3	3.4	11.1	30.4	4.8	7.0	145	
	3	4	4.4	14.3	30.4	4.9	7.0	145	
	3	5	5.4	17.6	30.3	4.8	7.0	145	
	3	6	6.4	20.9	30.3	4.8	7.0	145	
	3	6.6	7.0	22.9	30.2	4.2	6.9	146	
	4	0.3	0.7	2.2	30.8	5.8	7.1	143	0.86
	4	1	1.4	4.5	30.6	5.2	7.1	143	
	4	2	2.4	7.8	30.5	5.1	7.1	144	
	4	3	3.4	11.1	30.4	5	7.1	144	
	4	4	4.4	14.3	30.4	4.7	7.0	145	
	4	5	5.4	17.6	30.3	4.8	7.0	144	
	4	6	6.4	20.9	30.2	2.8	6.9	145	
4	7	7.4	24.2	29	0.2	6.8	167		
4	7.9	8.3	27.1	28.2	0.1	6.9	217		
4	0.3	0.7	2.2	30.6	6.1	7.1	144		
5	1	1	1.4	4.5	30.5	5.8	7.1	144	0.75
	1	2	2.4	7.8	30.5	5.4	7.1	143	
	1	3	3.4	11.1	30.5	5.4	7.1	143	
	1	3.4	3.8	12.4	30.5	5.4	7.1	143	
	2	0.3	0.7	2.2	30.7	6.1	7.2	144	0.71
	2	1	1.4	4.5	30.5	5.6	7.2	143	
2	2	2.4	7.8	30.5	5.4	7.1	143		



	2	3	3.4	11.1	30.5	5.3	7.1	143	
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
5	2	4	4.4	14.3	30.5	5.4	7.1	143	
	2	5	5.4	17.6	30.5	3.2	7.0	143	
	2	5.2	5.6	18.3	30.3	0.2	7.0	145	
	3	0.3	0.7	2.2	30.5	5.5	7.0	143	0.86
	3	1	1.4	4.5	30.4	5	7.0	144	
	3	2	2.4	7.8	30.3	4.6	7.0	145	
	3	3	3.4	11.1	30.3	4.3	6.9	145	
	3	4	4.4	14.3	30.3	4.2	6.9	146	
	3	5	5.4	17.6	30.2	4.3	6.9	145	
	3	6	6.4	20.9	30.1	3.7	6.8	147	
	3	6.1	6.5	21.2	30.1	0.2	6.8	150	
	4	0.3	0.7	2.2	30.6	4.9	7.0	145	0.79
	4	1	1.4	4.5	30.5	4.5	7.0	146	
	4	2	2.4	7.8	30.5	4.4	7.0	146	
6	1	0.3	0.7	2.2	32	7.6	7.9	145	0.91
	1	1	1.4	4.5	31.4	6.6	7.7	145	
	1	2	2.4	7.8	31	5.4	7.4	145	
	1	2.6	3.0	9.8	31	5	7.2	146	
	2	0.3	0.7	2.2	32.3	7.7	8.0	145	0.85
	2	1	1.4	4.5	31	6.6	7.8	145	
	2	2	2.4	7.8	30.8	5.2	7.4	145	
	2	3	3.4	11.1	30.7	4.9	7.3	146	
	2	3.6	4.0	13.1	30.5	1.4	7.0	146	
	3	0.3	0.7	2.2	32.2	7.5	7.7	145	0.71
	3	1	1.4	4.5	31.4	7.1	7.7	145	
	3	2	2.4	7.8	30.8	5.5	7.4	144	

	3	3	3.4	11.1	30.7	5.1	7.2	144	
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)	
6	3	4	4.4	14.4	30.7	4.8	7.2	144		
	3	5	5.4	17.6	30.6	3.8	7.0	144		
	3	6	6.4	20.9	30.4	0.2	6.7	178		
	4	0.3	0.7	2.2	30.4	5.4	7.0	144	0.54	
	4	1	1.4	4.5	30.3	5.3	7.0	144		
	4	2	2.4	7.8	30.3	5.2	7.0	144		
	4	3	3.4	11.1	30.3	5.2	7.0	145		
	4	4	4.4	14.3	30.3	5.1	7.0	144		
	4	5	5.4	17.6	30.3	5.1	7.0	145		
	4	6	6.4	20.9	30.3	5	7.0	145		
	4	6.4	6.8	22.2	30.3	4.2	6.8	145		
	5	0.3	0.7	2.2	30.6	5.9	7.1	144	0.70	
	5	1	1.4	4.5	30.5	5.7	7.1	144		
	5	2	2.4	7.8	30.4	5.7	7.1	144		
	5	3	3.4	11.1	30.4	5.7	7.1	144		
	6	5	4	4.4	14.3	30.4	5.6	7.1	144	
5		4.4	4.8	15.6	30.4	5.4	7.1	144		
6		0.3	0.7	2.2	30.6	5.5	7.1	144	0.75	
6		1	1.4	4.5	30.5	5.3	7.1	143		
6		2	2.4	7.8	30.5	5.3	7.1	143		
6		3	3.4	11.1	30.4	5.1	7.1	143		
6		4	4.4	14.3	30.4	4.9	7.0	143		
6		5	5.4	17.6	30.4	4.5	7.0	143		
6		5.3	5.7	18.6	30.4	2.7	6.9	145		
7		1	0.3	0.7	2.2	32.2	8.5	8.5	143	0.95
		1	1	1.4	4.5	31.9	8.4	8.5	143	
		1	1.8	2.2	7.1	31.7	8.2	8.4	144	
	2	0.3	0.7	2.2	31.9	8.6	8.5	145	0.78	
	2	1	1.4	4.5	31.5	8.3	8.4	143		

	2	2	2.4	7.8	31.3	7.8	8.2	142	
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
7	2	3	3.4	11.1	31	6.3	7.6	142	
	2	4	4.4	14.4	30.8	5.3	7.3	143	
	2	4.9	5.3	17.3	30.6	0.2	7.2	192	
	3	0.3	0.7	2.2	32	7.7	8.2	145	0.85
	3	1	1.4	4.5	31.4	7.8	8.3	143	
	3	2	2.4	7.8	30.9	7.1	7.9	144	
	3	3	3.4	11.1	30.6	6	7.6	144	
	3	4	4.4	14.4	30.6	5.7	7.4	144	
	3	5	5.4	17.6	30.6	5.6	7.3	144	
	3	5.7	6.1	19.9	30.3	0.4	7.0	210	
	4	0.3	0.7	2.2	32.2	7.9	8.0	145	0.65
	4	1	1.4	4.5	31.2	7.4	7.9	145	
	4	2	2.4	7.8	30.7	6	7.6	144	
	4	3	3.4	11.1	30.6	5.4	7.3	144	
	4	3.1	3.5	11.4	30.6	5.2	7.2	145	
8	5	0.3	0.7	2.2	31.9	7.5	7.7	145	0.71
	5	1	1.4	4.5	31	6.8	7.6	145	
	5	2	2.4	7.8	30.7	5.8	7.4	144	
	5	3	3.4	11.1	30.6	5.4	7.3	144	
	5	4	4.4	14.4	30.5	4.4	7.1	146	
	5	4.2	4.6	15.0	30.4	0.2	7.0	160	
	1	0.3	0.7	2.2	33.7	9.6	8.7	148	0.96
	1	1	1.4	4.5	30.9	8.3	8.3	146	
	2	0.3	0.7	2.2	32	9.5	8.7	147	0.75
	2	1	1.4	4.5	30.7	8	8.3	146	
2	2	2.4	7.8	30.3	6.5	7.9	146		
2	3	3.4	11.1	30.2	6	7.7	146		
2	4	4.4	14.3	30.2	5.9	7.5	146		
2	4.4	4.8	15.6	30	0.3	7.0	180		

	3	0.3	0.7	2.2	31.7	9.3	8.6	147	0.68
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)	
8	3	1	1.4	4.5	30.3	6.6	8.1	146		
	3	2	2.4	7.8	30.2	5.7	7.8	146		
	3	3	3.4	11.1	30.1	5.3	7.6	146		
	3	4	4.4	14.3	29.8	4.6	7.5	146		
	3	4.7	5.1	16.6	29.7	4.2	7.2	130		
	4	0.3	0.7	2.2	33.1	8.1	8.0	146	0.74	
	4	1	1.4	4.5	30.6	7.7	8.0	146		
	4	2	2.4	7.8	30	6.1	7.7	145		
	4	3	3.4	11.1	29.9	5.6	7.6	145		
	4	3.3	3.7	12.0	29.8	0.2	7.2	146		
	9	1	0.3	0.7	2.2	29.5	7.1	7.0	150	0.75
		1	0.8	1.2	3.8	29.5	7	7.0	151	
2		0.3	0.7	2.2	29.5	6.1	7.0	150	0.99	
2		1	1.4	4.5	29.5	6.1	7.0	152		
2		2	2.4	7.8	29.5	5.7	7.0	152		
3		0.3	0.7	2.2	29.5	6.2	7.0	152	0.87	
3		1	1.4	4.5	29.5	6.2	7.1	151		
3		2	2.4	7.8	29.5	6.1	7.0	152		
3		3	3.4	11.1	29.5	1.3	6.9	152		
3		3.5	3.9	12.7	29.5	1.5	6.9	153		
4		0.3	0.7	2.2	29.8	6.7	7.0	151	0.91	
4		1	1.4	4.5	29.7	6.5	7.1	151		
4	2	2.4	7.8	29.7	6.5	7.1	151			
4	3	3.4	11.1	29.5	6	7.1	151			
4	3.8	4.2	13.7	29.5	0.2	6.8	153			
5	0.3	0.7	2.2	30	6.3	7.0	151	0.77		
5	1	1.4	4.5	30	6.3	7.0	151			
5	2	2.4	7.8	30	6.2	7.0	152			
5	3	3.4	11.1	30	5.9	7.0	152			

	5	3.8	4.2	13.7	30	3.8	6.9	152	
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
10	1	0.3	0.7	2.2	29.9	6.4	7.0	152	0.81
	1	1	1.4	4.5	29.9	6.4	7.0	152	
	1	2	2.4	7.8	29.9	6.4	7.0	152	
	1	2.6	3.0	9.7	29.9	5.9	6.8	152	
	2	0.3	0.7	2.2	29.5	7.1	7.0	152	0.81
	2	1	1.4	4.5	29.5	7	7.1	152	
	2	2	2.4	7.8	29.5	6.8	7.1	152	
	2	3	3.4	11.1	29.5	6.5	7.0	152	
	2	3.3	3.7	12.0	29.5	5.3	6.9	152	
	3	0.3	0.7	2.2	29.3	6.2	7.0	152	0.80
	3	1	1.4	4.5	29.3	6.2	7.0	152	
	3	2	2.4	7.8	29.3	6.2	7.0	152	
	3	3	3.4	11.1	29	5.6	6.9	152	
	4	0.3	0.7	2.2	29.1	6.9	7.0	152	0.70
	4	1	1.4	4.5	29.1	6.9	7.0	152	
4	2	2.4	7.8	29.1	6.8	7.1	152		
5	0.3	0.7	2.2	29.3	6.5	7.0	152	0.68	
	1	1.4	4.5	29.3	6.6	7.0	152		
	2	2.4	7.8	29.3	6.4	7.0	152		
	2.6	3.0	9.7	29.3	6.1	6.9	153		
11	1	0.3	0.7	2.2	32.6	8.4	7.6	149	0.80
	1	1	1.4	4.5	30.5	5.7	7.2	148	
	2	0.3	0.7	2.2	32.8	8.6	8.1	148	0.77
	2	1	1.4	4.5	30	8.2	7.9	149	
	2	2	2.4	7.8	29.4	5.6	7.6	148	
	2	2.4	2.8	9.1	29.3	4	7.2	149	
	3	0.3	0.7	2.2	32.3	8.6	8.1	147	0.79
	3	1	1.4	4.5	30.1	6.7	7.7	148	
3	2	2.4	7.8	29.6	4.6	7.3	148		

	4	0.3	0.7	2.2	32	7.9	7.5	149	0.68
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Appendix A. (Continued)

Transect	Station #	Depth (m)	Adjusted Depth (m)	Adjusted Depth (ft)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
11	4	1	1.4	4.5	30	6	7.2	150	
	4	2	2.4	7.8	29.8	4.6	7.0	151	
	4	3	3.4	11.1	29.7	4.6	6.9	150	
	4	3.6	4.0	13.0	29.7	4.3	6.8	150	
12	1	0.3	0.7	2.2	29.3	3.5	6.5	163	0.82
	1	1	1.4	4.5	29.2	3.9	6.5	163	
	1	1.5	1.9	6.1	29.2	3.9	6.5	163	
	2	0.3	0.7	2.2	29	5.2	6.6	162	0.91
	2	1	1.4	4.5	28.9	5	6.5	162	
	2	1.6	2.0	6.5	28.8	4.5	6.5	162	
	3	0.3	0.7	2.2	28.6	5.4	6.6	160	0.82
	3	1	1.4	4.5	28.4	5.2	6.6	160	
	3	1.8	2.2	7.1	28.3	4.7	6.5	160	
	4	0.3	0.7	2.2	29	5.6	6.6	156	0.94
	4	1	1.4	4.5	28.9	5.4	6.6	156	
	4	2	2.4	7.8	28.8	5.3	6.5	156	
	4	3	3.4	11.1	28.8	4.8	6.5	156	
5	0.3	0.7	2.2	28.9	5.4	6.6	154	0.98	
5	1	1.4	4.5	28.8	4.9	6.5	154		
5	1.5	1.9	6.1	28.8	4.3	6.4	155		
13	1	0.3	0.7	2.2	29.3	4.2	6.5	150	0.76
	1	1	1.4	4.5	29.3	4.1	6.5	156	
	1	2	2.4	7.8	29.3	4	6.5	162	
	1	3	3.4	11.1	29.2	4	6.5	168	
	1	4	4.4	14.3	29.1	3.7	6.5	172	
	2	0.3	0.7	2.2	28.6	4.3	6.6	166	0.68
	2	1.0	1.4	4.5	28.6	4.1	6.6	167	
	2	2.0	2.4	7.8	28.6	3.9	6.6	167	
	3	0.3	0.7	2.2	28	4.1	6.5	163	0.57

	3	0.8	1.2	3.8	28	4	6.4	164	
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**Appendix A. (Concluded)**

<b>Transect</b>	<b>Station #</b>	<b>Depth (m)</b>	<b>Adjusted Depth (m)</b>	<b>Adjusted Depth (ft)</b>	<b>Temperature (°C)</b>	<b>Dissolved Oxygen (mg/l)</b>	<b>pH</b>	<b>Conductivity (µmhos)</b>	<b>Secchi Depth (m)</b>
14	1	0.3	0.7	2.2	27.7	4	6.8	263	0.45
	2	1	1.4	4.5	28.2	4.1	6.9	251	0.55
	2	1.6	2.0	6.5	28.3	2.7	6.8	250	
	3	0.3	0.7	2.2	29.2	3.7	6.8	210	0.64
	3	1	1.4	4.5	29.2	3.5	6.8	213	
	3	2	2.4	7.8	29.1	3.5	6.8	215	
	3	3	3.4	11.1	29.1	3.5	6.8	218	
	3	3.6	4.0	13.0	29.1	0.2	6.7	235	
	4	0.3	0.7	2.2	28.2	4.7	6.7	221	0.42
	4	0.8	1.2	3.8	28.2	4.3	6.7	220	
	5	0.3	0.7	2.2	28.6	5	6.7	191	0.55
	5	1	1.4	4.5	28.4	4.3	6.6	193	
	5	1.3	1.7	5.5	28.6	0.2	6.6	193	

**Appendix B.**  
**Hydrographic Profile Data.**



**Appendix B.  
Hydrographic Profile Data.**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
DAM	10296	8/14/1998	0.3	29.3	5.4	6.7	157	1.33
			1	29.2	5.3	6.7	157	
			2	29.1	4.7	6.7	158	
			3	29.1	4.1	6.6	158	
			4	29	3.9	6.6	158	
			5	29	3.9	6.6	159	
			6	28.9	3	6.6	162	
			7	28.9	0.1	6.7	162	
Longview	16156	8/14/1998	0.3	29.7	7	7	158	1.11
			1	29.4	6.6	7	158	
			2	29.2	6	7	159	
			3	29.2	6	6.9	159	
			4	29.1	5.7	6.9	159	
			5	29.1	0.2	6.9	159	
NETMWD	10297	8/5/1998	0.3	32.0	7.9	7.5	149	0.68
			1.0	30.0	6.0	7.2	150	
			2.0	29.8	4.6	7.0	151	
			3.0	29.7	4.6	6.9	150	
			3.6	29.7	4.3	6.8	150	
Hurricane	16452	8/5/1998	0.3	31.4	5.8	7	142	0.82
			1	31	5.8	7	142	
			1.2	30.8	5.6	7	142	
Arms/Copeland	16449	8/5/1998	0.3	32.2	7.5	7.7	145	0.71
			1	31.4	7.1	7.7	145	
			2	30.8	5.5	7.4	144	
			3	30.7	5.1	7.2	144	
			4	30.7	4.8	7.2	144	
			5	30.6	3.8	7	144	
Brushy	16448	8/5/1998	0.3	31.9	5.9	7.1	143	0.78
			1	30.7	5	7.1	144	
			2	30.4	4.1	7	143	
			3	30.4	3.9	6.9	142	
			6	30.4	0.2	6.7	178	
			7	30.4	0.2	6.7	178	
DAM	10296	9/30/1998	0.3	28.9	12.9	9.1	146	1.15
			1	28.6	7	9.2	145	
			2	28.4	7	9.1	146	
			3	28.4	6.8	9.1	145	
			4	28.3	6.6	8.9	143	
			5	27.3	5	8.3	142	
			6	26.3	2.6	8	141	
			7	26.1	2.7	7.9	144	
Longview	16156	9/30/1998	0.3	30.3	2.4	9.5	149	0.99
			1	29.6	3	9.3	148	

Appendix B. (Continued)

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
Longview	16156	9/30/1998	2	29.1	3	9.2	147	
			3	29	2.8	9.2	145	
			4	27.7	1.4	8.4	141	
			5	26.1	0.5	7.9	140	
			6	26	0.4	7.8	141	
DAM	10296	10/7/1998	0.3	25.4	7.6	6.1	143	0.66
			1	25.2	7.3	6.4	145	
			2	25.1	7.1	6.4	142	
			3	25.1	7.1	6.5	143	
			4	25.1	7.1	6.5	142	
			5	25.1	7.0	6.6	142	
			6	25.1	7.0	6.6	142	
			7	25.1	7.0	6.6	142	
Longview	16156	10/7/1998	0.3	25.7	8.1	6.7	142	0.70
			1	25.6	8.0	6.8	142	
			2	25.5	7.8	6.8	141	
			3	25.4	7.7	6.9	141	
			4	25.4	7.6	6.9	142	
			5	25.3	7.4	6.9	140	
			6	25.3	7.2	6.9	141	
			6.5	25.4	0.5	6.6	186	
NETMWD	10297	10/7/1998	0.3	24.4	9.2	6.7	139	0.80
			1	24.3	9.0	6.7	138	
			2	23.0	8.4	6.7	146	
			3	22.8	8.1	6.7	146	
			3.9	22.9	0.4	6.5	146	
DAM	10296	11/11/1998	0.3	17.4	8.9	7.1	113	1.09
			1	17.3	9.4	7.2	114	
			2	17.3	9.8	6.9	113	
			3	17.3	9.8	6.8	113	
			4	17.2	9.7	6.8	112	
			5	17.2	9.6	6.8	112	
			6	17.1	9.4	6.9	112	
			7	17.1	9.3	6.9	112	
Longview	16156	11/11/1998	0.3	17.1	4.6	7.3	114	1.16
			1	17.1	4.8	7.3	113	
			2	17.0	5.0	7.2	113	
			3	17.0	5.2	7.2	113	
			4	16.9	5.4	7.1	113	
			5	16.9	5.4	7.0	113	
			6	16.9	5.8	7.0	113	
			7	16.9	4.3	6.9	113	
DAM	10296	12/16/1999	0.3	13.9	8.2	7.7	70	1.25
			1	13.7	8.1	7.7	70	

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
DAM	10296	12/16/1999	2	13.7	8.0	7.7	70	
			3	13.7	8.0	7.7	70	
			4	13.7	7.9	7.7	70	
			5	13.6	7.9	7.7	70	
			6	13.6	7.8	7.7	70	
			7	13.5	7.8	7.7	70	
			Longview	16156	12/16/1999	0.3	13.5	9
			1	13.5	8.9	7.3	76	
			2	13.3	8.8	7.4	75	
			3	13.2	8.6	7.3	75	
			4	13.1	8.5	7.3	74	
			5	13.1	8.5	7.3	75	
			6	13.1	8.3	7.3	75	
			7	13.1	8.2	7.3	75	
NETMWD	10297	12/16/1999	0.3	11.1	9.5	7.4	82	1.17
			1	10.7	9.4	7.6	82	
			2	10.3	9.4	7.6	81	
			3	10.3	9.3	7.6	81	
			4	10.2	9.2	7.6	81	
			5	10.2	9.1	7.6	81	
			6	10.2	5.3	7.7	81	
			7	10.3	5.4	7.7	81	
Lone Star	10300	12/16/1999	0.3	11.1	11.1	7.6	84	0.50
Hurricane	16452	12/16/1999	0.3	12.8	10.1	7.5	56	1.17
			1	11.8	10.0	7.6	56	
			2	11.7	9.9	7.6	53	
			3	11.6	9.8	7.6	52	
			4	11.2	5.1	7.7	43	
Alley Crk.	16450	12/16/1999	0.3	12.5	10.4	7.7	60	1.55
			1	12.5	10.2	7.7	61	
			2	12.4	10.0	7.7	60	
			3	12.1	9.9	7.6	61	
			4	11.4	9.4	7.6	51	
			5	11.4	9.2	7.6	50	
			6	11.4	8.4	7.7	50	
			7	11.4	7.4	7.7	51	
Brushy	16448	12/16/1999	0.3	13.8	8.7	7.1	70	1.17
			1	13.7	8.6	7.1	70	
			2	13.6	8.4	7.1	70	
			3	13.5	8.2	7.1	69	
			4	13.5	8.2	7.1	69	
Arms/Cope	16449	12/16/1999	0.3	12.7	11.1	7.5	73	1.50
			1	12.6	10.8	7.5	73	
			2	12.5	10.7	7.6	72	

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
Arms/Cope	16449	12/16/1999	3	12.0	10.6	7.6	69	
			4	11.8	10.3	7.6	66	
			5	11.6	9.3	7.5	57	
			6	11.5	1.1	7.5	56	
DAM		1/18/1999	0.3	10.4	15.1	6.7	150	1.08
			1	9.9	15.0	6.7	150	
			2	9.8	14.7	6.6	150	
			3	9.7	14.7	6.6	150	
			4	9.6	14.4	6.6	150	
			5	9.5	14.4	6.6	150	
Longview	16156	1/18/1999	0.3	9.9	14	6.4	165	1.26
			1	9.7	14.1	6.4	163	
			2	9.5	14.0	6.4	164	
			3	9.5	14.1	6.5	164	
			4	9.4	13.9	6.5	165	
			5	9.4	13.8	6.5	165	
			6	9.4	13.8	6.5	165	
NETMWD	10297	1/18/1999	0.3	11.4	13.3	6.2	161	1.17
			1	10.8	13.3	6.3	159	
			2	10.7	13.3	6.3	156	
Lone Star	10300	1/18/1999	0.3	10.7	12	5.8	248	1.07
Hurricane	16452	1/18/1999	0.3	12.7	14.0	6.8	100	1.02
Alley Crk.	16450	1/18/1999	0.3	11.6	14.1	6.7	110	1.20
Brushy	16448	1/18/1999	0.3	10.3	14.5	6.6	150	1.18
			1	9.8	14.6	6.6	150	
			2	9.6	14.5	6.6	150	
			3	9.5	14.1	6.6	150	
			4	9.4	14.0	6.6	150	
			5	9.4	14.0	6.6	150	
Arms/Cope	16449	1/18/1999	0.3	10.2	14.2	6.6	164	1.17
			1	9.9	14.1	6.5	165	
			2	9.6	14.3	6.6	162	
			3	9.5	14.0	6.6	163	
			4	9.5	13.9	6.6	164	
DAM	10296	2/13/1999	0.3	14	12.6	7.2	105	1.35
			1	14.0	10.9	6.6	152	
			2	13.9	10.8	6.6	152	
			3	13.9	10.7	6.5	152	
			4	13.9	10.8	6.5	152	
			5	13.8	10.8	6.5	152	
			6	13.6	10.8	6.5	151	
			7	13.6	10.8	6.5	153	
			8	13.6	10.9	6.5	153	
Longview	16156	2/13/1999	0.3	14.5	10.7	6.3	155	1.10

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
Longview	16156	2/13/1999	1	14.4	10.6	6.4	157	
			2	14.4	10.6	6.4	157	
			3	14.4	10.6	6.4	161	
			4	14.3	10.6	6.4	161	
			5	14.3	10.6	6.4	161	
			6	14.3	10.6	6.4	165	
			7	14.3	10.7	6.5	165	
NETMWD	10297	2/13/1999	0.3	14.5	11	6.2	164	1.24
			1	14.5	10.5	6.2	163	
			2	14.3	10.4	6.3	164	
			3	14.3	10.3	6.3	163	
Lone Star	10300	2/13/1999	0.3	13.1	12.7	6	252	0.77
Hurricane	16452	2/13/1999	0.3	15.4	10.4	6.4	106	1.28
			1	15.4	10.0	6.4	105	
			2	15.4	9.7	6.4	104	
			3	15.3	9.6	6.4	103	
			4	15.0	5.0	6.6	179	
Alley Crk.	16450	2/13/1999	0.3	15.1	9.9	6.4	94	1.00
			1	15.0	9.8	6.4	93	
			2	15.0	9.7	6.4	93	
			3	14.9	9.7	6.4	92	
			4	14.9	9.8	6.4	91	
Brushy	16448	2/13/1999	0.3	13.9	11.2	6.4	153	1.37
			1	13.8	10.9	6.5	153.0	
			2	13.7	10.9	6.5	153.0	
			3	13.6	10.9	6.5	153.0	
			4	13.4	10.9	6.4	153.0	
			5	13.4	10.9	6.4	153.0	
			6	13.2	10.4	6.3	112	
Arms/Cope	16449	2/13/1999	0.3	14	10.9	6.6	166	1.43
			1	14.1	10.6	6.5	165	
			2	13.9	10.5	6.6	165	
			3	13.7	10.6	6.6	166	
			4	13.4	10.7	6.5	160	
			5	13.0	10.7	6.5	156	
DAM	10296	3/15/1999	0.3	13.5	12.4	7.1	101	1.10
			1	13.3	12.1	7.1	101	
			2	12.4	11.7	7.2	98	
			3	12.2	11.4	7.1	97	
			4	12.2	11.3	7.1	98	
			5	12.1	11.0	7.2	98	
			6	12.0	10.8	7.2	97	
Longview	16156	3/15/1999	0.3	13.6	12.6	7.2	105	1.21
			1	12.4	12.1	7.2	113	

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
Longview	16156	3/15/1999	2	12.1	11.6	7.2	107	
			3	12.0	11.1	7.2	103	
			4	12.0	10.9	7.3	101	
			5	12.0	10.7	7.3	100	
			6	12.0	10.5	7.3	98	
NETMWD	10297	3/15/1999	0.3	11.4	13.4	7	122	1.53
			1	10.9	12.7	7.3	124	
			2	10.6	12.4	7.3	127	
			3	10.3	12.1	7.4	128	
			4	10.3	11.5	7.4	129	
Lone Star	10300	3/15/1999	0.3	8.6	10.6	6.3	91	0.45
Hurricane	16452	3/15/1999	0.3	12.7	11.9	6.7	83	0.94
			1	12.3	11.5	6.9	106	
			2	11.7	11.1	7.0	102	
			3	11.5	10.8	7.0	99	
			4	11.4	10.5	7.0	96	
Alley Crk.	16450	3/15/1999	0.3	12	11.6	6.5	75	0.96
			1	11.8	11.2	6.6	103	
			2	11.7	10.9	6.7	100	
			3	11.6	10.7	6.8	99	
			4	11.5	10.6	6.8	98	
			5	11.5	9.6	6.8	86	
Brushy	16448	3/15/1999	0.3	13.2	12.9	7.3	101	0.96
			1	12.9	12.1	7.2	101.0	
			2	12.8	11.7	7.2	100.0	
			3	12.6	11.6	7.3	98.0	
			4	11.9	11.4	7.2	97.0	
			5	11.8	11.1	7.2	96.0	
Arms/Cope	16449	3/15/1999	0.3	12.5	12.7	6.7	102	1.02
			1	12.2	12.3	6.9	101	
			2	11.5	11.8	7.0	101	
			3	11.4	11.4	7.1	99	
			4	11.4	11.4	7.2	99	
			5	11.3	10.8	7.2	99	
DAM	10296	4/10/1999	0.3	20.6	10.1	6.7	142	1.60
			1	20.0	10.2	6.7	142	
			2	20.0	10.2	6.8	142	
			3	17.9	9.5	6.7	141	
			4	17.5	8.6	6.7	141	
			5	17.3	8.6	6.7	141	
			6	17.3	8.6	6.6	141	
			7	17.2	8.4	6.6	141	
			8	16.0	0.4	6.4	141	

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
Longview	16156	4/10/1999	0.3	20.5	10.6	7	148	1.20
			1	20.4	10.7	7.1	149	
			2	20.3	10.8	7.1	149	
			3	20.1	10.8	7.1	149	
			4	18.6	9.3	7.1	149	
			5	18.1	7.9	6.9	149	
NETMWD	10297	4/10/1999	0.3	23.5	6.8	6.1	174	1.09
			1	23.6	6.4	6.3	174	
			2	23.2	5.9	6.4	172	
			3	21.9	5.8	6.4	169	
			4	21.2	5.8	6.4	167	
			5	20.4	5.4	6.3	170	
Lone Star	10300	4/10/1999	0.3	22.1	3.8	5.8	188	0.75
Hurricane	16452	4/10/1999	0.3	23.4	8.8	6.6	119	1.01
			1	23.3	8.7	6.6	119	
			2	22.9	8.4	6.6	117	
			3	21.0	7.4	6.5	119	
Alley Crk.	16450	4/10/1999	0.3	21.9	9.3	5.8	114	1.28
			1	21.6	9.0	5.9	112	
			2	21.1	9.0	5.9	118	
			3	19.9	7.1	5.9	113	
			4	18.3	1.6	5.7	119	
Brushy	16448	4/10/1999	0.3	18.8	9.7	6.6	144	1.20
			1	18.4	9.7	6.5	144	
			2	17.6	9.1	6.6	144	
			3	17.5	8.7	6.5	144	
			4	17.4	8.6	6.5	144	
Arms/Cope	16449	4/10/1999	0.3	18.9	9.2	6.7	147	1.13
			1	18.8	9.1	6.7	148	
			2	18.4	9.0	6.7	148	
			3	18.3	8.6	6.6	148	
			4	17.7	7.6	6.6	149	
			5	17.0	0.4	6.3	152	
DAM	10296	5/18/1999	0.3	24.3	7.9	6.6	151	1.48
			1	24.3	7.9	6.6	152	
			2	24.3	7.7	6.6	156	
			3	24.2	7.5	6.6	152	
			4	24.1	7.4	6.6	153	
			5	24.1	7.3	6.6	152	
			6	23.5	6.5	6.5	151	
			7	22.3	3.6	6.3	157	
			8	21.9	2.0	6.3	237	
Longview	16156	5/18/1999	0.3	25.4	8.2	6.3	153	1.21
			1	25.4	8.1	6.5	153	

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
Longview	16156	5/18/1999	2	25.3	8.0	6.5	154	
			3	25.1	7.6	6.5	154	
			4	25.0	7.4	6.5	152	
			5	24.9	7.1	6.5	155	
			6	24.9	6.8	6.4	157	
			6.8	24.1	0.2	6.4	257	
NETMWD	10297	5/18/1999	0.3	25.5	7.1	6.3	176	0.66
			1	25.5	7.1	6.4	177	
			2	25.5	7	6.4	175	
			3	25.5	6.7	6.5	176	
Lone Star	10300	5/18/1999	0.3	23.1	4.5	6	232	0.73
Hurricane	16452	5/18/1999	0.3	26.2	7.7	6.5	141	1.08
			1	26.2	7.6	6.6	142	
			2	26.0	7.4	6.6	141	
			3	24.6	5.9	6.5	159	
			4	24.3	4.8	6.5	152	
Alley Crk.	16450	5/18/1999	0.3	25.7	7.4	6.4	133	1.08
			1	25.7	7.4	6.5	131	
			2	25.7	7.2	6.5	132	
			3	25.6	7.0	6.5	131	
Brushy	16448	5/18/1999	0.3	23.7	7.0	6.4	151	1.03
			1	23.7	6.9	6.4	152	
			2	23.6	6.8	6.4	151	
			3	23.6	6.9	6.4	151	
			4	23.4	6.6	6.4	149	
Arms/Cope	16449	5/18/1999	0.3	24.5	6.9	6.6	187	1.13
			1	24.4	6.9	6.6	190	
			2	24.4	6.8	6.6	190	
			3	24.4	6.8	6.6	190	
			4	24.3	6.7	6.6	189	
			5	24.0	5.9	6.5	187	
DAM	10296	6/16/1999	0.3	28.2	6.4	6.7	148	1.70
			1	28.0	6.5	6.7	148	
			2	27.6	6.4	6.7	148	
			3	27.5	6.2	6.7	148	
			4	27.2	3.6	6.6	148	
			5	26.1	0.6	6.4	148	
			6	25.0	0.3	6.3	154	
			7	24.4	0.3	6.3	154	
Longview	16156	6/16/1999	0.3	28.4	7.7	6.7	148	1.04



**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
Longview	16156	6/16/1999	1	28.4	7.6	6.8	147	
			2	28.3	7.5	6.8	147	
			3	28.2	7.4	6.8	147	
			4	28.1	7.3	6.8	147	
			5	28.1	7.0	6.8	147	
			6	26.7	1.2	6.6	152	
			7	25.1	0.4	6.6	159	
			8	24.3	0.3	6.4	166	
NETMWD	10297	6/16/1999	0.3	28.3	5.3	6.4	157	0.69
			1	28.3	5.2	6.4	157	
			2	28.2	5.1	6.4	157	
			3	28.2	5.1	6.4	157	
			3.95	28.2	4.8	6.4	157	
Lone Star	10300	6/16/1999	0.3	26.4	3.4	6.3	195	0.87
Hurricane	16452	6/16/1999	0.3	29.3	7.6	6.7	133	1.12
			1	28.9	7.5	6.7	133	
			2	28.3	6.9	6.7	134	
			3	27.4	2.7	6.6	147	
			4	26.7	0.4	6.4	149	
			4.5	26.1	0.2	6.5	160	
Alley Crk.	16450	6/16/1999	0.3	29.9	8.3	6.9	133	1.04
			1	29.4	8.2	7.0	133	
			2	29.0	7.5	7.0	133	
			3	28.0	4.0	6.8	145	
			4	27.4	1.5	6.5	148	
			4.5	26.7	0.2	6.5	180	
Brushy	16448	6/16/1999	0.3	29.6	7.9	6.8	147	1.02
			1	29.2	8.0	6.9	147	
			2	29.0	7.6	7.0	147	
			3	29.0	7.5	7.0	147	
			4	28.8	1.8	6.9	148	
			4.5	28.2	0.3	6.7	150	
Arms/Cope	16449	6/16/1999	0.3	29.1	7.4	6.7	147	0.94
			1	29.0	7.3	6.8	147	
			2	28.8	7.0	6.8	147	
			3	28.8	6.9	6.8	147	
			4	28.7	7.1	6.8	147	
			4.5	28.5	0.3	6.7	147	
DAM	10296	7/14/1999	0.3	31	8.7	7.1	151	1.90
			1	30.8	8.7	7.3	151	
			2	30.7	8.7	7.4	151	
			3	30.5	8.4	7.4	151	
			4	29.4	6.2	7.2	151	
			5	28.9	2.3	7.0	151	

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
DAM	10296	7/14/1999	6	28.0	0.2	6.6	151	
			7	26.6	0.2	6.5	166	
			8	25.3	0.2	6.4	175	
Longview	16156	7/14/1999	0.3	30.5	8.8	7.2	147	1.42
			1	30.4	8.8	7.4	147	
			2	30.1	8.5	7.4	147	
			3	30.3	8.3	7.4	147	
			4	29.5	6.6	7.3	147	
			5	29.3	5.0	7.0	147	
			6	28.4	0.3	6.8	149	
			6.25	27.7	0.1	6.3	198	
			NETMWD	10297	7/14/1999	0.3	30.7	6.9
			1	30.7	6.9	6.4	148	
			2	30.4	6.2	6.4	147	
			3	29.5	2.1	6.2	155	
			4	29.4	2.0	6.0	159	
			5	29.3	1.5	6.1	173	
Lone Star	10300	7/14/1999	0.3	28	2.3	6	263	0.75
Hurricane	16452	7/14/1999	0.3	31.2	8.4	6.8	140	1.29
			1	31.0	8.3	6.9	140	
			2	30.7	8.1	6.9	138	
			3	30.1	5.5	6.8	138	
			4	29.1	0.5	6.4	144	
			4.25	28.5	0.2	6.3	173	
Alley Crk.	16450	7/14/1999	0.3	31.4	8.9	6.5	135	1.07
			1	30.8	8.9	6.7	135	
			2	30.4	7.7	6.7	136	
			3	30.2	4.5	6.6	133	
			4	29.4	0.2	6.4	140	
			5	28.5	0.2	6.1	165	
Brushy	16448	7/14/1999	0.3	29.7	7.7	6.4	149	1.36
			1	29.5	7.8	6.4	148	
			2	29.4	7.7	6.5	148	
			3	29.2	7.8	6.5	148	
			4	29.0	6.9	6.5	148	
			5	28.9	6.3	6.4	148	
Arms/Cope	16449	7/14/1999	0.3	30.2	8.6	6.6	144	1.27
			1	29.8	8.4	6.7	144	
			2	29.5	6.7	6.7	146	
			3	29.1	5.4	6.6	145	
			4	28.9	4.2	6.4	145	
			5	28.6	2.2	6.3	145	
			5.25	28.5	0.2	6.1	145	
DAM	10296	8/18/1999	0.3	31.9	8.2	7.2	138	1.51

**Appendix B. (Continued)**

Station	Station ID	Date	Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Conductivity (µmhos)	Secchi Depth (m)
DAM	10296	8/18/1999	1	31.5	8.4	7.3	138	
			2	31.4	8.5	7.3	138	
			3	31.2	8.6	7.2	138	
			4	30.5	7.2	7.1	137	
			5	30.4	6.7	6.9	137	
			6	30.3	6.7	6.9	137	
			7	27.1	4.0	6.8	166	
Longview	16156	8/18/1999	0.3	30.8	7	7	137	1.22
			1	30.7	7.0	6.9	137	
			2	30.6	7.1	6.9	137	
			3	30.6	7.0	6.8	137	
			4	30.5	6.7	6.8	137	
			5	30.3	6.0	6.7	137	
NETMWD	10297	8/18/1999	0.3	31.5	7.2	6.5	135	1.19
			1	31.4	7.2	6.6	134	
			2	30.6	5.8	6.5	138	
			3	30.2	5.1	6.4	140	
Lone Star	10300	8/18/1999	0.3	27.6	3.9	6	293	0.75
Hurricane	16452	8/18/1999	0.3	31.5	8.5	7.1	137	1.44
			1	31.3	8.5	7.1	137	
			2	30.6	7.8	7.0	136	
			3	30.3	7.3	7.0	136	
Alley Crk.	16450	8/18/1999	0.3	31.8	8.6	7.3	131	0.97
			1	31.0	8.8	7.4	131	
			2	30.7	8.6	7.3	131	
			3	30.6	7.5	7.1	133	
			4	30.3	5.6	6.9	133	
Brushy	16448	8/18/1999	0.3	31.3	7.2	6.9	138	1.02
			1	31.0	7.3	6.9	138	
			2	30.7	7.0	6.9	138	
			3	30.5	5.5	6.7	139	
Arms/Cope	16449	8/18/1999	0.3	31.4	8	6.9	136	1.13
			1	31.2	8.0	7.0	137	
			2	31.0	7.9	7.0	137	
			3	30.5	6.8	6.8	137	
			4	30.4	5.6	6.6	137	
			5	30.2	4.8	6.5	137	

## **Appendix C.**

### **Diurnal Variation in Dissolved Oxygen and Temperature Profile Data.**

Appendix C.  
 Lake O' the Pines Nutrient Study Diurnal Profile Data  
 19-20 February 1999

Time	Parameter										
<b>Dam (10296)</b>											
<b>15:57</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8	8.2
	Temp (C)	14.9	14.5	14.3	14.2	14.2	13.6	13.2	13.1	13.1	13.2
	D.O. (mg/l)	9.8	9.8	9.9	9.8	9.7	9.4	9.1	9.1	8.8	5.1
	Cond (uS/cm)	139	139	140	139	140	140	139	139	139	139
	pH (S.U.)	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6
<b>6:55</b>	Depth (m)	0.3	1	2	3	4	5	6	7	7.4	
	Temp (C)	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.3	6.2
	D.O. (mg/l)	9.1	9.1	9.1	9.1	9.1	9	8.9	8.8		
	Cond (uS/cm)	135	141	139	139	139	139	142	139		
	pH (S.U.)	6.61	6.63	6.63	6.61	6.64	6.60	6.56	6.58		
<b>Longview Intake (16156)</b>											
<b>16:34</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8	
	Temp (C)	15.4	14.2	13.7	13.5	13.5	13.5	13.5	13.4	13.5	
	D.O. (mg/l)	10.2	10.6	10.3	9.3	9	8.4	8.7	8.6	7.3	
	Cond (uS/cm)	145	143	144	145	147	147	147	144	148	
	pH (S.U.)	6.6	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.7	
<b>7:30</b>	Depth (m)	0.3	1	2	3	4					
	Temp (C)	13.6	13.6	13.6	13.6	13.6					
	D.O. (mg/l)	9.3	9.1	9.1	9.1	9.1					
	Cond (uS/cm)	144	144	144	144	145					
	pH (S.U.)	6.5	6.58	6.57	6.61	6.64					
<b>NETMWD Intake (10297)</b>											
<b>17:19</b>	Depth (m)	0.3	1	2							
	Temp (C)	15.9	14	13.4							
	D.O. (mg/l)	10	10.5	9.9							
	Cond (uS/cm)	163	150	166							
	pH (S.U.)	6.5	6.7	6.7							
<b>9:02</b>	Depth (m)	0.3									
	Temp (C)	12.92									
	D.O. (mg/l)	9.22									
	Cond (uS/cm)	172									
	pH (S.U.)	6.4									
<b>Lone Star Boat Ramp (10300)</b>											
<b>18:30</b>	Depth (m)	0.3									
	Temp (C)	14.4									
	D.O. (mg/l)	9.2									
	Cond (uS/cm)	230									
	pH (S.U.)	6.1									
<b>4:20</b>	Depth (m)	0.3									
	Temp (C)	11.7									
	D.O. (mg/l)	8.7									
	Cond (uS/cm)	212									
	pH (S.U.)	6.38									

<b>Hurricane Creek (16452)</b>										
<b>15:30</b>	Depth (m)	0.3	1	2	3	3.75				
	Temp (C)	14.4	14.3	14.2	13.7	13.7				
	D.O. (mg/l)	9.4	9.2	9	8.6	6.8				
	Cond (uS/cm)	103	101	99	95	96				
	pH (S.U.)	5.6	5.8	5.8	5.8	5.8				
<b>6:40</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	13.5	13.8	13.8	13.8	13.7				
	D.O. (mg/l)	9.4	8.7	8.3	8.3	8.6				
	Cond (uS/cm)	105	106	106	106	106				
	pH (S.U.)	6.7	6.7	6.7	6.6	6.6				
<b>Alley Creek (16450)</b>										
<b>15:41</b>	Depth (m)	0.3	1	2	3					
	Temp (C)	14.8	14.2	13.7	13.7					
	D.O. (mg/l)	9.6	9	8.5	8.2					
	Cond (uS/cm)	109	86	84	83					
	pH (S.U.)	6.7	6.7	6.7	6.6					
<b>8:03</b>	Depth (m)	0.3	1	2	3	4	4.5			
	Temp (C)	13.53	13.56	13.56	13.56	13.55	13.59			
	D.O. (mg/l)	8.7	8.3	8.3	8.3	8.2	7.6			
	Cond (uS/cm)	89	79.5	79.3	79.2	78.5	72			
	pH (S.U.)	6.62	6.61	6.58	6.58	6.56	6.45			
<b>Brushy Creek (16448)</b>										
<b>16:18</b>	Depth (m)	0.3	1	2	3	4	5	5.2		
	Temp (C)	15.7	15.4	14.4	13.7	13.4	13.3	13.3		
	D.O. (mg/l)	9.7	9.8	9.9	9.8	9.5	9.4	9.2		
	Cond (uS/cm)	141	140	141	140	136	139	139		
	pH (S.U.)	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
<b>7:14</b>	Depth (m)	0.3	1	2	3	4	5	6	6.8	
	Temp (C)	13.9	13.9	13.9	13.9	13.6	13.5	13.4	13.4	
	D.O. (mg/l)	9.7	9.5	9.5	9.5	9.1	8.9	8.6	6.3	
	Cond (uS/cm)	140.0	143.0	140.0	140.0	140.0	140.0	140.0	141.0	
	pH (S.U.)	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	
<b>Arms/Copeland Creeks (16449)</b>										
<b>16:52</b>	Depth (m)	0.3	1	2	3	4	4.9			
	Temp (C)	15.5	14.3	13.3	13.2	13.1	13.1			
	D.O. (mg/l)	9.9	10.4	9.5	9.3	9.2	6.7			
	Cond (uS/cm)	149	146	148	146	144	145			
	pH (S.U.)	6.5	6.7	6	6.6	6.6	6.5			
<b>7:41</b>	Depth (m)	0.3	1	2	3	4	5	5.6		
	Temp (C)	13.5	13.5	13.3	13.2	13.2	13.2	13.2		
	D.O. (mg/l)	9.6	9.4	9.0	8.7	8.6	8.2	6.0		
	Cond (uS/cm)	143	145	145	144	144	143	142		
	pH (S.U.)	6.65	6.72	6.73	6.72	6.67	6.67	6.51		

Appendix C.  
 Lake O' the Pines Nutrient Study Diurnal Data  
 26-27 May 1999

Time	Parameter									
<b>Dam (10296)</b>										
<b>18:00</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8
	Temp (C)	27.5	27	26.5	26.4	26.2	24.2	23.4	23.2	22.7
	D.O. (mg/l)	8.7	8.7	8.3	7.9	7.6	4.9	3.1	2.4	1.8
	Cond (uS/cm)	152	151	151	151	151	151	155	155	157
	pH (S.U.)	6.7	6.8	6.7	6.7	6.7	6.6	6.4	6.3	6.2
<b>0:35</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8
	Temp (C)	26.6	26.6	26.4	26.1	25.5	23.9	23.2	22.9	22.6
	D.O. (mg/l)	7.7	7.8	7.3	6.9	5.6	3.6	2.6	2	1.2
	Cond (uS/cm)	152	153	152	152	152	152	154	155	159
	pH (S.U.)	6.8	6.8	6.8	6.8	6.7	6.6	6.4	6.3	6.2
<b>7:05</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8
	Temp (C)	25.6	25.6	25.3	24.7	24.3	23.8	23.3	23.1	22.6
	D.O. (mg/l)	6.1	6	5.3	3.8	3.3	2.4	2.6	2.1	0.5
	Cond (uS/cm)	103	101	101	101	101	101	101	102	115
	pH (S.U.)	6.5	6.5	6.5	6.5	6.4	6.3	6.3	6.2	6.2
<b>12:05</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8
	Temp (C)	25.5	25.4	25.4	24.7	24.2	23.9	23.7	23.3	22.5
	D.O. (mg/l)	5.3	5.2	5.1	3.6	3	2.7	2.6	2.2	0.2
	Cond (uS/cm)	152	152	153	152	153	153	153	155	159
	pH (S.U.)	6.6	6.6	6.6	6.6	6.5	6.4	6.4	6.4	6.3
<b>Longview Intake (16156)</b>										
<b>17:10</b>	Depth (m)	0.3	1	2	3	4	5	6		
	Temp (C)	27.6	26.6	26.4	26.3	26.1	24.2	23.1		
	D.O. (mg/l)	9.2	9.4	9.4	9.1	8.8	2.8	1.6		
	Cond (uS/cm)	154	153	153	154	154	154	155		
	pH (S.U.)	6.8	7	7.1	7.1	7.1	6.7	6.4		
<b>23:40</b>	Depth (m)	0.3	1	2	3	4	5	6		
	Temp (C)	26.4						23.6		
	D.O. (mg/l)	8.6						0.24		
	Cond (uS/cm)	152						170		
	pH (S.U.)	7.1						6.5		
<b>6:20</b>	Depth (m)	0.3	1	2	3	4	5	6		
	Temp (C)	25.9						23.8		
	D.O. (mg/l)	7.4						0.4		
	Cond (uS/cm)	152						180		
	pH (S.U.)	6.5						6.4		
<b>11:10</b>	Depth (m)	0.3	1	2	3	4	5	6		
	Temp (C)	25.9	25.9	25.9	25.9	25.9	25.7	24		
	D.O. (mg/l)	6.7	6.7	6.5	6.3	6.2	5.7	0.4		
	Cond (uS/cm)	153	152	152	153	153	154	154		
	pH (S.U.)	6.4	6.6	6.6	6.7	6.7	6.7	6.5		
<b>NETMWD Intake (10297)</b>										

<b>16:30</b>	Depth (m)	0.3								
	Temp (C)	27.9								
	D.O. (mg/l)	7.7								
	Cond (uS/cm)	173								
	pH (S.U.)	6.2								
<b>22:55</b>	Depth (m)	0.3								
	Temp (C)	26								
	D.O. (mg/l)	5								
	Cond (uS/cm)	171								
	pH (S.U.)	6.6								
<b>5:45</b>	Depth (m)	0.3								
	Temp (C)	25.7								
	D.O. (mg/l)	5.6								
	Cond (uS/cm)	170								
	pH (S.U.)	6.5								
<b>10:35</b>	Depth (m)	0.3								
	Temp (C)	26.1								
	D.O. (mg/l)	5.5								
	Cond (uS/cm)	170								
	pH (S.U.)	6.5								
<b>Lone Star Boat Ramp (10300)</b>										
<b>16:00</b>	Depth (m)	0.3								
	Temp (C)	25.2								
	D.O. (mg/l)	7.7								
	Cond (uS/cm)	216								
	pH (S.U.)	5.4								
<b>22:30</b>	Depth (m)	0.3								
	Temp (C)	25.5								
	D.O. (mg/l)	5.9								
	Cond (uS/cm)	217								
	pH (S.U.)	6.4								
<b>5:30</b>	Depth (m)	0.3								
	Temp (C)	24.6								
	D.O. (mg/l)	5.4								
	Cond (uS/cm)	160								
	pH (S.U.)	6.4								
<b>10:15</b>	Depth (m)	0.3								
	Temp (C)	24.3								
	D.O. (mg/l)	4.9								
	Cond (uS/cm)	131								
	pH (S.U.)	6.1								
<b>Hurricane Creek (16452)</b>										
<b>18:20</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	28.4	28.3	27.9	25.7	24.4				
	D.O. (mg/l)	9.2	9.2	8.8	3.6	3.4				
	Cond (uS/cm)	135	136	143	147	150				
	pH (S.U.)	6.8	6.9	6.9	6.7	6.5				
<b>1:00</b>	Depth (m)	0.3	1	2	3	4				



	Temp (C)	27.3				24.3				
	D.O. (mg/l)	7.9				0.7				
	Cond (uS/cm)	133				165				
	pH (S.U.)	6.6				6.4				
<b>7:25</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	26.6				24.4				
	D.O. (mg/l)	6.5				2.2				
	Cond (uS/cm)	133				151				
	pH (S.U.)	6.4				6.3				
<b>12:25</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	27	26.7	26.6	24.8	24.8				
	D.O. (mg/l)	6.6	6.3	6.2	1.7	0.4				
	Cond (uS/cm)	135	204	187	178	179				
	pH (S.U.)	6.3	6.3	6.4	6.3	6.4				
<b>Alley Creek (16450)</b>										
<b>18:40</b>	Depth (m)	0.3	1	2	3					
	Temp (C)	27.6	27.6	27.2	25.6					
	D.O. (mg/l)	8.9	8.8	8.5	4.4					
	Cond (uS/cm)	140	139	140	148					
	pH (S.U.)	6.8	6.8	6.9	6.7					
<b>23:25</b>	Depth (m)	0.3	1	2	3					
	Temp (C)	27.1			26.3					
	D.O. (mg/l)	8.2			5.7					
	Cond (uS/cm)	128			144					
	pH (S.U.)	6.8			6.7					
<b>6:10</b>	Depth (m)	0.3	1	2	3	3.5				
	Temp (C)	26.5			26	25				
	D.O. (mg/l)	7			4.8	1.8				
	Cond (uS/cm)	133			142	151				
	pH (S.U.)	6.8			6.5	6.5				
<b>11:00</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	26.5				24.9				
	D.O. (mg/l)	6.4				1				
	Cond (uS/cm)	135				148				
	pH (S.U.)	6.6				6.3				
<b>Brushy Creek (16448)</b>										
<b>15:45</b>	Depth (m)	0.3	1	2	3	4	4.6			
	Temp (C)	27.4	27.4	26.6	26.2	25.6	25.4			
	D.O. (mg/l)	8.9	8.8	8.8	6.9	3.1	1.1			
	Cond (uS/cm)	151	151	151	152	152	155			
	pH (S.U.)	6.8	6.8	6.8	6.7	6.7	6.4			
<b>0:15</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	26.7				26.6				
	D.O. (mg/l)	7.8				7.2				
	Cond (uS/cm)	151.0				150.0				
	pH (S.U.)	6.5				6.6				
<b>6:50</b>	Depth (m)	0.3	1	2	3	4.5				
	Temp (C)	26.3				26.0				

	D.O. (mg/l)	7.1				4.1			
	Cond (uS/cm)	151.0				185.0			
	pH (S.U.)	6.5				6.4			
<b>11:50</b>	Depth (m)	0.3	1	2	3	3.5			
	Temp (C)	26.2			26.2	26.2			
	D.O. (mg/l)	6.4			6.3	6.2			
	Cond (uS/cm)	152.0			152.0	152.0			
	pH (S.U.)	6.5			6.6	6.6			
<b>Arms/Copeland Creeks (16449)</b>									
<b>17:25</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	27.2	26.7	26.1	26	25.8			
	D.O. (mg/l)	9.1	9.2	8.5	8	6.1			
	Cond (uS/cm)	151	151	151	151	151			
	pH (S.U.)	6.9	7	6.9	6.9	6.7			
<b>23:50</b>	Depth (m)	0.3	1	2	3	4	5		
	Temp (C)	26.4					25.6		
	D.O. (mg/l)	8.0					0.2		
	Cond (uS/cm)	151.0					154.0		
	pH (S.U.)	6.6					6.5		
<b>6:30</b>	Depth (m)	0.3	1	2	3	4	4.5		
	Temp (C)	26.0					25.9		
	D.O. (mg/l)	7.2					6.2		
	Cond (uS/cm)	152.0					152.0		
	pH (S.U.)	6.4					6.5		
<b>11:25</b>	Depth (m)	0.3	1	2	3	4	5		
	Temp (C)	25.9					25.7		
	D.O. (mg/l)	6.4					3.6		
	Cond (uS/cm)	152					153		
	pH (S.U.)	6.4					6.4		

Appendix C.  
 Lake O' the Pines Nutrient Study Diurnal Data  
 12-13 July 1999

Time	Parameter										
<b>Dam (10296)</b>											
<b>12:00</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8	
	Temp (C)	30.2	29.7	29.6	29.5	29.1	28.7	28.3	27.2	25.4	
	D.O. (mg/l)	7.5	7.5	7.4	6.9	3.2	2	0.5	0.2	0.1	
	Cond (uS/cm)	147	147	147	148	148	148	148	155	152	
	pH (S.U.)	6.9	7	7	7	6.7	6.6	6.4	6.4	6.4	
<b>17:55</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8	
	Temp (C)	32.3	32.1	30.1	29.7	29.3	28.6	27.8	27	25.7	
	D.O. (mg/l)	8	8.1	8.5	7.6	5	1.6	0.2	0.1	0.1	
	Cond (uS/cm)	148	148	147	147	147	148	148	157	170	
	pH (S.U.)	7.6	7.7	7.8	7.6	7.4	7	6.6	6.6	6.6	
<b>23:50</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8	
	Temp (C)	31	30.3	29.8	29.7	29.5	28.9	28.5	27.2	24.6	
	D.O. (mg/l)	8	8.4	7.9	7.4	6.2	2.5	0.9	0.2	0.1	
	Cond (uS/cm)	147	147	147	147	148	147	147	155	179	
	pH (S.U.)	7.5	7.7	7.7	7.6	7.4	7	6.7	6.6	6.7	
<b>6:45</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8	9
	Temp (C)	29.7	29.7	29.7	29.5	29.4	29.1	28.4	27.6	24.9	24.1
	D.O. (mg/l)	7.7	7.7	7.7	6.9	6.1	3.3	0.5	0.2	0.1	0.1
	Cond (uS/cm)	147	147	148	148	147	147	147	151	175	182
	pH (S.U.)	6.9	7	7.1	7.1	7	6.8	6.5	6.5	6.5	6.5
<b>Longview Intake (16156)</b>											
<b>11:15</b>	Depth (m)	0.3	1	2	3	4	5	6	6.3		
	Temp (C)	30	29.8	29.5	29.5	29.5	29.4	28.4	28		
	D.O. (mg/l)	7	6.9	6.3	6.2	6.1	6	0.4	0.2		
	Cond (uS/cm)	145	144	144	144	144	144	149	203		
	pH (S.U.)	6.5	6.6	6.6	6.6	6.6	6.6	6.4	6.4		
<b>17:15</b>	Depth (m)	0.3	1	2	3	4	5	6			
	Temp (C)	30.6	29.8	29.5	29.5	29.4	29.3	28.5			
	D.O. (mg/l)	8.3	7.1	5.8	5.9	5.7	5.5	0.5			
	Cond (uS/cm)	145	143	143	143	143	143	148			
	pH (S.U.)	7.6	7.5	7.3	7.1	7	6.9	6.3			
<b>0:46</b>	Depth (m)	0.3	1	2	3	4	5	6			
	Temp (C)	30.3	30.3	29.5	29.4	29.4	29.3	28.2			
	D.O. (mg/l)	8.3	8.1	5.6	5.6	5.5	5.4	0.3			
	Cond (uS/cm)	146	145	142	143	144	142	150			
	pH (S.U.)	7.2	7.3	7.2	7	7	6.9	6.7			
<b>6:05</b>	Depth (m)	0.3	1	2	3	4	5	6			
	Temp (C)	29.5	29.5	29.5	29.5	29.5	29.4	28.7			
	D.O. (mg/l)	6.4	6.4	6.4	6.4	6.2	5.9	1.3			
	Cond (uS/cm)	143	143	142	142	144	143	147			

	pH (S.U.)	6.7	6.8	6.8	6.8	6.8	6.8	6.8			
<b>NETMWD Intake (10297)</b>											
<b>10:15</b>	Depth (m)	0.3									
	Temp (C)	29.7									
	D.O. (mg/l)	5.4									
	Cond (uS/cm)	145									
	pH (S.U.)	6									
<b>16:30</b>	Depth (m)	0.3									
	Temp (C)	33.3									
	D.O. (mg/l)	7.3									
	Cond (uS/cm)	141									
	pH (S.U.)	6.9									
<b>20:15</b>	Depth (m)	0.3									
	Temp (C)	31.1									
	D.O. (mg/l)	6.3									
	Cond (uS/cm)	142									
	pH (S.U.)	7.1									
<b>5:15</b>	Depth (m)	0.3									
	Temp (C)	30.5									
	D.O. (mg/l)	7.2									
	Cond (uS/cm)	138									
	pH (S.U.)	6.8									
<b>Lone Star Boat Ramp (10300)</b>											
<b>9:45</b>	Depth (m)	0.3									
	Temp (C)	28.4									
	D.O. (mg/l)	2.4									
	Cond (uS/cm)	258									
	pH (S.U.)	5.7									
<b>16:15</b>	Depth (m)	0.3									
	Temp (C)	28.9									
	D.O. (mg/l)	3.3									
	Cond (uS/cm)	265									
	pH (S.U.)	6.3									
<b>22:00</b>	Depth (m)	0.3									
	Temp (C)	29									
	D.O. (mg/l)	3									
	Cond (uS/cm)	261									
	pH (S.U.)	6.9									
<b>5:00</b>	Depth (m)	0.3									
	Temp (C)	28.1									
	D.O. (mg/l)	2.6									
	Cond (uS/cm)	258									
	pH (S.U.)	6.5									
<b>Hurricane Creek (16452)</b>											
<b>12:20</b>	Depth (m)	0.3	1	2	3	4	4.7				
	Temp (C)	31.1	30.5	30	29.3	28.7	28.4				
	D.O. (mg/l)	7	7	6.6	4.8	0.8	0.3				

	Cond (uS/cm)	133	132	133	145	147	152				
	pH (S.U.)	6.7	6.7	6.8	6.7	6.5	6.3				
<b>18:15</b>	Depth (m)	0.3	1	2	3	4					
	Temp (C)	33	30.5	30	29.2	28.6					
	D.O. (mg/l)	7.9	7.4	6.9	2.3	0.3					
	Cond (uS/cm)	130	132	135	145	148					
	pH (S.U.)	7.1	7.1	7	6.7	6.5					
<b>0:15</b>	Depth (m)	0.3	1	2	3	4	5				
	Temp (C)	31.4	30.6	29.9	29.3	28.7	28.2				
	D.O. (mg/l)	7.7	7.4	7	3.6	0.8	0.1				
	Cond (uS/cm)	131	134	141	144	147	190				
	pH (S.U.)	7.1	7.1	7.1	6.9	6.7	6.6				
<b>7:05</b>	Depth (m)	0.3	1	2	3	4					
	Temp (C)	30.2	30.2	29.9	29.4	28.7					
	D.O. (mg/l)	7.1	7.1	6	3.5	0.8					
	Cond (uS/cm)	132	31	136	142	147					
	pH (S.U.)	6.8	6.8	6.8	6.7	6.6					
<b>Alley Creek (16450)</b>											
<b>12:50</b>	Depth (m)	0.3	1	2	3	4	4.5				
	Temp (C)	31.3	30.3	30	29.9	29.3	29				
	D.O. (mg/l)	7.3	7.2	6.7	6.3	1.3	0.6				
	Cond (uS/cm)	134	135	127	127	145	147				
	pH (S.U.)	6.5	6.8	6.8	6.8	6.5	6.4				
<b>18:40</b>	Depth (m)	0.3	1	2	3	4	4.5				
	Temp (C)	32.9	31.3	30.3	29.9	29.4	29				
	D.O. (mg/l)	8.8	8.8	7.9	6.3	3	0.7				
	Cond (uS/cm)	133	133	130	130	142	168				
	pH (S.U.)	7.6	7.8	7.7	7.4	7.1	6.7				
<b>1:05</b>	Depth (m)	0.3	1	2	3	3.5					
	Temp (C)	31.5	30.6	30.1	29.8	29.6					
	D.O. (mg/l)	8.2	7.9	6.9	5.4	0.3					
	Cond (uS/cm)	134	130	127	127	137					
	pH (S.U.)	7.3	7.4	7.3	7.1	6.8					
<b>7:35</b>	Depth (m)	0.3	1	2	3	4	5				
	Temp (C)	30.3	30.3	30.2	29.8	29.4	28.7				
	D.O. (mg/l)	7.7	7.7	6.7	4.3	1.6	0.2				
	Cond (uS/cm)	132	132	133	134	140	157				
	pH (S.U.)	6.7	6.8	6.9	6.7	6.6	6.5				
<b>Brushy Creek (16448)</b>											
<b>11:35</b>	Depth (m)	0.3	1	2	3	3.3					
	Temp (C)	29.8	29.6	29.3	29.2	29					
	D.O. (mg/l)	7.5	7.4	6.9	6.7	6.1					
	Cond (uS/cm)	146	146	146	146	146					
	pH (S.U.)	6.8	6.9	6.9	6.8	6.8					
<b>17:35</b>	Depth (m)	0.3	1	2	3	4	5	5.5			
	Temp (C)	33.1	30.5	29.7	29.4	29.3	28.9	28.9			
	D.O. (mg/l)	8.2	8.5	8.0	7.1	6.9	5.3	5.0			
	Cond (uS/cm)	147.0	147.0	147.0	147.0	147.0	147.0	147.0			

	pH (S.U.)	7.4	7.7	7.6	7.4	7.2	7.0	6.9			
<b>23:25</b>	Depth (m)	0.3	1	2	3	4	5				
	Temp (C)	31.4	31.2	29.6	29.3	29.1	28.9				
	D.O. (mg/l)	8.2	8.3	7.4	6.7	5.9	3.3				
	Cond (uS/cm)	148.0	148.0	147.0	147.0	146.0	149.0				
	pH (S.U.)	7.6	7.8	7.7	7.6	7.2	7.0				
<b>6:25</b>	Depth (m)	0.3	1	2	3	4	4.5				
	Temp (C)	29.6	29.6	29.3	29.3	29.1	28.8				
	D.O. (mg/l)	7.5	7.5	6.3	6.3	5.9	3.5				
	Cond (uS/cm)	146	147.0	146.0	146.0	147.0	157.0				
	pH (S.U.)	6.8	6.9	6.9	6.9	6.8	6.7				
<b>Arms/Copeland Creeks (16449)</b>											
<b>11:00</b>	Depth (m)	0.3	1	2	3	4	5	6	6.2		
	Temp (C)	29.9	29.4	29.2	29.1	29	29	28.9	28.9		
	D.O. (mg/l)	7.6	7.5	6.8	6.3	6.1	6.5	2.2	0.2		
	Cond (uS/cm)	142	143	143	143	143	142	142	178		
	pH (S.U.)	6.3	6.5	6.5	6.4	6.4	6.4	6.4	6.5		
<b>17:00</b>	Depth (m)	0.3	1	2	3	4	5	6			
	Temp (C)	31.6	30.2	29.4	29.2	29.1	28.9	28.8			
	D.O. (mg/l)	8.8	8.8	7.9	6.6	6.0	5.1	0.2			
	Cond (uS/cm)	145.0	145.0	141.0	142.0	142.0	142.0	149.0			
	pH (S.U.)	7.5	7.7	7.5	7.2	6.9	6.8	6.7			
<b>22:55</b>	Depth (m)	0.3	1	2	3	4	4.5				
	Temp (C)	30.8	29.6	29.3	29.1	29.0	28.9	28.8			
	D.O. (mg/l)	8.3	7.9	6.5	6.0	5.6	4.9	0.4			
	Cond (uS/cm)	144.0	142.0	142.0	142.0	140.0	140.0	144			
	pH (S.U.)	7.6	7.6	7.3	7.1	7.0	6.8	6.8			
<b>5:50</b>	Depth (m)	0.3	1	2	3	4	5	6			
	Temp (C)	29.4	29.4	29.4	29.4	29.1	28.9	28.5			
	D.O. (mg/l)	7.1	7.1	7.1	6.7	5.8	5.1	0.1			
	Cond (uS/cm)	142	142	142	142	142	141	152			
	pH (S.U.)	6.8	6.9	6.9	6.9	6.9	6.8	6.7			

Appendix C.  
Lake O' the Pines Nutrient Study Diurnal Data  
16-17 August 1999

Time	Parameter									
<b>Dam (10296)</b>										
<b>12:05</b>	Depth (m)	0.3	1	2	3	4	5	6	7	7.5
	Temp (C)	31.1	30.8	30.4	30.3	30.1	30.1	30.1	27.4	26.5
	D.O. (mg/l)	6.2	6.2	5.9	5.6	5.3	5.2	5.3	2.2	1.5
	Cond (uS/cm)	149	150	150	150	150	150	150	179	180
	pH (S.U.)	6.7	6.8	6.8	6.8	6.7	6.7	6.6	6.6	6.6
<b>17:55</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8
	Temp (C)	32.6	32.4	31.6	30.3	30.2	30.1	29.9	27.5	25.8
	D.O. (mg/l)	7.3	7.3	6.8	5.9	5.6	5.7	4.7	3.1	2.4
	Cond (uS/cm)	150	150	151	149	150	150	152	176	194
	pH (S.U.)	7.6	7.5	7.5	7.5	7.2	7.1	7	7	6.8
<b>23:55</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8
	Temp (C)	31.5	31.4	30.7	30.4	30.2	30.1	30	27.2	25.5
	D.O. (mg/l)	6.3	6.2	5.6	5.2	4.8	4.7	4.2	2	1.5
	Cond (uS/cm)	151	151	150	150	150	150	153	177	191
	pH (S.U.)	7.5	7.5	7.5	7.4	7.3	7.3	7.2	7.1	7
<b>6:20</b>	Depth (m)	0.3	1	2	3	4	5	6	7	8
	Temp (C)	30.4	30.5	30.5	30.5	30.4	30.2	30.1	26.7	25.6
	D.O. (mg/l)	4.9	4.8	4.8	4.7	4.7	4.5	3.9	1.8	1.3
	Cond (uS/cm)	150	149	150	150	150	150	151	180	188
	pH (S.U.)	7	7.1	7.1	7.2	7.2	7.2	7.1	7	6.9
<b>Longview Intake (16156)</b>										
<b>11:30</b>	Depth (m)	0.3	1	2	3	4	5	5.5		
	Temp (C)	31.3	30.8	30.6	30.5	30.5	30.5	30.5		
	D.O. (mg/l)	6.5	6.6	6.3	6.1	6.1	6.2	5.2		
	Cond (uS/cm)	150	150	150	150	149	148	169		
	pH (S.U.)	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
<b>17:15</b>	Depth (m)	0.3	1	2	3	4	5	6		
	Temp (C)	33.4	31.4	30.7	30.6	30.5	30.4	30.4		
	D.O. (mg/l)	8.4	8.7	7.5	7	6.8	6.7	5.6		
	Cond (uS/cm)	150	150	150	150	150	150	151		
	pH (S.U.)	7.5	7.7	7.4	7.3	7.2	7.2	7		
<b>23:15</b>	Depth (m)	0.3	1	2	3	4	5	5.5		
	Temp (C)	31.2	31.3	31.1	30.7	30.5	30.5	30.4		
	D.O. (mg/l)	7.3	7.4	7.3	6.9	6.4	5.7	5.2		
	Cond (uS/cm)	150	150	150	149	150	149	152		
	pH (S.U.)	7.3	7.6	7.6	7.7	7.6	7.5	7.3		

<b>5:45</b>	Depth (m)	0.3	1	2	3	4	5			
	Temp (C)	30.6	30.6	30.6	30.6	30.6	30.4			
	D.O. (mg/l)	5.5	5.3	5.2	5.1	4.9	4			
	Cond (uS/cm)	150	150	149	150	150	151			
	pH (S.U.)	7.4	7.4	7.4	7.4	7.4	7.3			
<b>NETMWD Intake (10297)</b>										
<b>10:35</b>	Depth (m)	0.3								
	Temp (C)	30.2								
	D.O. (mg/l)	6.7								
	Cond (uS/cm)	150								
	pH (S.U.)	6.3								
<b>16:30</b>	Depth (m)	0.3								
	Temp (C)	31.7								
	D.O. (mg/l)	8.1								
	Cond (uS/cm)	150								
	pH (S.U.)	7.1								
<b>22:25</b>	Depth (m)	0.3								
	Temp (C)	31.8								
	D.O. (mg/l)	7								
	Cond (uS/cm)	146								
	pH (S.U.)	7.6								
<b>4:50</b>	Depth (m)	0.3								
	Temp (C)	30.4								
	D.O. (mg/l)	5.5								
	Cond (uS/cm)	146								
	pH (S.U.)	7.5								
<b>Lone Star Boat Ramp (10300)</b>										
<b>10:10</b>	Depth (m)	0.3								
	Temp (C)	28.2								
	D.O. (mg/l)	3.2								
	Cond (uS/cm)	310								
	pH (S.U.)	5.9								
<b>16:10</b>	Depth (m)	0.3								
	Temp (C)	29.3								
	D.O. (mg/l)	5.6								
	Cond (uS/cm)	311								
	pH (S.U.)	6.7								
<b>22:00</b>	Depth (m)	0.3								
	Temp (C)	28.4								
	D.O. (mg/l)	3.6								
	Cond (uS/cm)	322								
	pH (S.U.)	7.3								
<b>4:30</b>	Depth (m)	0.3								
	Temp (C)	27.5								
	D.O. (mg/l)	3.8								
	Cond (uS/cm)	314								
	pH (S.U.)	7								



<b>Hurricane Creek (16452)</b>									
<b>12:30</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	31.2	30.9	30.7	30.5	30.5			
	D.O. (mg/l)	7	7	6.8	6.5	6.1			
	Cond (uS/cm)	148	148	148	147	147			
	pH (S.U.)	6.8	6.9	6.9	6.8	6.8			
<b>18:15</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	32.6	32.6	31.1	30.4	30.1			
	D.O. (mg/l)	6.7	6.8	6.8	6.1	5.8			
	Cond (uS/cm)	150	150	149	147	149			
	pH (S.U.)	7.1	7.2	7.3	7.1	7			
<b>0:20</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	31.6	31.7	30.8	30.4	30.1			
	D.O. (mg/l)	6.4	6.5	6.2	3.1	5.9			
	Cond (uS/cm)	150	149	148	146	147			
	pH (S.U.)	7.1	7.2	7.2	7.2	7.2			
<b>6:40</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	30.6	30.6	30.6	30.3	30.1			
	D.O. (mg/l)	5	4.9	4.9	4.3	2.3			
	Cond (uS/cm)	148	148	149	150	150			
	pH (S.U.)	6.9	7	7.1	7.1	7			
<b>Alley Creek (16450)</b>									
<b>12:50</b>	Depth (m)	0.3	1	2	3	4	4.5		
	Temp (C)	32.3	31.6	31.3	31.2	31	30.7		
	D.O. (mg/l)	7.2	7.3	7	6.9	6.7	1		
	Cond (uS/cm)	145	146	145	145	145	226		
	pH (S.U.)	7	7	7	7	7	6.7		
<b>18:40</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	32.9	31.7	31.2	31	30.9			
	D.O. (mg/l)	7.5	7	6.8	6.2	5.5			
	Cond (uS/cm)	147	145	141	141	143			
	pH (S.U.)	7.8	7.8	7.7	7.6	7.4			
<b>0:45</b>	Depth (m)	0.3	1	2	3				
	Temp (C)	31.3	31.3	31.3	31				
	D.O. (mg/l)	6.9	6.7	6.5	5.5				
	Cond (uS/cm)	145	145	145	145				
	pH (S.U.)	7.1	7.3	7.4	7.3				
<b>7:05</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	30.7	30.7	30.7	30.7	30.7			
	D.O. (mg/l)	4.3	4.3	4.2	4.2	4.2			
	Cond (uS/cm)	144	144	143	144	146			
	pH (S.U.)	7	7	7.1	7.1	7.1			
<b>Brushy Creek (16448)</b>									
<b>11:50</b>	Depth (m)	0.3	1	2	3	4			
	Temp (C)	32	31.5	31.3	31.2	31			
	D.O. (mg/l)	6.9	7	7	6.7	6.5			
	Cond (uS/cm)	151	149	150	150	149			
	pH (S.U.)	6.7	6.8	6.8	6.8	6.8			

<b>17:35</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	33.2	33.0	32.4	31.2	31.0				
	D.O. (mg/l)	8.3	8.3	8.3	7.1	3.8				
	Cond (uS/cm)	152.0	151.0	150.0	150.0	152.0				
	pH (S.U.)	7.8	7.9	7.9	7.8	7.4				
<b>23:25</b>	Depth (m)	0.3	1	2	3	4.5				
	Temp (C)	32.1	32.1	31.2	30.9	30.6				
	D.O. (mg/l)	7.1	7.1	6.4	5.9	5.0				
	Cond (uS/cm)	150.0	150.0	150.0	150.0	150.0				
	pH (S.U.)	7.7	7.8	7.8	7.7	7.4				
<b>6:05</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	31.0	31.0	31.0	31.0	30.7				
	D.O. (mg/l)	5.0	4.9	4.9	4.2	3.9				
	Cond (uS/cm)	151.0	150.0	150.0	149.0	150.0				
	pH (S.U.)	7.3	7.3	7.3	7.3	7.3				
<b>Arms/Copeland Creeks (16449)</b>										
<b>11:10</b>	Depth (m)	0.3	1	2	3	4	5			
	Temp (C)	31.3	30.8	30.8	30.7	30.6	30.5			
	D.O. (mg/l)	7.1	6.7	6	5.4	5.4	1.8			
	Cond (uS/cm)	149	149	149	149	150	158			
	pH (S.U.)	6.4	6.5	6.5	6.4	6.5	6.4			
<b>17:00</b>	Depth (m)	0.3	1	2	3	4	5			
	Temp (C)	33.1	31.4	31.0	30.8	30.5	30.3			
	D.O. (mg/l)	8.3	8.4	8.2	7.6	6.4	4.3			
	Cond (uS/cm)	149.0	150.0	148.0	149.0	149.0	184.0			
	pH (S.U.)	7.5	7.6	7.5	7.3	7.1	6.9			
<b>23:00</b>	Depth (m)	0.3	1	2	3	4	4.5			
	Temp (C)	31.5	31.4	30.8	30.7	30.6				
	D.O. (mg/l)	7.5	7.5	6.8	6.4	5.8				
	Cond (uS/cm)	150.0	150.0	149.0	150.0	148.0				
	pH (S.U.)	7.8	7.8	7.8	7.7	7.6				
<b>5:30</b>	Depth (m)	0.3	1	2	3	4				
	Temp (C)	30.7	30.7	30.7	30.7	30.5				
	D.O. (mg/l)	5.5	5.5	5.6	5.6	4.4				
	Cond (uS/cm)	149	149	149	149	149				
	pH (S.U.)	7.5	7.5	7.5	7.5	7.4				

**Appendix D.**  
**Primary Productivity Data.**

**Appendix D.**  
**March 16, 1999 - Primary Productivity Study**

Depth (meters)	Chamber	Initial D.O.	Initial D.O. Average	Final D.O.	Final D.O. Average (Light)	Final D.O. Average (Dark)	Net Primary Productivity	Respiration	Gross Primary Productivity
<b>Hurricane Creek (16452)</b>									
0.5	Light	8.8	8.8	10.1	10.1	10	1.300	-1.200	0.100
	Light	9.1		10.1					
	Dark	8.6		10					
	Dark	8.7		10					
1	Light	8.7	8.6	10.2	10.2	8.65	1.575	-0.025	1.550
	Light	8.6		10.2					
	Dark	8.7		8.7					
	Dark	8.5		8.6					
2	Light	8.6	8.6	9	9	8.65	0.425	-0.075	0.350
	Light	8.6		9					
	Dark	8.5		8.7					
	Dark	8.6		8.6					
<b>Dam (10296)</b>									
0.5	Light	9.9	9.8	10.5	10.5	10	0.650	-0.150	0.500
	Light	9.6		10.5					
	Dark	9.9		10					
	Dark	10		10					
1	Light	10.3	10.2	10.6	10.55	10.1	0.350	0.100	0.450
	Light	10.2		10.5					
	Dark	10.2		10.1					
	Dark	10.1		10.1					
2	Light	10.3	10.4	10.3	10.35	10.05	-0.025	0.325	0.300
	Light	10.4		10.4					
	Dark	10.4		10.3					
	Dark	10.4		9.8					

**Appendix D. - March 16, 1999 (Concluded)**

<b>Depth (meters)</b>	<b>Chamber</b>	<b>Initial D.O.</b>	<b>Initial D.O. Average</b>	<b>Final D.O.</b>	<b>Final D.O. Average (Light)</b>	<b>Final D.O. Average (Dark)</b>	<b>Net Primary Productivity</b>	<b>Respiration</b>	<b>Gross Primary Productivity</b>
Longview Intake (16156)									
0.5	Light	9.6	9.6	10.1	10.1	9.6	0.500	0.000	0.500
	Light	9.6		10.1					
	Dark	9.5		9.5					
	Dark	9.7		9.7					
1	Light	9.5	9.6	10	10.15	9.6	0.550	0.000	0.550
	Light	9.5		10.3					
	Dark	9.6		9.6					
	Dark	9.8		9.6					
2	Light	9.3	9.3	9.5	9.6	8.75	0.275	0.575	0.850
	Light	9.3		9.7					
	Dark	9.3		8.7					
	Dark	9.4		8.8					
Arms/Copeland Creeks (16449)									
0.5	Light	10.8	10.8	Lost	10.5	10.3	-0.325	0.525	0.200
	Light	10.8		10.5					
	Dark	10.9		10.3					
	Dark	10.8		10.3					
1	Light	11.2	11.6	10	10.15	9.25	-1.375	2.275	0.900
	Light	11.1		10.3					
	Dark	12		9.1					
	Dark	11.8		9.4					
2	Light	12	11.2	10.3	10.2	10.15	-1.225	1.275	0.050
	Light	11.2		10.1					
	Dark	11.4		10.3					
	Dark	11.1		10					

**Appendix D.**  
**May 24,1999 - Primary Productivity Study**

Depth (meters)	Chamber	Initial D.O.	Initial D.O. Average	Final D.O.	Final D.O. Average (Light)	Final D.O. Average (Dark)	Net Primary Productivity	Respiration	Gross Primary Productivity
<b>Hurricane Creek (16452)</b>									
0.5	Light	8.5	8.6	9.2	9.15	8.6	0.575	-0.025	0.550
	Light	8.6		9.1					
	Dark	8.5		8.5					
	Dark	8.7		8.7					
1	Light	8.4	8.5	8.7	8.85	8.55	0.400	-0.100	0.300
	Light	8.4		9					
	Dark	8.6		8.6					
	Dark	8.4		8.5					
3	Light	5.5	5.9	5.9	6.1	6	0.275	-0.175	0.100
	Light	5.8		6.3					
	Dark	6.1		6.1					
	Dark	5.9		5.9					
<b>Dam (10296)</b>									
0.5	Light	8.9	8.9	9.1	9.05	8.85	0.150	0.050	0.200
	Light	8.9		9					
	Dark	8.9		8.9					
	Dark	8.9		8.8					
1	Light	8.6	9.1	9.3	9.25	8.9	0.300	0.050	0.350
	Light	8.7		9.2					
	Dark	9.7		9					
	Dark	8.8		8.8					
3	Light	8.1	9.4	8.8	8.8	8.8	-0.275	0.275	0.000
	Light	10		8.8					
	Dark	9.2		8.8					
	Dark	9		8.8					

**Appendix D. - May 24, 1999 (Concluded)**

Depth (meters)	Chamber	Initial D.O.	Initial D.O. Average	Final D.O.	Final D.O. Average (Light)	Final D.O. Average (Dark)	Net Primary Productivity	Respiration	Gross Primary Productivity
Longview Intake (16156)									
0.5	Light	9.1	9.0	9.2	9.2	8.75	0.175	0.275	0.450
	Light	9		<b>Lost</b>					
	Dark	9		9					
	Dark	9		8.5					
1	Light	9.1	9.2	9.5	9.4	9.1	0.200	0.100	0.300
	Light	8.8		9.3					
	Dark	9.7		9					
	Dark	9.2		9.2					
3	Light	8.9	9.0	8.8	8.8	8.25	-0.150	0.700	0.550
	Light	9		8.8					
	Dark	9.2		8.3					
	Dark	8.7		8.2					
Arms/Copeland Creeks (16449)									
0.5	Light	9.4	9.5	9.4	9.35	8.9	-0.150	0.600	0.450
	Light	9.3		9.3					
	Dark	9.8		9					
	Dark	9.5		8.8					
1	Light	9.3	9.2	9.5	9.4	9.05	0.150	0.200	0.350
	Light	9.2		9.3					
	Dark	9.3		9					
	Dark	9.2		9.1					
3	Light	9.1	9.0	9.2	9.1	8.75	0.075	0.275	0.350
	Light	9		9					
	Dark	9		8.7					
	Dark	9		8.8					

**Appendix D.**  
**July 13,1999 - Primary Productivity Study**

Depth (meters)	Chamber	Initial D.O.	Initial D.O. Average	Final D.O.	Final D.O. Average (Light)	Final D.O. Average (Dark)	Net Primary Productivity	Respiration	Gross Primary Productivity
<b>Hurricane Creek (16452)</b>									
0.5	Light	6	6.05	6.1	6.2	5.95	0.150	0.100	0.250
	Light	6		6.3					
	Dark	6		5.8					
	Dark	6.2		6.1					
1	Light	5.9	5.85	6.6	6.4	5.7	0.550	0.150	0.700
	Light	6		6.2					
	Dark	5.6		5.6					
	Dark	5.9		5.8					
3	Light	5.5	5.5	5.6	5.55	5.25	0.050	0.250	0.300
	Light	5.5		5.5					
	Dark	5.5		5.3					
	Dark	5.5		5.2					
<b>Dam (10296)</b>									
0.5	Light	7.8	7.35	6.3	6.05	6.15	-1.300	1.200	-0.100
	Light	7.4		5.8					
	Dark	7		6.3					
	Dark	7.2		6					
1	Light	6.3	6.325	<b>Lost</b>	6.3	6.15	-0.025	0.175	0.150
	Light	6.3		6.3					
	Dark	6.4		6.1					
	Dark	6.3		6.2					
3	Light	6	6.1	7	7	6.15	0.900	-0.050	0.850
	Light	6		7					
	Dark	6.3		6.2					
	Dark	6.1		6.1					



**Appendix D. - July 13, 1999 (Concluded)**

<b>Depth (meters)</b>	<b>Chamber</b>	<b>Initial D.O.</b>	<b>Initial D.O. Average</b>	<b>Final D.O.</b>	<b>Final D.O. Average (Light)</b>	<b>Final D.O. Average (Dark)</b>	<b>Net Primary Productivity</b>	<b>Respiration</b>	<b>Gross Primary Productivity</b>
Longview Intake (16156)									
0.5	Light	6.2	6.25	6.3	6.35	6	0.100	0.250	0.350
	Light	6.5		6.4					
	Dark	6		6					
	Dark	6.3		6					
1	Light	6.4	6.3	6.6	6.6	6	0.300	0.300	0.600
	Light	6.5		6.6					
	Dark	6		6					
	Dark	6.3		6					
3	Light	6	6	5.8	6.1	5.65	0.100	0.350	0.450
	Light	6		6.4					
	Dark	6		5.7					
	Dark	6		5.6					
Arms/Copeland Creeks (16449)									
0.5	Light	6	6.025	6.2	6.25	5.95	0.225	0.075	0.300
	Light	6.1		6.3					
	Dark	6.2		5.9					
	Dark	5.8		6					
1	Light	6.1	6.075	6.5	6.35	6	0.275	0.075	0.350
	Light	6.1		6.2					
	Dark	5.8		5.9					
	Dark	6.3		6.1					
3	Light	6.6	6.325	6.4	6.35	6	0.025	0.325	0.350
	Light	6.2		6.3					
	Dark	6.2		6					
	Dark	6.3		6					

**Appendix D.**  
**August 21,1999 - Primary Productivity Study**

Depth (meters)	Chamber	Initial D.O.	Initial D.O. Average	Final D.O.	Final D.O. Average (Light)	Final D.O. Average (Dark)	Net Primary Productivity	Respiration	Gross Primary Productivity
<b>Hurricane Creek (16452)</b>									
0.5	Light	5.1	5.125	5.9	5.75	5	0.625	0.125	0.750
	Light	5.2		5.6					
	Dark	5		5					
	Dark	5.2		5					
1	Light	5.1	5.1	5.5	5.55	4.9	0.450	0.200	0.650
	Light	5.2		5.6					
	Dark	5		4.9					
	Dark	5.1		4.9					
3	Light	4.8	4.75	4.8	4.75	4.6	0.000	0.150	0.150
	Light	4.7		4.7					
	Dark	4.7		4.6					
	Dark	4.8		4.6					
<b>Dam (10296)</b>									
0.5	Light	4.9	5.325	5.3	5.55	4.85	0.225	0.475	0.700
	Light	5.7		5.8					
	Dark	5.2		4.9					
	Dark	5.5		4.8					
1	Light	5	5.05	5.9	6.05	4.9	1.000	0.150	1.150
	Light	5.1		6.2					
	Dark	5		4.9					
	Dark	5.1		4.9					
3	Light	4.7	4.6	4.7	4.7	4.5	0.100	0.100	0.200
	Light	4.6		4.7					
	Dark	4.6		4.5					
	Dark	4.5		4.5					

**Appendix D. - August 21, 1999 (Concluded)**

<b>Depth (meters)</b>	<b>Chamber</b>	<b>Initial D.O.</b>	<b>Initial D.O. Average</b>	<b>Final D.O.</b>	<b>Final D.O. Average (Light)</b>	<b>Final D.O. Average (Dark)</b>	<b>Net Primary Productivity</b>	<b>Respiration</b>	<b>Gross Primary Productivity</b>
Longview Intake (16156)									
0.5	Light	5.7	5.475	6.1	6.1	5.25	0.625	0.225	0.850
	Light	5.5		6.1					
	Dark	5.4		5.3					
	Dark	5.3		5.2					
1	Light	5.5	5.7	6.1	6.05	5.25	0.350	0.450	0.800
	Light	5.5		6					
	Dark	6		5.3					
	Dark	5.8		5.2					
3	Light	4.7	4.6	4.6	4.6	4.4	0.000	0.200	0.200
	Light	4.6		4.6					
	Dark	4.6		4.4					
	Dark	4.5		4.4					
Arms/Copeland Creeks (16449)									
0.5	Light	5.5	5.525	6.3	6.4	5.45	0.875	0.075	0.950
	Light	5.6		6.5					
	Dark	5.5		5.4					
	Dark	5.5		5.5					
1	Light	5.6	5.65	6	6.1	5.4	0.450	0.250	0.700
	Light	5.9		6.2					
	Dark	5.6		5.4					
	Dark	5.5		5.4					
3	Light	5.6	5.475	5.6	5.6	5.3	0.125	0.175	0.300
	Light	5.5		5.6					
	Dark	5.4		5.3					
	Dark	5.4		5.3					

