South Carolina Electric & Gas
Columbia, South Carolina

Saluda Project (FERC No. 516)
Lake Murray Water Quality Report

1.0 BACKGROUND

1.1 FERC Relicensing

The Saluda Hydroelectric Project (Saluda Project) is a federally licensed hydroelectric project located on the Saluda River in Lexington County, South Carolina. The Saluda Project is owned and operated by South Carolina Electric & Gas Company (SCE&G) and licensed by the *Federal Energy Regulatory Commission* (FERC) as Project No. 516 and is due to expire in 2010. As part of the relicensing process, SCE&G has contracted with Reservoir Environmental Management, Inc. (REMI) to consolidate current and historical water quality information for the Saluda Project and the Saluda River immediately downstream of the Project. This report presents this consolidated water quality information to be used as part of the relicensing process for the Saluda Project.

1.2 Water Quality Data Available

A considerable amount of water quality information has been collected on Lake Murray over the last six decades. The first data were collected in 1947 and these early efforts continued up to the early 1970's by the South Carolina Pollution Control Authority, the South Carolina Department of Health and Environmental Control (SCDHEC), and the U.S. Geological Survey (USGS). In 1974, the Environmental Protection Agency (EPA) included Lake Murray in its National Eutrophication Survey under which data were collected from significant reservoirs and lakes located all over the United States. As part of the relicensing process for the current FERC license for operating The Saluda Project, SCE&G contracted with ERC, Inc., to conduct a comprehensive assessment of Lake Murray in 1974 and 1975. The SCDHEC has monitored the lake and its inflowing waters monthly since about 1973 and continues to the present time. SCE&G in cooperation with USGS collected data on Lake Murray during the period 1990-1996. SCE&G has continued to monitor water quality on the lake since 1996.

Maps of the study area are presented in Figures 1 through 5. The main body of Lake Murray is presented in Figure 1. The dark blue lines on the map represents the original river channel for the Saluda River as well as the major creeks, and the number of Saluda River miles upstream from the *dam* are indicated on the map. The sampling locations for the SCDHEC and SCE&G are also shown on the maps. Figure 2 shows the upper portion of Lake Murray as well as the inflow region where the Bush and Little Rivers enter the lake and the Saluda River up to Chappells. Figure 3 shows the Little Saluda River watershed and embayment. Figure 4 shows the area above Chappells, and Figure 5 shows the upper portions of the watersheds for the Bush and Little Rivers.

Pertinent characteristics of Lake Murray are presented in Table 1. The reservoir has a maximum depth of 175 feet. The lake is approximately 40 miles long and has a maximum width of 14 miles. The shoreline length is 524 miles, with 330 miles developed for residential use. The shoreline development ratio is 17.7 which means that the lake has 17.7 times the shoreline length that would exist if the lake were circular. Therefore, processes related to the lake margin (e.g., shoreline development, recreational development, and housing development) can be expected to be significant.

Hydrology of the watershed flows is presented in Table 2 and shows the percent distribution of flows from the various sub-basins. It is interesting to note that ERC reported that 56% of inflow enters during the first four months of the year. Annual flows into Lake Murray vary year to year and can affect water quality significantly. Figure 6 presents the annual and summer month flows at Chappells, which is downstream from Greenwood Hydro.

1.3 Important Issues for Lake Murray

The most important water quality parameters are those that might affect the water uses of Lake Murray, i.e., recreation, fishing, drinking water supply, and aesthetics. The following water quality parameters are considered to be the most important. The most important factors that affect these parameters are major sources of wastewater discharges in the watershed and other watershed activities.

- Pathogens are organisms in water that cause diseases in people and are always a concern of those who use water in the natural environment, especially those who are in direct "full-body" contact with the water.

- Temperature and DO are two parameters which are perhaps the most important indicators of the fundamental characteristics of water quality in reservoirs. Temperature affects the physical structure of the reservoir by causing summer thermal stratification which essentially causes the lake to set up in three layers of water: the surface layer, or epilimnion; the bottom layer, or hypolimnion; and the middle layer, or metalimnion. These three layers do not mix with one another, so the surface layer is the only layer that is contact with the atmosphere and sunlight. The surface layer usually has sufficient dissolved oxygen concentration (DO); however, the other two layers usually suffer DO depletion due to inadequate re-aeration. Both temperature and DO significantly affect the fishery that occurs in the reservoir.

- Nutrients also influence the water quality in reservoirs. The primary nutrients required for growth of algae and aquatic plants include carbon, nitrogen, and phosphorus. Phosphorus and nitrogen are usually the most important water quality constituents that control the growth of algae and aquatic plants. The concentrations of phosphorus and nitrogen are most often evaluated for lake eutrophication assessments. Attached aquatic plants are also significantly affected by reservoir pool level operations (i.e., wide variations in pool levels reduce the amount of attached aquatic plants in reservoirs).

- Chlorophyll *a* is a water quality measurement that indicates the amount of lake productivity due to algae that occurs in the water.

- Water Clarity is one of the most important water quality parameters to essentially all users of the lake. The measurement of water clarity is also a key indicator of the levels of algae and suspended solids (usually clay particles) in the water.

2.0 WATER QUALITY DATABASE & ANALYSIS

2.1 Sources of Information

Data from three agencies and SCE&G were consolidated into a database for Lake Murray and its drainage area up to Greenwood Reservoir. The primary source of data used to evaluate trends was from the SCDHEC stations. These data provided monthly, quarterly and yearly measurements of many parameters collected throughout the Lake Murray watershed. The data density in the SCDHEC database is relatively consistent from 1974 to 1998. At the time of this report, SCDHEC data collected after 1998 had not been released, and therefore was not used in this assessment.

The other two agencies that collected water quality data in the Lake Murray watershed were EPA and USGS. EPA collected samples at 7 different locations in March, July and September of 1973. USGS collected data in the 1960s and early 1970 at multiple stations in the watershed.

In 1996 SCE&G took over thirteen USGS water quality sampling stations. Twelve of these stations are located in Lake Murray and one is downstream from the Saluda Dam. SCE&G collects monthly field samples at all the stations, and chemical samples twice a year at seven of the stations.

Table 3 is a general summary of the type and location of the data collected since 1970. The stations in the table are grouped and organized by distance from the Saluda Dam.

2.2 Description of DASLER (Data Management and Analysis System for Lakes, Estuaries, and Rivers)

The DASLER software program was used to build the water quality database. DASLER is a Windows-based program designed to manage and report water quality data. It serves as an interface to database programs such as Microsoft Access and Oracle. DASLER was chosen for building the database because it dictates a strict format for the data, as well as, the metadata. If this format is not followed, DASLER will not accept the data and therefore not include it in the database. This non-imported data can then be corrected and re-entered. This characteristic of DASLER greatly improves the quality of the database and therefore creates a valuable and user-friendly resource.

The Lake Murray database is designed to include all field water quality data, as well as, nutrient, organic, metals and bacteriological data collected in the Lake Murray watershed. Pesticide and other toxic data were not imported into the database, but in many cases were downloaded from STORET and are available in Excel spreadsheets. Table 4 lists and describes the location of all stations that have data in the database. A description of the ID code is at the top of the table. Table 5 provides an overview of data density throughout the Lake Murray watershed. All results in the database were counted without regard for parameter or depth. In other words, lake stations where data was collected at multiple depths will have a larger number than a station where only the surface was sampled even though the stations my have been monitored the same number of times. This table is intended to be used as a quick reference of how much data were collected at each station in each year. Both tables are sorted in the same order and therefore allow easy cross-referencing.

2.3 Types of Analysis Used to Compile the Data

Various types of plots were used to aid in the water quality assessment of Lake Murray. For lake stations with adequate data, contour plots of dissolved oxygen and temperature data were created. These contour plots were prepared for both longitudinal plots across multiple stations as well as across time at the same station and were used to determine water quality patterns over space and time. Time series plots of many different parameters were done for all stations of interest. These plots show all surface samples of a particular parameter for the period of record.

Daily flow data from USGS gages in the watershed including below the Saluda Dam were also analyzed. Daily flow values were averaged for each year, as well as for certain parts of each year such as May through September. Data from the gage at Chappells from 1930 to 1998 were plotted. Since the gage at Chappells represents the primary inflow into Lake Murray, this plot was used to compare hydrology from year to year and allow for categorization of years as low, normal or high flow years. After the years were categorized by flow, water quality patterns for different types of hydrology were determined.

3.0 RESULTS AND DISCUSSION

3.1 Applicable Water Quality Standards

All water in Lake Murray and its inflowing waters are classified as "freshwaters," or FW. The Saluda River below the dam is classified for trout waters, and this reach of river is further classified for "trout put, grow, and take," or TPGT where DO is to maintained at not less than a daily average of 5 mg/l. The FW and TPGT classifications are described in the 1998 report as follows:

- Class FW are freshwaters that are suitable for primary and secondary contact recreation and as a source for drinking water supply, after conventional treatment, in accordance with the requirements of the Department. These waters are suitable for fishing, and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. This class is also suitable for industrial and agricultural uses.
- Class TPGT are freshwaters suitable for supporting the growth of stocked trout populations and a balanced indigenous aquatic community of fauna and flora.

3.2 Literature Review

We present the following synopsis of several water quality reports available for Lake Murray for the last 25 years. Two major sources are ERC and SCDHEC.

3.2.1 Environmental Research Center, Inc. Report

SCE&G funded a comprehensive water quality and biological assessment of Lake Murray that was conducted over the period September 1974 through August 1975 in conjunction with their previous FERC license application for the Saluda Hydroelectric Project (ERC, Inc., 1976). The ERC report provided a review of the historical database on Lake Murray, for the period 1947 through

1974. The ERC report also provided a comprehensive limnological assessment of Lake Murray. ERC collected and assessed data from 33 stations in and around Lake Murray.

Data were collected for numerous years by federal and state agencies to assess the water quality, flow, and discharge characteristics of Lake Murray and its tributaries. These agencies included the South Carolina Pollution Control Authority, the SCDHEC, and the USGS. The value of these data was limited for several reasons. Generally only single-depth samples easily reached from shore were collected. For the most part data collections were made only in the spring and summer months therefore these data were not representative of open waters and subsurface waters for all months of the year.

Recognizing the limitations of the historical water quality data, seasonal trends were evaluated and changes in selected water quality parameters were evaluated over the length of the lake. In general, noticeable differences occurred between the upper and lower stations in Lake Murray. For example, the concentration of nitrates, phosphates, fecal coliforms and BOD were generally higher at upper lake stations compared to lower lake stations. In part, this was attributed to the change from rapidly flowing waters in the upper part of the lake compared to slow-moving waters in the lower of part of the lake. Historical data from the Bush River suggested an especially high nutrient concentration in this tributary.

ERC estimated that there were 100 houses on Lake Murray shoreline in 1951. Including summer homes, year-round houses, and mobile homes, the number of dwellings had increased to 5000 by 1973. About 40 commercial recreation-oriented establishments, such as gas docks, boat storage, rental and repair, boating and fishing supply sales, and food services had also been established by 1973.

At the time of the ERC study, at least five point source discharges existed on Lake Murray, with two additional discharges proposed. The ERC report also included an assessment of the McMeekin Steam Generating Plant, and ERC concluded that it caused minimal, if any, effects on the ecology of Lake Murray and the Saluda River.

ERC conducted a comprehensive limnological study over the period September 1974 through August, 1975. The stream flows into Lake Murray in the summer of 1975 were the fourth highest over the period of record (see Figure 6).

Sediments

ERC studied the sediments of the lake and found that most of the sedimentation in the lake takes place over a distance from about miles 19 (near Rocky Creek) to 25 (Blacks Bridge) above the dam (see Figures 1 and 2.) They found that these sediments were comprised of a greater percentage of small particles in comparison to other parts of the lake, with the exception of the lower part of the Little Saluda embayment (i.e., near the Hwy. 391 bridge). The lower deepwater stations exhibited very little sediment deposition since the Saluda Dam had been completed.

Water Quality

Twenty-four physical and chemical parameters were sampled at Lake Murray at 33 selected stations over a period of 12 months. Following are some of the ERC results:

- Lake Murray alkalinity values were generally low.
- The pH of Lake Murray seldom deviated outside the limits for Class A waters (6.0 to 8.0) as defined by the South Carolina State Pollution Control Authority. Over the complete 12 months of sampling, the pH of Lake Murray had a range of 5.3 to 9.1 pH units.
- The highest concentrations of chlorophyll *a* were measured at the upper lake tributary stations that included the Saluda River, the Little Saluda River, the Bush River, and Lake Murray near Blacks Bridge and Rocky Creek. The highest

concentration recorded was 64.8 µg/L in the Clouds Creek embayment. The following table summarizes average concentrations of chlorophyll *a* by locations in the lake for the months of May through October.

Location	Chlorophyll *a*, µg/L	
	May-Oct	Annual
Upper lake (down to Rocky Creek)	12.9	10.1
Mid-Lake	6.8	5.9
Lower Lake	4.6	4.0
Mean for all stations	8.1	6.7

- The concentration of dissolved phosphorus varied from 0.42 mg/l in the Bush River to undetectable levels at numerous downstream deepwater stations. The Bush River registered the highest reading in 11 out of 12 monthly sampling periods, with the lower part of the Little Saluda River recording the remaining high value during September, 1974. The lowest readings almost always occurred in the lower part of the lake. They recorded that dissolved phosphorus values for Lake Murray were high in relation to most lakes. As shown in the following table the upper lake area had the highest concentrations, the lower Lake had the lowest concentrations, and the middle lake areas had intermediate values.

Location	Dissolved Phosphorus, mg/l
Upper lake (down to Rocky Creek)	0.10
Mid-Lake	0.09
Lower Lake	0.07
Mean for all stations	0.09

- Total phosphorus concentrations ranged from undetectable to 1.15 mg/l. The Bush River exhibited the highest concentrations in the Lake Murray system in 9 out of 12 monthly sampling periods. The following table summarizes total phosphorus concentrations measured by ERC in Lake Murray.

Location	Total Phosphorus, mg/l
Upper lake (down to Rocky Creek)	0.16
Mid-Lake	0.10
Lower Lake	0.04
Mean for all stations	0.10

- Fecal and total coliforms occasionally reached high levels in Lake Murray, especially after periods of heavy runoff from the watershed. Part of the water quality standards indicated that no more than 10 percent of the total samples shall exceed 400 per 100 ml during any thirty-day period. This part of the standard was exceeded on several occasions at upper lake stations.

- ERC reported that the historical BOD_5 averaged 2.7 mg/l. We assumed that this is the inflow BOD. (page 254, ERC report)

Phytoplankton (Algae)

ERC reported…"The phytoplankton community of most large, freshwater lakes contains the organisms that provide *energy* to the lake ecosystem through photosynthetic conversion of solar energy to stored biochemical energy as food to consuming biological organisms. In some lakes attached algae and aquatic plants also play a substantial role as primary producers, but this is not the case in Lake Murray. The Lake Murray ecosystem appears to be regulated in the upper part of the lake by both autotrophic production and a considerable amount of allochthonous material (i.e., autotrophic production is the production of algae within the lake and allochthonous materials include all organic materials produced in the watershed, both algae and other organic matter.) The mid-region and lower area of the lake and most large lake arms are almost entirely under an autotrophic regime and are not as productive as the upper end of the lake."

"On an annual basis, species composition of the algal community followed a commonly observed pattern, i.e., diatoms made up the greatest percentage of the algal community during colder months while other algal types were more prevalent in the main body of the lake during warmer months. April showed a large increase in green algal species. Shallower upstream and tributary stations, which normally exhibited higher nutrient concentrations than in the main lake, often showed extremely diverse populations and high numbers of individuals."

"As the lake surface and tributaries cleared and warmed in spring, blue-green algae became abundant and dominated the algal populations. Species of

Chroococcus, Anabaena, Oscillatoria, Anabaenopsis, Merismopedia, and Rhaphidiopsis increased to bloom proportions at upper lake stations in summer reaching an average density of 9,050 units/ml in August, 1975. Those lake areas that consistently showed high densities of blue-green algae included the main channel of the lake down to Rocky Creek, the Little Saluda River embayment (including the Cloud Creek arm), and the Bush River. However, the phytoplankton populations in the Saluda River did not increase to densities as high as in the smaller tributaries. Blue-green algae never reached densities that cause floating, odorous masses to develop and were never evident along the shoreline in visible quantities. The mid-region and lower area of the lake had August concentrations of blue-green algae of 2,032 and 2,584 units/ml, respectively."

During the years 1974-1975, Lake Murray was highly productive with regard to phytoplankton densities.

Trophic Status

ERC reported on the results of 24 trophic status determinations for Lake Murray. Twelve of these classifications were determined to be mesotrophic, and 11 of these classifications were reported to be eutrophic. "To classify Lake Murray in any manner other than meso-eutrophic would be erroneous. With further shoreline development and additional nutrient inputs from the watershed and septic tanks, Lake Murray will show symptoms of greater eutrophication. It is unlikely that the lake will ever go back to a total mesotrophic condition but management toward a majority of mesotrophic criteria would be a reasonable objective."

3.2.2 SCDHEC Reports

The SCDHEC has a long history of monitoring, evaluating, and protecting water quality in Lake Murray. The lake has received considerable attention especially over the last 25 years.

The SCDHEC recently published two reports on water quality in the Saluda River basin:

1. Watershed Water Quality Management Strategy—Saluda-Edisto Basin, Technical Report No. 003-95, Bureau of Water Pollution Control
2. Watershed Water Quality Assessment—Saluda River Basin, Technical Report No. 005-98, December, 1998, Bureau of Water

The information in these reports, especially the second report, will be summarized here since they are the most significant assessments of water quality over the last 25 years. SCE&G (in cooperation with USGS) has partnered with SCDHEC over the last 10 years to undertake the water quality assessments on Lake Murray, and the results of all this monitoring are presented in later sections of this report.

SCDHEC Results Reported In the 1995 And 1998 Reports

Table 6 presents the results of the SCDHEC findings for Lake Murray that are described in the above reports. The results of the SCDHEC findings as they apply to water quality and water uses in Lake Murray are summarized as follows:

- The results reported in Table 6 are summarized in Table 7.
- The findings of the 1995 and 1998 reports are generally similar with one big exception: the 1998 report listed a greater number of locations as "not supporting" and "partially supporting." Only 9 locations in Lake Murray and its associated watersheds were found to be fully supporting the *aquatic life* use in 1998 compared to 18 locations in 1995. Locations only on Lake Murray (including embayments) that were fully supporting the aquatic life use were especially reduced: from 11 locations fully supporting in 1995 to only 5 locations fully supporting in 1998. This large decrease is attributable to the effects of metal concentrations exceeding the water quality criteria.
- From a total of 12 stations on Lake Murray (including embayments), 7 stations were listed as non-supporting or only partially supporting water uses. Metal concentrations were listed as the cause for 6 of these stations and nutrients were

listed as the cause for 2 stations (note: the causes for 1 station listed both metals and nutrients.)

- The cause for non-supporting designations at five stations on the lake is copper which exceeds the acute water quality criteria for aquatic life. Two additional stations on the lake were listed as only partially supporting aquatic life due to copper, which exceeds the acute water quality criteria for aquatic life. Copper as well as all other metals were measured as "total" concentrations in the water and sediment samples. Only a part of the total copper would be toxic to aquatic life. The report also states that elevated copper concentrations are reported for many locations all around the State and that these copper concentrations do not appear to cause toxic conditions in waters of the State. The elevated metal concentrations in the lake are consistent with those reported for inflows to the lake; hence, the likely cause for elevated metal concentrations is the natural geology of the watershed.
- Fecal coliforms were identified as the cause for impacting recreation at 6 locations in 1995 and 8 locations in 1998. All of these locations were either in the inflows to Lake Murray or in the tailwater. The elevated fecal coliform designations were all attributable to point or nonpoint sources, or both. All locations in Lake Murray were reported to be fully supporting of the recreational use of the lake; however, increasing trends in fecal coliforms were reported for much of the main channel of the lake, in both 1995 and 1998.
- The eutrophication assessments, which uses a multi-parameter index with a statewide *baseline* from a 1980-81 assessment, indicate that conditions at the upper end of the lake had improved, except at Rocky Creek and in the Bush River arm of Lake Murray. The 1998 report stated that the two upper locations on the Saluda River arm (S-310 and S-223) and the Little Saluda River arm had improved from Category I ratings to Category II ratings, or intermediate trophic status. However, the locations at Rocky Creek and in the Bush River arm of Lake Murray were reported to be among the most eutrophic sites on large lakes in South Carolina. All the locations between Rocky Creek and the dam, including the embayment locations, were reported to be among the least eutrophic in South Carolina. In addition, these same locations were reported to have decreasing

trends in total phosphorus, and a few of the locations were also reported to have decreasing trends in nitrogen and BOD concentrations. The multi-parameter index is based on data for the following parameters: water clarity, total phosphorus, total inorganic nitrogen, chlorophyll *a*, and DO.

- Low DO in the tailwater was the cause for non-supporting and partially supporting ratings in the tailrace and the first station below the dam (S-149). The 1998 report indicated that conditions at this latter location had improved due to a lower percentage of the DO data being less than the water quality criteria. Low pH levels were also given as a reason of non-supporting aquatic life uses in the tailrace.

Miscellaneous Information Provided in the Reports

Except for a very small wastewater discharger (i.e., Dreher Island), there are no direct dischargers to the lake.

SCDHEC is currently considering a "No Discharge" designation for boats on the lake to protect water quality for the water supplies for Columbia and West Columbia as well as for recreation. A final decision was expected in 1999 **[?]**

Watershed management was recommended to reduce phosphorus loading to a number of areas of the lake:

- Rocky Creek area of Lake Murray (S-279)
- Bush River arm of Lake Murray (S-309)

There was a watershed study conducted on the Bush River and Camping Creek to address nonpoint sources. The 1998 reported the following: "This was a comprehensive watershed project in a predominantly agricultural watershed. The project was implemented with several cooperating agencies, with the SCDNR as the lead agency. The project area lies mostly in Newberry County and the watershed drainage is to Lake Murray. The project began in 1990 and was concluded in August of 1998. The project provided funding for technical and financial assistance to farmers in the watershed for Best Management Practices (BMPs) related to rowcropping and confined animal operations. Innovative BMP demonstrations funded by the project included provision of manure nutrient testing by a mobile laboratory, portable animal waste lagoon pumpout and spray irrigation equipment available for rent to farmers in the watershed, and the effective pesticide management."

Growth potential in the area around the lake was discussed for several specific regions, and the following information is taken from selected sections of the 1998 report:

- The area around Lake Murray: "There will be continued growth in areas bordering and surrounding Lake Murray. The widening of US 378 to four lanes has increased the expansion rate on the Lexington side of the lake. US 76 runs along the opposite shoreline of the lake, as does a rail line. The widening of I-26 toward the Chapin\Pomaria Exit is encouraging growth on both sides of the interstate. Residential development continues to grow within the region. The area around the dam is the most developed and has water and sewer. The Richland County portion of the lake is also well developed and has several residential subdivisions where water and sewer are available. A study has been prepared and the findings are currently being reviewed to determine the feasibility of providing sewer service to areas surrounding Lake Murray within the 208 management areas of the Town of Chapin, the City of Columbia, Richland County, the Town of Lexington, and the Lexington County Joint Municipal Water and Sewer Commission (those portions of Lexington and Richland Counties bordering the lake). This will facilitate continued development along the shoreline as well as development along US 378. SC 6 is undergoing a corridor study, and the portion crossing the dam will be widened. The City of Columbia and Lexington County are currently in the discussion phase in working together to solve Lexington County's water and sewer needs. The Bush River continues to be limited in terms of assimilating capacity, and as such there has been discussion among various sewer providers in the county for a larger regional facility that would discharge within this watershed, as well as some discussion for a single entity water and sewer provider for the lower part of Newberry County. Lake

Murray, as the main water-based recreational resource in the region, draws millions of visitors annually to its numerous parks, recreational areas, and waterways. All aspects of growth surrounding Lake Murray (tourist industry, residential development, agricultural activities) are expected to continue."

- The area around the tailwater: "There is high potential for future residential and industrial development in this watershed. The area surrounding the Town of Lexington has grown rapidly during the past several years and the trend should continue. Several important highways run through the area including: SC 6, which runs from the Lake Murray dam south through the Town of Lexington, and US 1 and US 378, which run west from the City of West Columbia and intersects with Highway 6 in Lexington; I–20 also serves the area. The watershed's industrial corridor is one of the most economically attractive in the Midlands Area for future development. Once sewer is readily available, residential development is expected to increase and large industrial prospects can be attracted to the area. The recent construction of a water plant on the shore of Lake Murray north of the Town of Lexington, has made available a water supply sufficient to support development. The City West Columbia and Lexington County have extended major water mains in the area. Non-industrial discharges in the basin are targeted for elimination with effluent transported to the City of Cayce's wastewater treatment plant through a regional system. This will decrease discharge levels into the lower portion of the Saluda River."
- The City of Greenville is located in the Saluda River watershed and has high potential to continue as an urban growth area and source of point and non-point pollution.

Table 8 summarizes the NPDES Permits and lists the major sources and number of minor sources in each sub-basin that drains to Lake Murray (downstream from Greenwood Dam).

Table 9 presents a list of reaches/issues on the SCDHEC 303(d) and Total Maximum Daily Load (TMDL) lists. Fecal coliform is the only issue listed as a cause for TMDLs: two sites on the Bush River and one site on Rawls Creek which discharges to the Saluda River downstream from the dam. Eight sites are designated as being potential TMDL sites, and six of these are caused by fecal coliform. Two of these sites are caused by low DO, which can be attributed to discharges from the Saluda Project.

There are a total of 51 sites listed on the 303(d) list. The most significant cause for listing is fecal coliform, which is shown as the cause at 21 sites. It is important to note that most all of these sites indicate a significant potential concern to recreation where these streams enter Lake Murray or the Saluda River. Although the sampling sites on Lake Murray do not indicate a concern for fecal coliform, it is important to note that inflow regions of Lake Murray and the Saluda River are likely to be contaminated periodically by fecal coliform and unfit for recreation during these times. Recreational uses are likely to be particularly threatened following rainfall/runoff events.

It should be noted that phosphorus is listed as the cause for two sites on the 303(d) list: Bush River arm of Lake Murray (S-309) and Rocky Creek area of Lake Murray (S-279). But these sites are not listed as potential TMDLs even though they are listed at the level of priority 2. The phosphorus concentrations in the inflows to Lake Murray probably contribute to the low DO in the discharges from the Saluda Project.

Table 9 also lists pH as a concern below Saluda Dam. Low pH in reservoir releases is caused by decomposition of organic matter in the lake, and this commonly occurs in lake waters that have low alkalinity like Lake Murray. Organic matter in lakes comes from algal growths (primarily in the lake), wastewater discharges in the watershed, and natural sources in forested watersheds. Such minor low pH excursions (in magnitude as well as frequency) have minor effects on aquatic life (probably immeasurable), and cannot be remedied practically except possibly through watershed reductions of man-made sources of nutrients and organic loads and, possibly, reductions in internal nutrient cycling.

3.3 Analysis of Water Quality Data

3.3.1 Nutrients, Algae, and Water Clarity

Inflow Stations

A considerable amount of data are available for assessing the sources and trends of nutrients that enter Lake Murray, as well as the nutrient concentrations, algal productivity and water clarity in Lake Murray.

The main flow entering Lake Murray comes from the Saluda River. Greenwood Dam can be viewed as the main source of water to the Saluda River that enters Lake Murray. SCDHEC has a sampling station, S-186, a short distance downstream from Greenwood Dam, and water quality data from this location were analyzed to determine the concentrations, patterns, trends, and loads of nutrients and organic matter from this source.

Figure 7 shows the Total Phosphorus (TP) concentrations over the period 1974 to 1998. There was an apparent upward trend in concentrations until 1985 when the concentrations were substantially reduced and an apparent downward trend began. This dramatic change is probably attributable to the implementation of tertiary wastewater treatment for Greenville's wastewater discharges to the Reedy River. The current mean concentration of TP at this station is about 0.02 mg/l. Biological Oxygen Demand (BOD_5) also decreased as shown in Figure 8, dropping from a mean of about 2.5 mg/l during the period 1969 through 1986 to a mean of about 1.3 mg/l for the period 1987 through 1998. The decrease in BOD lagged the decrease in TP perhaps due to the release of methane and other decomposition products from the sediments of Lake Greenwood sometime after the drop of TP in the water column. Total Kjeldahl nitrogen (TKN, a measure of the organic nitrogen and ammonia nitrogen) followed a pattern similar that for TP, probably attributable to the TKN associated with algal growths (see Figure 9.) Nitrate+Nitrite concentrations appeared to decrease over the period 1985 through 1987. However, as shown in Figure 10, there is another interesting observation.

Nitrate+nitrite concentrations drop to near zero every year during the summer and autumn months. This drop in nitrate+nitrite is significant because it indicates that the only algae that may be able to grow during this time in the upper end of Lake Murray are blue-green algae, which are often more troublesome than other algal species such as diatoms and green algae.

There is one additional SCDHEC sampling station on the Saluda River prior to its flowing into Lake Murray: S-295, located at SC 39 near Chappells. Figure 11 presents TP data for the period 1988 through 1998. It is important to note the apparent increase in TP between the Greenwood Dam and station S-295: TP increases from about 0.02 mg/l at S-186 (just below Greenwood Dam) to about 0.06 mg/l at S-295 (approximately 3.5 miles downstream). This 200 % increase in TP is highly significant because TP can result in organic matter (i.e., through algal growths) being generated that is about 100 times the weight of TP available. The water quality in most hydropower reservoirs is very sensitive to the concentration of TP in their inflows. Figure 12 presents the results of a study conducted for EPA to determine the TP concentrations in the inflows to hydropower reservoirs. This figure shows that Lake Murray could be among the cleanest 10-20 % of the reservoirs included in the study if the TP concentration was in the range of 0.02 mg/l like that reported for the station below Greenwood Dam. However, with the TP concentration found at S-295 Lake Murray receives TP concentration that near the 70 percentile ranking for reservoirs that are not considered to be TMDL sites.

An examination of the TP data in Ninety-Six Creek (SCDHEC's station S-093) shows that it has a mean concentration of about 0.7 to 1 mg/l (see figure 13), about 40 times the concentration of TP in the Saluda River below Greenwood Dam. Using the mean concentrations of TP in the Saluda River below Greenwood and in Ninety-Six Creek in combination with their mean annual flows, the respective TP loads exerted on Lake Murray can be estimated. This approximate analysis shows that Ninety-Six Creek has a TP load of 410 lbs/day and the Saluda River has a load of 210 lbs/day. The station at S-295 has a load of about 620 lbs/day, so it's apparent that Ninety-Six Creek accounts for essentially all the increase in TP between Greenwood Dam and Chappells.

The Bush River near its inflow point to Lake Murray also contains a relatively high concentration of TP (see Figure 14): about 0.8 mg/l. Using the same approach for estimating its TP loading to Lake Murray, the Bush River has an estimated load of 280 lbs/day. After the Bush River enters Lake Murray and the Saluda River, the estimated concentration of TP in the Saluda River would be about 0.08 mg/l. This concentration of TP is greater than the mean TP concentration in the Congaree River at the inflow to Lake Marion and ranks at the 80-percentile level when compared to the other reservoirs as discussed above.

The Little Saluda River near the inflow to the Little Saluda River arm of Lake Murray (station S-123) has been monitored by SCDHEC since 1974 (see Figure 15). Their data show a significant decreasing trend over the years, with a significant drop in 1989. The current concentration of TP is about 0.2 mg/l, which leads to an estimated daily load of about 96 lbs/day.

Clouds Creek near the inflow to the Little Saluda River arm of Lake Murray (station S-255) has been monitored by SCDHEC since 1979 (see Figure 16). Their data show a significant increasing trend over the years. The current concentration of TP is about 0.3 mg/l, which leads to an estimated daily load of about 56 lbs/day.

Significant aquatic plant communities at the upper end of Lake Murray (see page 73 in 1998 report) could contribute to high organic and nutrient loads in the upper area of the lake due to their die-off each year and settling in areas of the upper end of the lake. An annual lake draw down would probably help reduce the impacts of these plants on algal production in the upper area of the lake. However, these decomposing plants could then result in higher concentrations of anoxic products in the hypolimnion of the lake and possibly increase the levels of anoxic products that would end up in the discharge through the Saluda Project turbines.

Upper End of Lake Murray, Including Embayments

SCDHEC's station in the Bush River arm of Lake Murray (S-309) was reported in both the 1995 and 1998 reports to be among the most eutrophic sites on large lakes in South Carolina. The TP for this station is plotted in Figure 17, and the mean TP was about 0.1, indicative of eutrophic-hypereutrohic conditions (Heiskary and Walker, 1987).

SCDHEC's and SCE&G's station in the Little Saluda River arm of Lake Murray (S-222 and 8M, respectively) was reported in both SCDHEC reports to be in intermediate trophic condition. However, SCDHEC only had data for 1976-1980, 1992 and 1996-1997. The plot of TP in Figure 18 is based on SCE&G's data that are collected only twice each year. This plot indicates that the mean TP concentration is about 0.04 mg/l.

At Blacks Bridge (S-223, about 25 miles upstream from Saluda Dam), SCDHEC commented in their 1995 report that this was among the most eutrophic sites on large lakes in South Carolina, but in their 1998 report they revised this site to intermediate trophic status. Figure 19 presents the TP data collected at this site since 1974 and shows that the current mean TP concentration is about 0.06 mg/l, about the same as the mean concentration observed at the inflow station at S-295 and about 25 % less than the estimated concentration entering Lake Murray due to the added TP entering from the Bush River. This decrease in TP by the time inflows reach this point can be attributed to precipitation of TP to the sediments, either in the form of inorganic suspended solids or associated with dead algae.

At Lake Murray in the Rocky Creek area (S-279, about 18 miles upstream from the dam), SCDHEC commented in their 1998 report that this was the among the most eutrophic sites on large lakes in South Carolina, but in their 1995 report they reported this site to be intermediate trophic status—in essence the opposite of their 1995 and 1998 ratings for the Blacks Bridge site. Figure 20 presents the TP data collected at this site since 1975 and shows that the current mean TP concentration is about 0.05 mg/l, only a slight decrease from the mean concentration observed at Blacks Bridge. This marginal decrease in TP shows that this station is still strongly influenced by inflow water quality and processes that are characteristic of what limnologists often consider the riverine and transition zones of a reservoir. This observation is consistent with the two SCDHEC reports as well as the ERC report.

The Lower End of Lake Murray, Including the Embayments

For the forebay of Lake Murray (S-204 and 1SP, near the towers upstream from the dam), SCDHEC commented in their 1998 report that this was among the least eutrophic sites in South Carolina. Figure 21 presents the TP data collected at this site since 1976 and shows that the current mean TP concentration is about 0.02 mg/l, and possibly 0.01 mg/l at times as shown for the SCE&G data (these latter data had a lower minimum detectable concentration.) A closer look at the SCDHEC data for this station in comparison with the data collected at Rocky Creek and Blacks Bridge shows that one major difference between the forebay and the upstream stations is that the TP is low essentially all year round in the forebay. The upstream stations occasionally experience TP values as low as 0.02 mg/l (especially in the summer when inflow can be lower and algae consume the TP), but they increase significantly at times.

Comparison of TP, Chlorophyll a, and Secchi Depth at Various Locations

Table 10 summarizes the TP, chlorophyll a, and Secchi *depth* conditions at various locations in the inflows and Lake Murray. Compared to the results reported in the ERC report, the more recent SCDHEC data indicate that TP concentrations are about 50 % less than reported by ERC, but chlorophyll a concentrations are about the same as reported by ERC. This inconsistency (i.e., the lower TP concentration but similar chlorophyll a concentrations) could be caused by a number of factors, but the most likely causes are the higher flows (and associated inorganic suspended solids) during the ERC study and possibly differences in water sample analytical methods.

Nutrient Loads to the Upper End of Lake Murray

Figures 22 and 23 as well as Table 11 show the distribution of flow and TP loadings between the major waterways that enter the upper end of Lake Murray. It is obvious from these charts and table that several smaller waterways contribute much greater TP loads than would be expected for the amount of water that they contribute. Four of the tributaries (i.e., Ninety-Six Creek, Bush River, Little Saluda River, and Clouds Creek) contribute 75 percent of the TP to Lake Murray while their streamflow contributions total 12 percent. As discussed above, the TP concentrations in these smaller waterways are caused by point source discharges and development in the watershed. If these TP loads were reduced, the upper areas of Lake Murray would have less algae and greater water clarity, and the DO in the reservoir and the releases from the Saluda Project likely would be increased (Matthews et al., 2001; Williams, 2001; this report, re: Greenwood).

3.3.2 Dissolved Oxygen and Temperature

Lake Data

SCE&G has collected (or sponsored USGS to collect) water quality profiles throughout Lake Murray during the 1990's. The data collected on DO are the most useful for gleaning understanding of water quality dynamics in the lake. The data collected during the period 1996 through 2000 are plotted in Figures 24 through 28, respectively. A major factor that affects water quality is annual and summer flows through Lake Murray, and these flows are proportional to the flows at Chappells as shown in Figure 6. Figure 6 shows that flows were near normal levels in the years 1996 through 1998 while the flows in 1999 and 2000 were low.

Here are some general patterns of DO that can be gleaned from Figures 24-28:

- DO starts decreasing in the upper part of Lake Murray in May and June each year

- DO is low (< 2 mg/L) in the metalimnion and near the sediments in the upper end of the lake by June each year
- At specific locations within Lake Murray, DO is often lower at some point in the water column than near the sediments, indicating significant DO demands in the water column. This is significant because it suggests that a dominant DO demand can be attributed to inflow water quality parameters like nutrients, algae, and organic matter.
- In July, the DO in the forebay is much greater in low flow years (1999 and 2000) than in normal flow years. In low flow years the DO was generally greater than 5 mg/L at all depths in the forebay, whereas in normal flow years the DO was generally less than 5 mg/L and minimum DO levels varied from < 1 mg/L to < 3 mg/L.
- In August, the DO in the forebay is much greater in low flow years (1999 and 2000) than in normal flow years. In low flow years the DO was generally greater than 3 mg/L at all depths in the forebay, whereas in normal flow years the DO was generally less than 3 mg/L and minimum DO levels were < 0.5 mg/L. Also, the DO in the metalimnion was generally lower than near the sediments in the forebay of Lake Murray. These observations in July and August suggest that water displacement within the reservoir affects the DO distribution within the reservoir, i.e., in normal and wet years, water movement through Lake Murray is greater and moves poor water quality (*e.g.*, low DO) down through the hypolimnion more rapidly.
- In August, the hypolimnion beginning 10 miles above the dam and metalimnion throughout the lake typically experienced DO < 2 mg/L (in all years).
- In September, the DO in the forebay is marginally greater in low flow years (1999 and 2000) than in normal flow years. In low flow years the DO was generally greater than 1.5 mg/L at all depths in the forebay, whereas in normal flow years the DO was generally about 0.5 mg/L and less.
- In September, most of the hypolimnion and metalimnion experienced DO < 0.5 mg/L throughout the lake, except in 1999 and 2000 when the forebay area experienced slightly higher DO concentrations.

- In October, the DO in the hypolimnion was less than 0.5 mg/L at all locations except in 2000 when the DO was about 1 mg/L for about the first eight miles above the dam. It is interesting to note that the elevation of the metalimnion in 1996 was about 10 m lower than in the other years. This was caused by high flows preceding the sampling date that drew the low DO water out of the lake more rapidly than usual.

It is important to note that the low DO values in the upper end of the lake are caused by decomposition of algae and other inflowing organic matter that takes place in the water column as well as in the form of sediment oxygen demand (Ruane and Hauser, 1991). If Lake Murray is like many other hydropower reservoirs, the low DO in the metalimnion all the way to the dam is caused by this decomposition of algae and other organic matter that initiates at the upper end of the lake. Although the DO in the metalimnion appears to be only marginally lower than the DO levels observed near the sediments of the lake, the contour plots do not reveal the difference in the volumes of water with low DO in these two areas of the lake (i.e., the metalimnion volume compared to the volume of water near the sediments.)

The volume of the metalimnion (in July, this layer of the lake occupies an average elevation range from about 94 m to 99.5 m and ranges in temperature from about 17^{o} C to 25^{o} C) is about 350,000 ac-ft whereas the volume of the water with low DO consumed by the sediments is estimated to be about 15,000 ac-ft. There is about 25 times the volume of water with DO depression in the metalimnion as there is in the water with DO depression over the sediments. A rough estimate of the mass of the DO demands in these two areas of the lake is approximately proportional to the volumes of water in these two areas. Hence, it is estimated that the DO demands in the metalimnion (caused primarily by inflow water quality, algae, and sediment oxygen demand in the inflow region of the lake) are about 25 times greater than the DO demand attributed to the sediments in the deeper water of the lake. Following DO depletion in the metalimnion, DO consumption in the hypolimnion speeds up because more organic material (e.g., dead algae) settles through the metalimnion without being decomposed. Hence, even the low DO in the hypolimnion in the late summer can be attributed to DO demands that initiate in the water column (as opposed to the deep reservoir sediments.)

Figure 29 presents contour plots for the temperature dynamics in Lake Murray for the year 1996. It is instructive to track the 16^{o} C contour line over the period of June through October. This shows how a dominant body of water moves through the lake. In June this layer of water is at about elevation 95 m; in July, about elevation 92 m; in August, about elevation 89 m; in September, about elevation 78 m; and in October, all the water having a temperature of 16^{o} C had been drawn out of the lake. This illustrates how water in the metalimnion is drawn down in the lake to where it is eventually all drawn out of the lake through the turbines.

Hypothesis: a major portion of the water with low DO that is passed through the turbines derives from low DO water in the metalimnion and much of the hypolimnion, which is low in DO due to the nutrients and organic matter in the Bush River, Ninety-Six Creek, and Little Saluda River. Sediment oxygen demand in the inflow region of Lake Murray also causes low DO in the metalimnion, but this sediment oxygen demand as well as nutrient releases from these sediments can be attributed to the impacts of these same watershed nutrient and organic sources. As illustrated using the temperature dynamics in the lake, most of the water in the metalimnion and hypolimnion is eventually drawn out through the turbines. The low pH concerns that SCDHEC identified for the turbine discharges can only be addressed by nutrient management in the watershed or, possibly, by reducing internal nutrient cycling.

To prove this hypothesis, a water quality model like CE-QUAL-W2 would be needed to simulate the complex, dynamic water quality linkages and processes as they currently occur as well as how they would occur if nutrients and organic loads from the watershed were reduced. Such a model would allow a quantitative assessment of the effects of the TP loads in the Lake Murray watershed on DO in the releases from Lake Murray. It would also be needed to determine the amount of supplemental aeration that might be needed following implementation of the full turbine venting system and nutrient controls in the watershed. It is important to consider for a situation like Lake Murray how much aeration, if any, is needed following watershed TP reductions. Also, the model would provide an assessment of the benefits of watershed TP controls to the coolwater fish species that inhabit the metalimnion. In addition, the model would allow an assessment of the potential eutrophication improvements in the upper regions of Lake Murray where SCDHEC has designated some of these areas as less than fully supporting.

The turbine discharge from Greenwood Hydro (Buzzards Roost) is now oxygenated (as of 1998), and the DO downstream from this project is plotted in Figure 30. This figure presents the results of SCDHEC grab samples for DO and shows that the DO in the discharge has generally been greater than 5 mg/l, with one exception in 1999 when a DO observation was made at 4.6 mg/L. It is interesting to note that the DO in the Greenwood releases had already improved as a result of the water quality improvements upstream from Greenwood in the 1980's.

The DO in the lower layer of water in the Little Saluda embayment tends to be less than DO in the lower layer of water in the main river channel, sometimes by as much as 5 mg/L (Figure 31.) This could be caused by lower flows in this embayment, higher internal nutrient loads within the embayment (i.e., higher rates of nutrient releases from the sediments within the embayment), and nutrients entering the embayment from the main channel or from the watershed. If these lower DO values are caused by internal nutrient cycling, this factor possibly could be reduced by dropping the pool level of the lake in the winter so as to re-suspend sediments in the embayment and redeposit them the sediments at another location down reservoir where they may not have as much impact on the lake. If these lower DO values are caused by local watershed sources of nutrients, watershed management (point and nonpoint source controls) may be needed to improve DO. If these lower DO values are attributed to nutrients entering from the channel, then nutrient reductions in Ninety-Six Creek and the Bush River may be needed to improve DO.

Tailwater Data

SCE&G started monitoring DO and temperature in the releases from The Saluda Project in 1989, and they are continuing this monitoring. The results of the DO monitoring since 1989 are presented in Figure 32, and the results of the temperature monitoring since 1996 are presented in Figure 33. Presented with the DO and temperature data are the cumulative flows through the Saluda Project starting in January and May for each year.

The most striking pattern shown in these plots is the increased DO starting in 1999 when turbine venting was implemented together with modified operations at the Saluda Project so that aeration could be maximized using the turbine venting capability currently installed. The amount of water flow that passes through the turbines affects the amount of air that can be aspirated through the turbine system—a lower amount of flow, or gate setting, allows more air to be aspirated into the turbine system which in turn allows DO to be increased to a greater extent in the turbine discharges. Figure 34 shows how much DO has increased in the tailwater since this system was implemented in 1999. The median DO has increased from about 2.7 mg/L to about 7.2 mg/L. The percentage of time that the DO is less than 5 mg/L has decreased from 88% to 12%. The percentage of time that the DO is less than 3 mg/L has decreased from about 55% to about 3%.

The current turbine venting system and modified operational scheme was developed using field studies in October 1998 and data analyses using the data obtained during these field studies (Saluda Hydroelectric Project Turbine Venting Study—1998, April 1999.) SCE&G is in the process of implementing other recommendations in the April 1999 report. They have installed hub baffles on Unit 5 and plan to install hub baffles on the other units in the near future.

One significant finding during the 1998 study was that the USGS gage in the tailrace yields lower daily average DO values. Over a period of nine days, the average daily DO as measured by the USGS gage was 0.6 lower than the average of three other DO monitors located across a transect of the river. Instantaneous measures of DO at the USGS monitor were as much as 2.5 mg/l less than monitors located out in the river. The USGS monitor is located in an area of the streambank where it does not measure water that is representative of the river. It was placed there so that it could be maintained on a weekly basis without significantly increasing the cost. A new monitor is available from Stevens® that holds calibration for many months without significant maintenance requirements. SCE&G may want to consider replacing the current monitor with a Stevens® monitor so that it will be more representative of actual conditions.

The plots for 1999-2000 show that daily average DO dropped to less than 4 mg/l periodically. These periods were associated with days when daily turbine flows were higher as evidenced by the cumulative flows during these periods of lower DO. Units 1- 4 currently do not have hub baffles on them, so when these are installed, the daily average DO values will increase. The ultimate capability of turbine venting for adding DO to the discharges at the Saluda Project will not be known until the hub baffles and perhaps other improvements are added to the system and tested.

Part of the success of the turbine venting system can be attributed to the low flows that occurred in 1999-2001, i.e., SCE&G was able to operate the turbine venting without having to operate at higher flows as frequently as they would have to in normal and high flow years. The summertime cumulative flows in 1999-2001 were less than half of the normal cumulative flows observed in most of the other years (see the cumulative flow plots in Figure 32) for which DO data are available.

Following are some additional general observations:

- In normal and wet years, the minimum DO period (i.e., when DO is less than 2 mg/L) tends to start earlier in the year and end sooner.
- In low flow years, maximum temperature in the turbine discharges is lower.

4.0 CONCLUSIONS AND RECOMMENDATIONS

- A considerable amount of water quality data have been collected by SCDHEC and SCE&G over the last 25 years to allow an assessment of conditions on Lake Murray as well as its inflows and the Saluda Project discharges.
- SCDHEC has conducted three assessments of water quality conditions associated with Lake Murray over the last decade.
- The findings of SCDHEC's last two assessments (their 1998 report and their 303(d) list) were similar.
- From a total of twelve stations on Lake Murray (including embayments), seven stations were listed as non-supporting or only partially supporting water uses. Metal concentrations were listed as the cause for six of these stations and nutrients were listed as the cause for two stations (note: the causes for one station listed both metals and nutrients.) The locations impacted by nutrient concentrations were listed as priority 2 on the 303(d) list, but they were not designated as potential TMDL sites. The locations impacted by metals concentrations were given the lowest priority (i.e., priority 3) on the 303(d) list. SCDHEC requires considerable more effort before determining whether the metals concentrations are actually a cause for not fully supporting aquatic life on Lake Murray.
- The stations at Rocky Creek and in the Bush River arm of Lake Murray were reported to be among the most eutrophic sites on large lakes in South Carolina, and both these locations were designated as non-supporting for aquatic life uses. All the locations between Rocky Creek and the dam, including the embayment locations, were reported to be among the least eutrophic in South Carolina.
- Low DO in the tailwater was the cause for non-supporting and partially supporting ratings in the tailrace and the first station below the dam (S-149), respectively. Low pH levels were also given as a reason of non-supporting aquatic life uses in the tailrace. The 303(d) list listed these stations as priority 1, and they may become designated as TMDL sites.
- Fecal coliforms were identified as the cause for impacting recreation at six locations in 1995 and 8 locations in 1998. All of these locations were either in the inflows to Lake Murray or in the tailwater. The elevated fecal coliform designations were all attributable to point or nonpoint sources, or both. All locations in Lake Murray were reported to be fully supporting the recreational use of the lake; however, increasing trends in fecal coliforms were reported for much of the main channel of the lake, in both 1995 and 1998.

- There are a total of 51 sites listed on the 303(d) list. The most significant cause is fecal coliform, which is shown as the cause at 21 sites. Three sites have been designated as TMDLs, and six additional sites may become designated as TMDLs.
- Except for a very small wastewater discharger (i.e., Dreher Island), there are no direct dischargers to the lake.
- SCDHEC is considering a "No Discharge" designation for boats on the lake to protect water quality for the water supplies for Columbia and West Columbia as well as for recreation. A final decision was passed in 1999 approving this designation.
- Watershed management was recommended to reduce phosphorus loading to two areas of the lake: Bush River embayment and the Rocky Creek area of Lake Murray.
- The water quality in the discharges from Greenwood Dam have improved dramatically over the last 15 years. In the late 1980's, nutrients and organic matter was reduced. In 1998, an aeration system was installed and DO in the discharges is now usually greater than 5 mg/l.
- However, the TP load to Lake Murray still remains high due to nutrient loads from Ninety-Six Creek, Bush River, Little Saluda, and Clouds Creek. These tributaries to the upper end of Lake Murray contribute an estimated 75% of the TP load to Lake Murray while their streamflow contributions only total 12%.
- Phosphorus loads have dramatically decreased in the watershed above Greenwood Reservoir and therefore in the discharges from Greenwood Dam. This reduction in pollutant loads has resulted in improved water quality in the upper areas of Lake Murray, especially upstream from Rocky Creek. Similar reductions of P loads in Ninety-Six Creek, Bush River, Little Saluda, and Clouds Creek would probably improve water quality (trophic status, water clarity, reductions in algae, DO) in the upper areas of Lake Murray (Rocky Creek and upstream). If these waterways were reduced to natural levels, the inflows to Lake Murray would be among the cleanest 10-20% of the hydropower reservoirs reported in a recent EPA study (Crossman and Ruane, 2000). DO in the reservoir as well as the releases also would likely improve.
- The concentration of TP in Lake Murray downstream from the Bush River embayment is estimated to be greater than the mean TP concentration in the Congaree River at the inflow to Lake Marion, and ranks at the 80 percentile level when compared to the other reservoirs as discussed above regarding the EPA study.

- Further study (water quality modeling and perhaps additional water quality data collection) would be required to determine how water quality might improve using more point source controls in the watershed as well as a periodic lake drawdown to reduce internal nutrient cycling.
- Considerations for internal nutrient cycling—eutrophication at Rocky Creek and low DO in the metalimnion (and subsequently in the turbine discharges) could be partly attributed to internal nutrient cycling due to it being the first main sampling station in the lake above which a lot of anoxic water forms that may be subject to upwelling due to power pulse inflows being cooler than the surface water. This upwelling could cause additional P and N (i.e., NH_3) into the surface layer. This upwelling of nutrients in combination with low NO_3 in the inflows from Greenwood, especially for the upper lake area, could cause algae to grow. Sediment management should be considered for reducing internal nutrient cycling, if it is occurring. The sediment data collected by ERC showed that the area down to Rocky Creek is depositional. This probably is still the case, but it would be good to get some data to confirm this.
- If the Little Saluda River is experiencing water quality problems (algae, anoxics, low DO), sediment management may be especially important and perhaps the only way to improve conditions due to the small watershed feeding this embayment (i.e., it's a sizeable body of water with relatively low potential for sediments to be flushed out.) Nutrients accumulate in a system like this and just cycle over and over as they are taken up by algae, the algae die and settle, and then the nutrients are cycled up into the water column again.
- The following hypothesis can be formulated based on the available data on Lake Murray, its watershed, and the Saluda Project turbine discharges:

    Hypothesis: a major portion of the water with low DO that is passed through the turbines derives from low DO water in the metalimnion and much of the hypolimnion, which is low in DO due to the nutrients and organic matter in the Bush River, Ninety-Six Creek, and Little Saluda River. Sediment oxygen demand in the inflow region of Lake Murray also causes low DO in the metalimnion, but this sediment oxygen demand as well as nutrient releases from these sediments can be attributed to the impacts of these same watershed nutrient and organic sources. As illustrated using the temperature dynamics in the lake, most of the water in the metalimnion and hypolimnion is eventually drawn out through the turbines. The low pH concerns that SCDHEC identified for the turbine discharges can only be addressed by nutrient management in the watershed or by reducing internal nutrient cycling.

To prove this hypothesis, a water quality model like CE-QUAL-W2 would be needed to simulate the complex, dynamic water quality linkages and processes as they currently occur as well as how they would occur if nutrients and organic loads from the watershed were reduced. Such a model would allow a quantitative assessment of the effects of the TP loads in the Lake Murray watershed on DO in the releases from Lake Murray. It would also be needed to determine the amount of supplemental aeration that might be needed following implementation of the full turbine venting system and nutrient controls in the watershed. It is important to consider for a situation like Lake Murray how much aeration, if any, is needed following watershed TP reductions. Also, the model would provide an assessment of the benefits of watershed TP controls to the coolwater fish species that inhabit the metalimnion. In addition, the model would allow an assessment of the potential eutrophication improvements in the upper regions of Lake Murray where SCDHEC has designated some of these areas as less than fully supporting.

- DO in the turbine discharges probably would improve if TP were reduced using point source controls in the watershed and/or by reducing internal nutrient cycling. Although the DO in the turbine discharges probably would not achieve the South Carolina DO criteria without turbine venting, it would be higher than previous (pre-1999 conditions) concentrations and would exceed previous DO levels with greater frequency of occurrence at selected DO levels, and the metalimnion may not experience DO levels as low as current conditions—this could help lake fish (i.e., DO would be higher in areas of the lake where temperature is more desirable for coolwater species of fish).
- In 1999, a turbine venting system was implemented together with modified operations at the Saluda Project so that aeration could be maximized using the turbine venting capability currently installed. The amount of water flow that passes through the turbines affects the amount of air that can be aspirated through the turbine system—a lower amount of flow, or gate setting, allows more air to be aspirated into the turbine

system which in turn allows DO to be increased to a greater extent in the turbine discharges.

- Since this system was implemented in 1999, the median DO in the Saluda Project discharges has increased from about 2.7 mg/L to about 7.2 mg/L. The percentage of time that the DO is less than 5 mg/L has decreased from 88 percent to 12 percent. The percentage of time that the DO is less than 3 mg/L has decreased from about 55 percent to about 3 percent.
- The current turbine venting system and modified operational scheme was developed using field studies in October 1998 and data analyses using the data obtained during these field studies. SCE&G is in the process of implementing other recommendations from this study. SCE&G has installed hub baffles on Unit 5 and plans to install hub baffles on the other units in the near future.
- One significant finding during the 1998 study was that the USGS gage in the tailrace yields lower daily average DO values. Over a period of nine days, the average daily DO as measured by the USGS gage was 0.6 lower than the average of three other DO monitors located across a transect of the river. Instantaneous measures of DO at the USGS monitor were as much as 2.5 mg/l less than monitors located out in the river. SCE&G may want to consider replacing the current monitor with a Stevens® monitor that can be located in a more representative area of the tailwater.
- Aeration of releases: the current turbine venting system with the addition of hub baffles would increase the achievable minimum DO, especially when turbines are operated at higher gate settings. Additional aeration beyond maximizing the turbine venting system capability might not be needed if nutrient sources in the watershed and possibly the up-reservoir sediments were reduced. Selection of the best approach for the next step of aeration, if it is needed, would depend significantly on the characteristics of the low DO in the reservoir after nutrient loads to the reservoir were reduced. A CE-QUAL-W2 model could be used for estimating the benefits of nutrient controls in the watershed, reduction of internal nutrient cycling, and how DO conditions would change in the reservoir and turbine discharges following nutrient reductions. This model could also be used to determine if and how much supplemental aeration might be needed following reductions of nutrient loads to Lake Murray.

- Fecal coliform levels were reported by SCDHEC to be acceptable in Lake Murray, but fecal coliform in inflowing streams are often above the South Carolina water quality criteria. This is typical of many large reservoirs. Unfortunately, most of the sampling stations within large lakes like Lake Murray are not in sensitive areas where fecal coliform might occasionally exceed the water quality criteria. It is especially important to consider those locations near inflow points where you might expect periodic episodes of high inflows. This concern can be addressed by adding monitoring points closer to the inflow regions (perhaps specifically for fecal coliform) and by educating the public and using warning signs near these inflow points. Special studies can be used to identify these areas and the extent of the concern for each inflow region.

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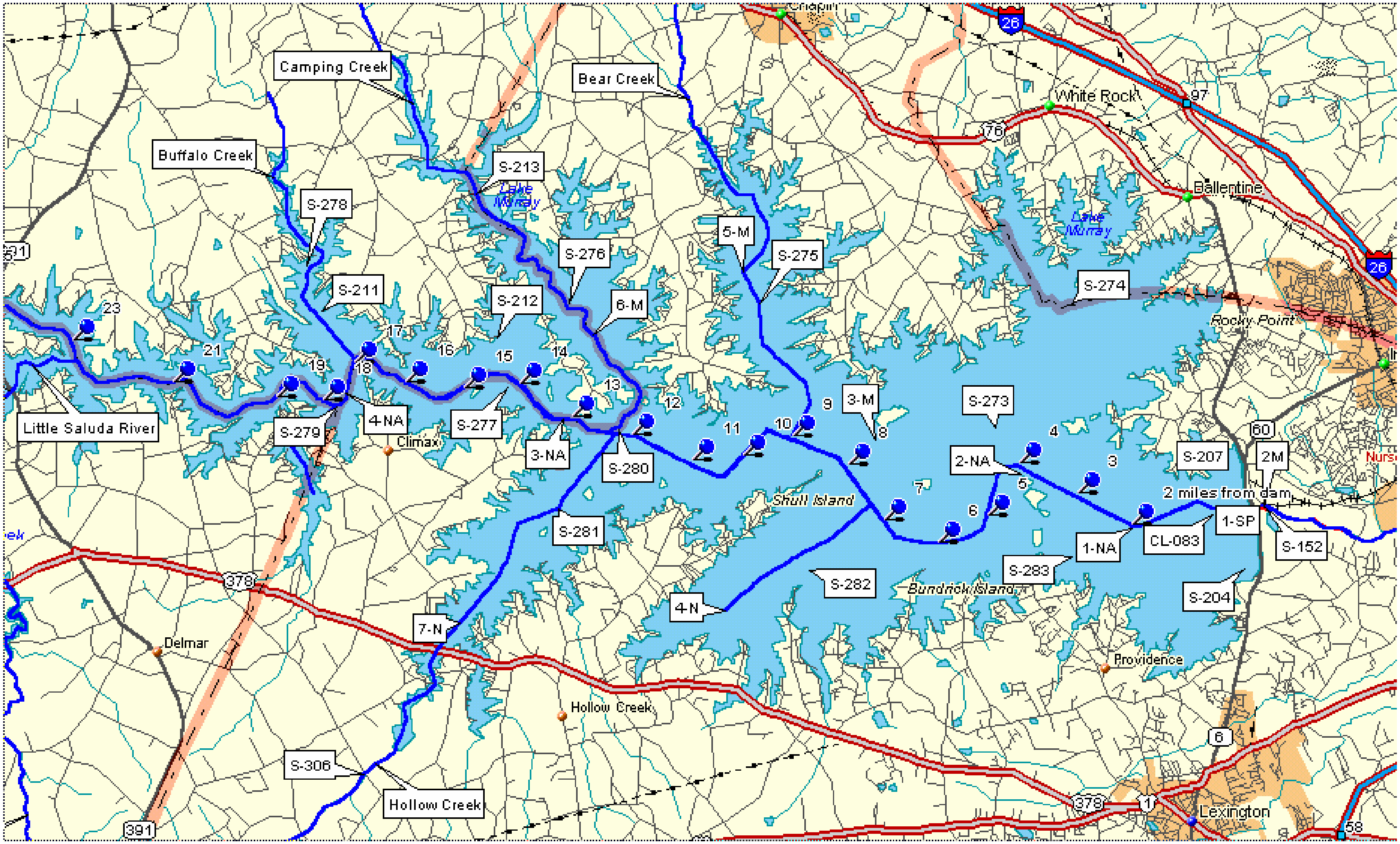

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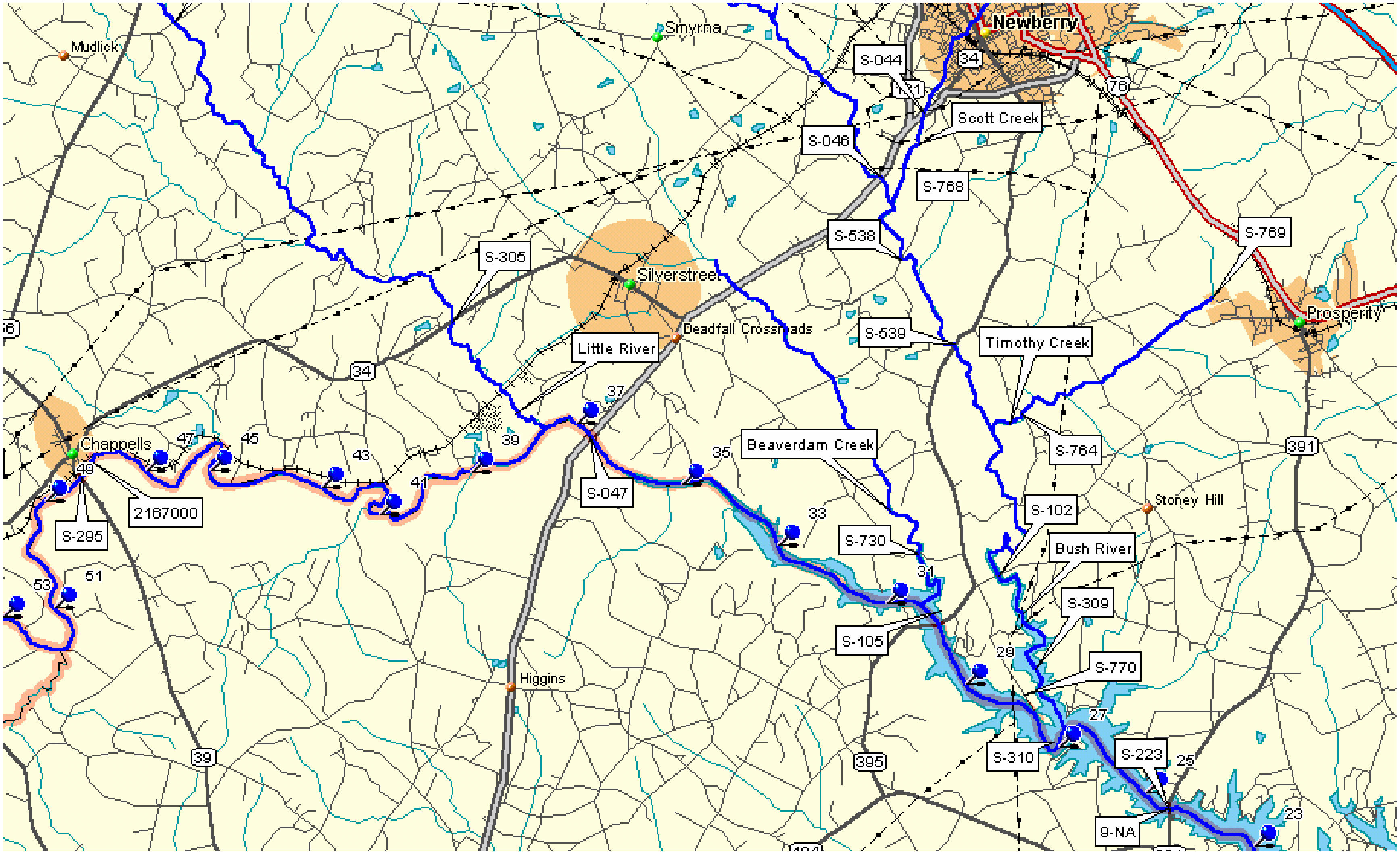

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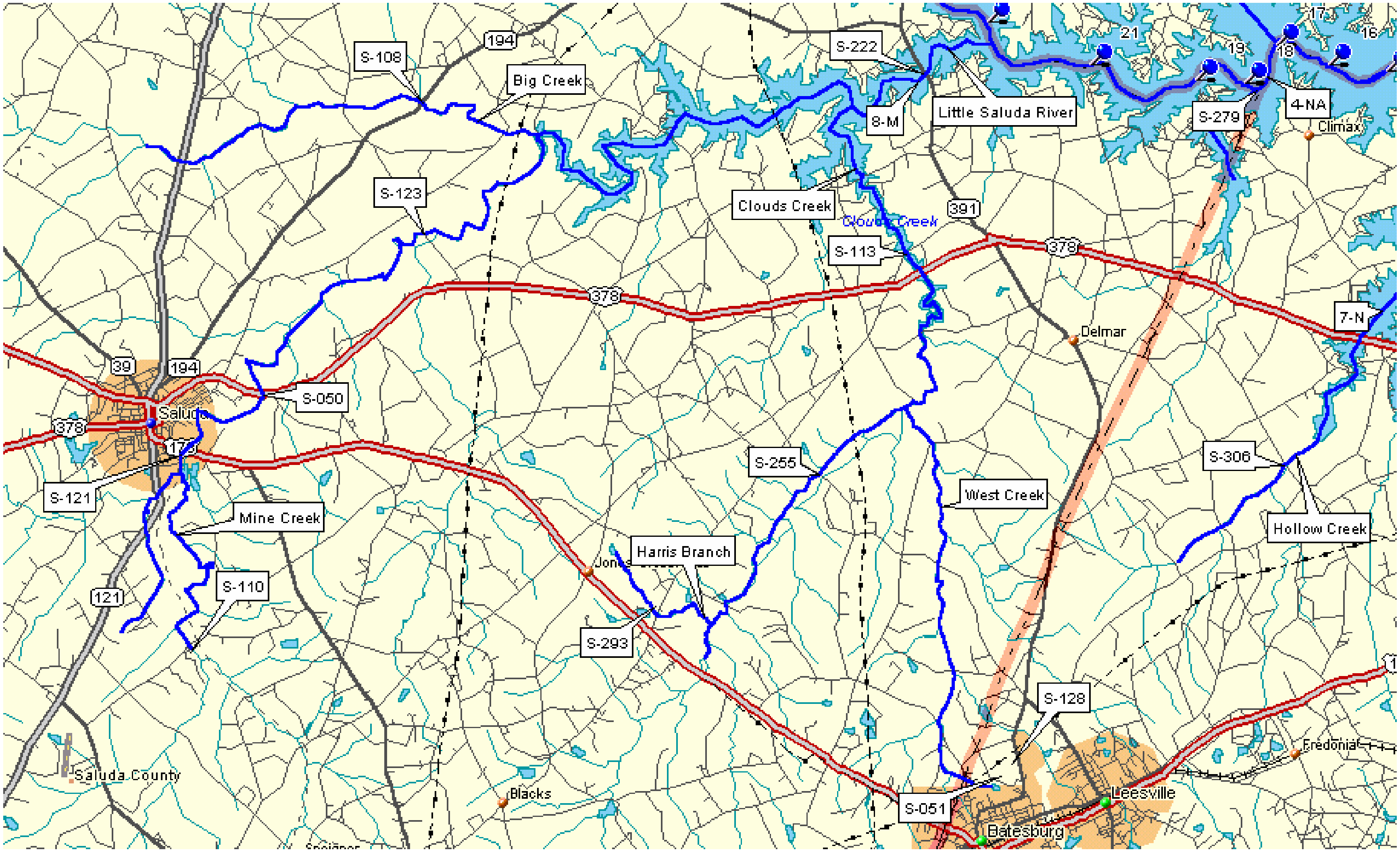

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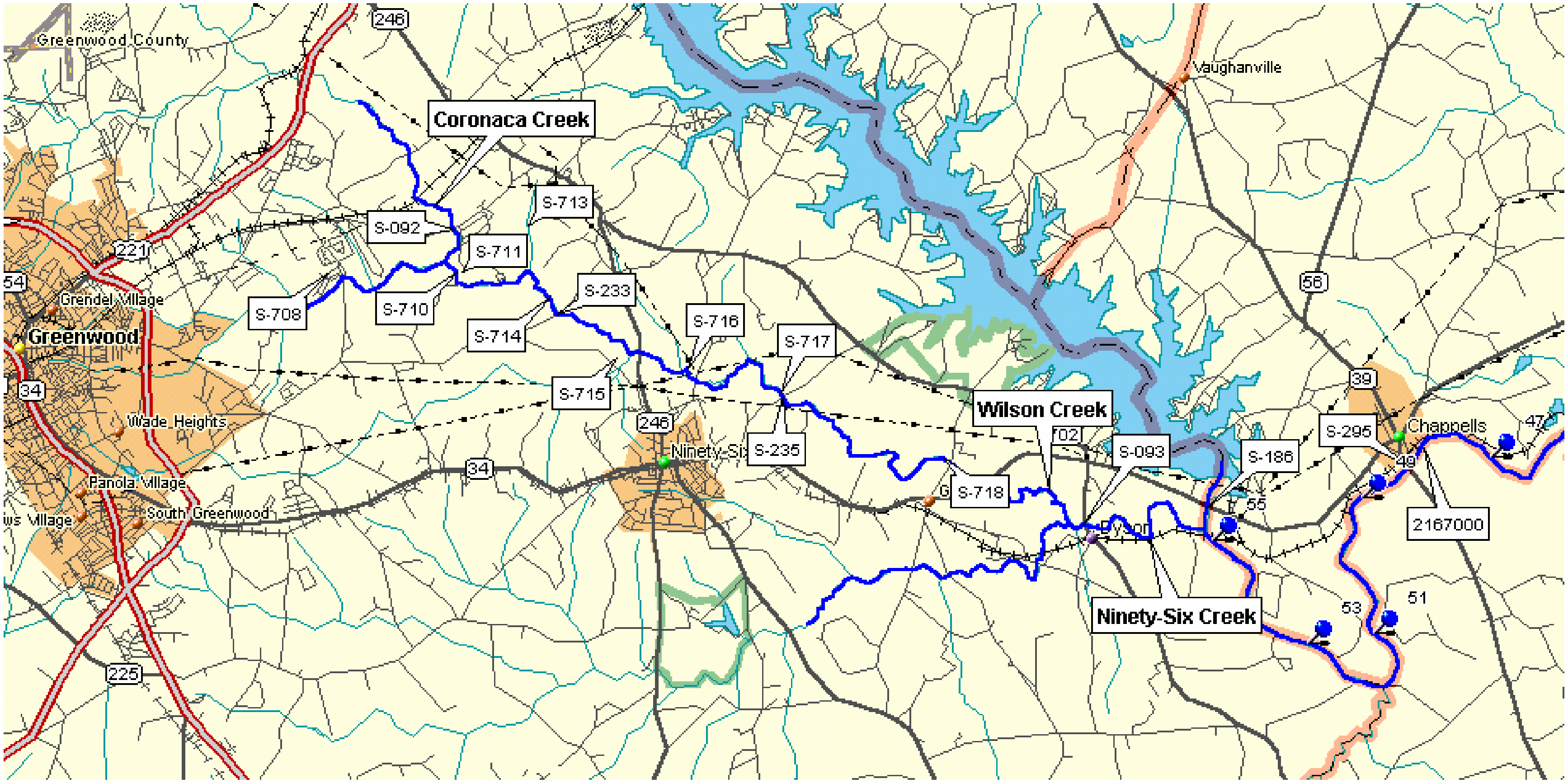

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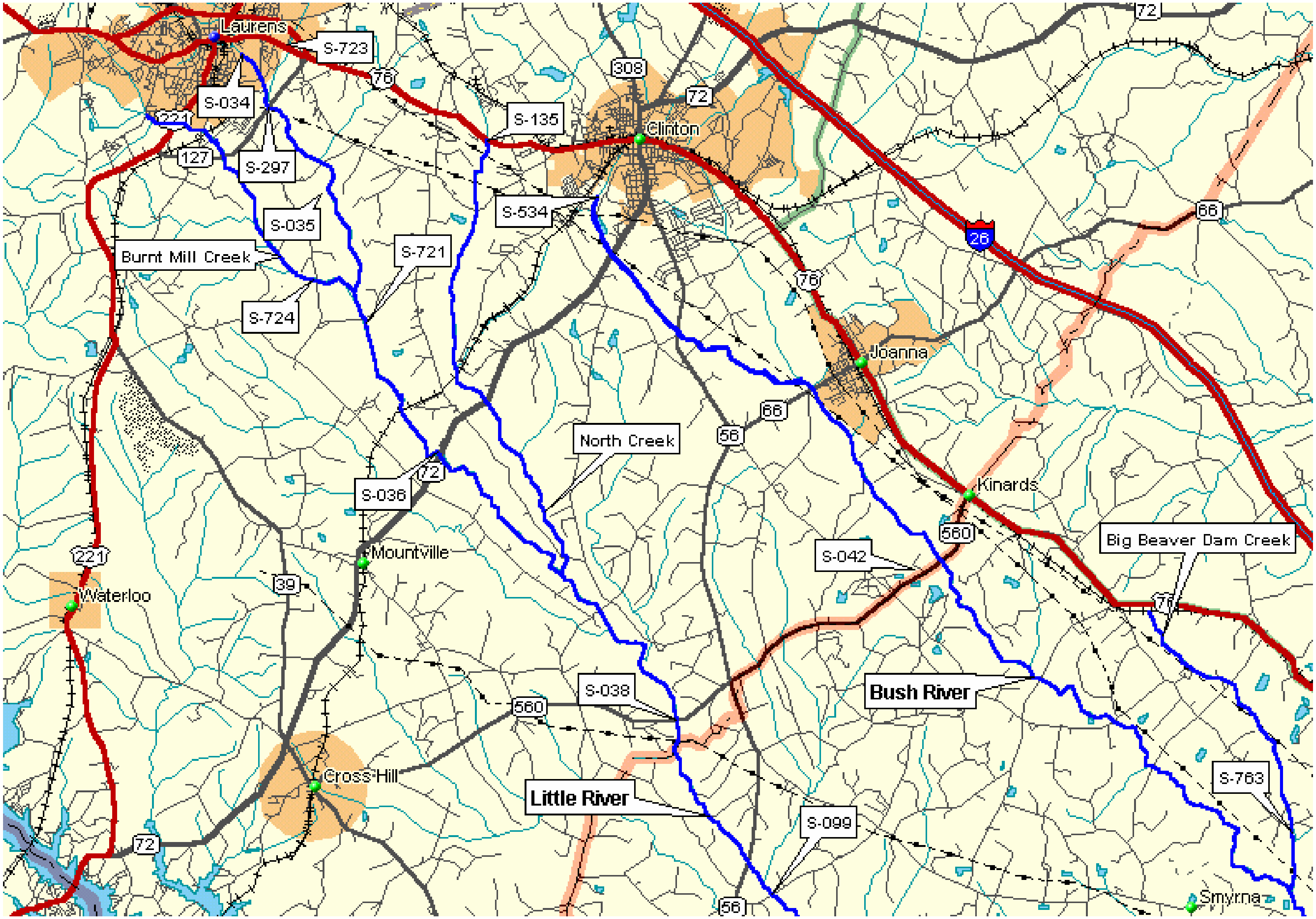

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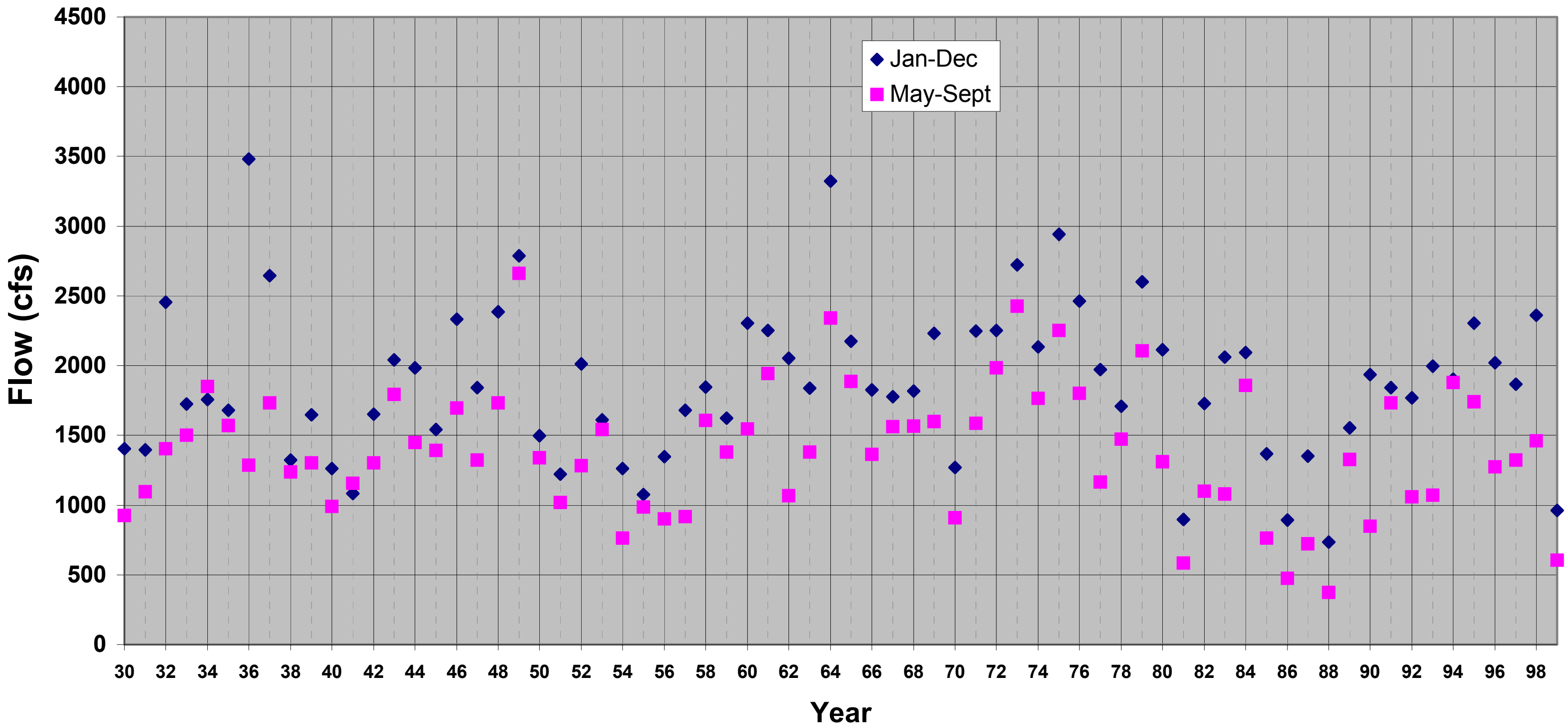

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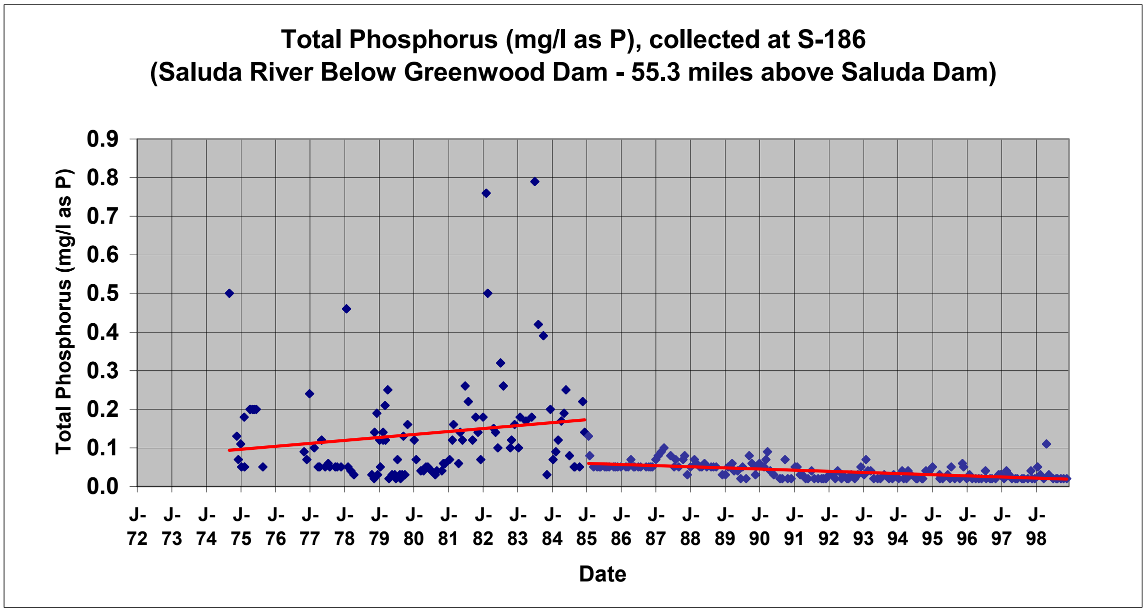

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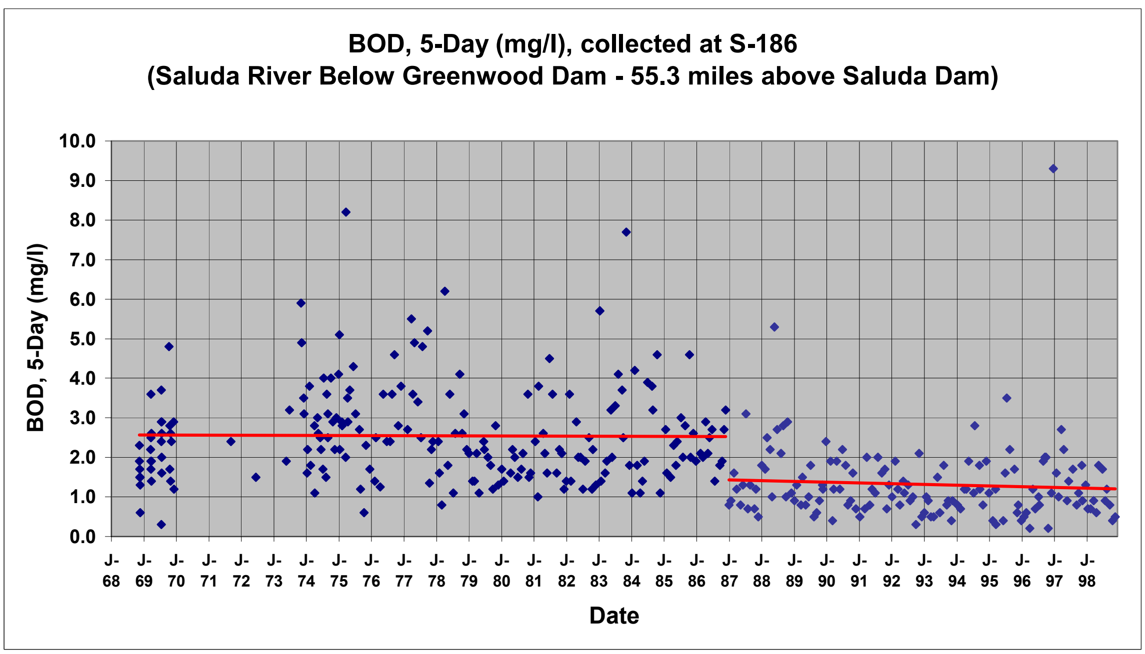

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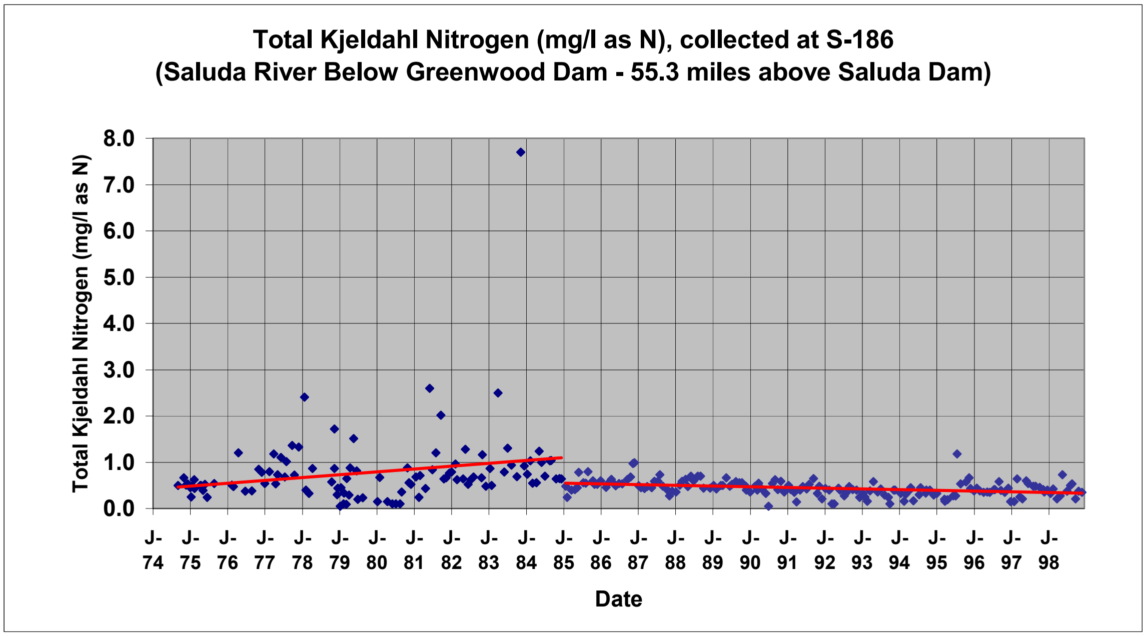

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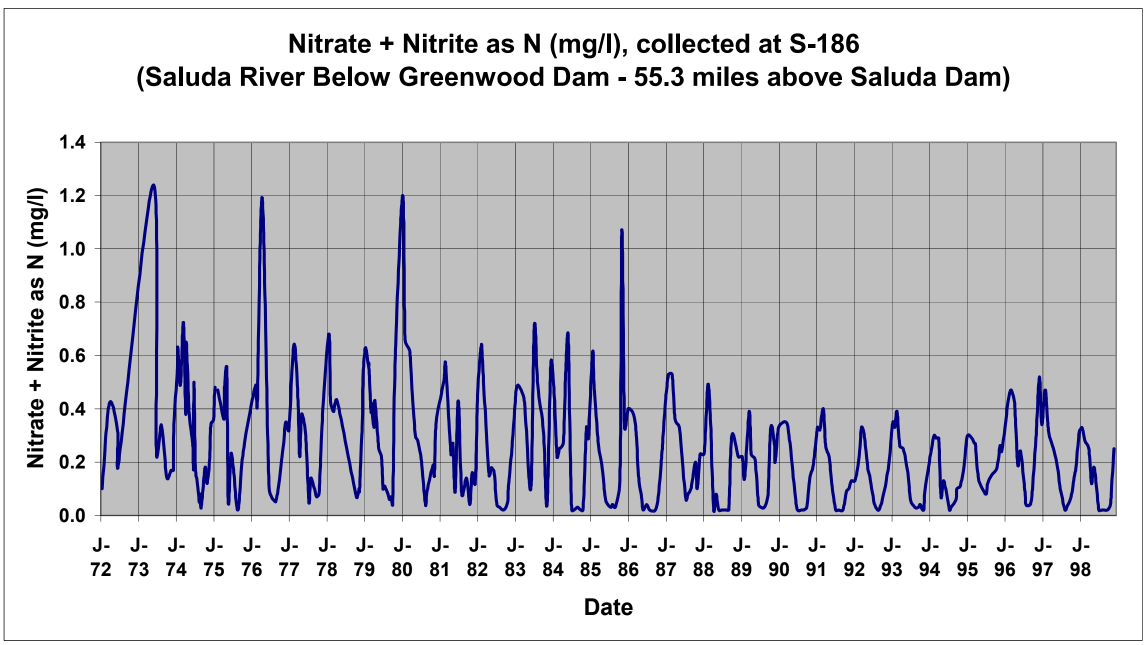

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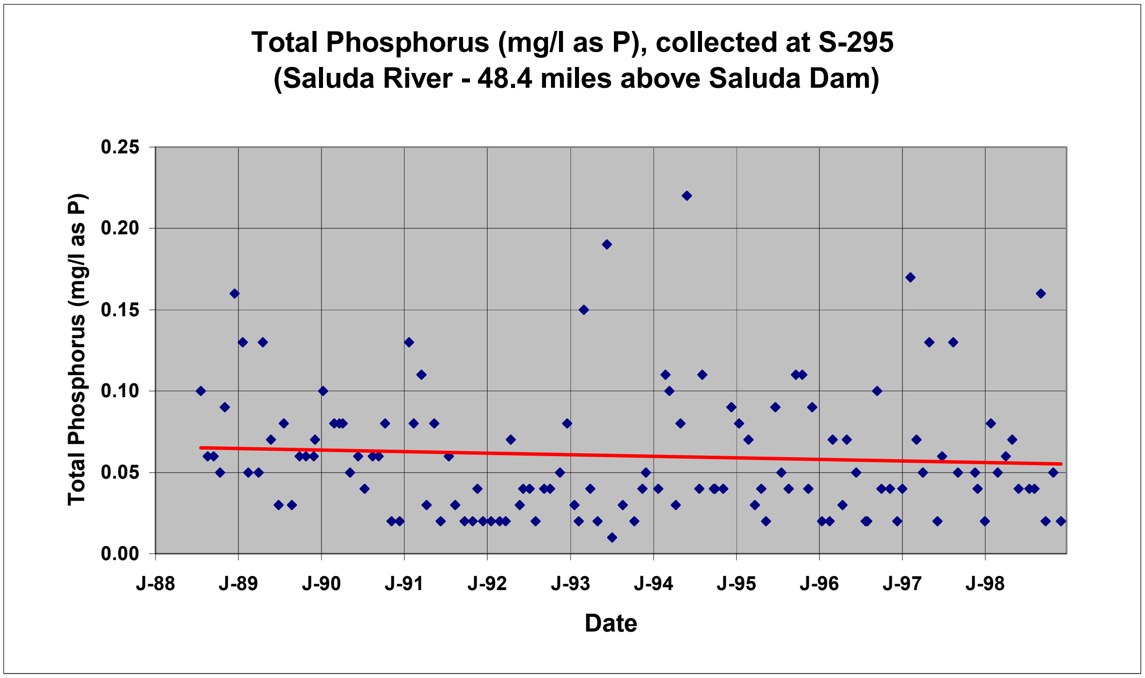

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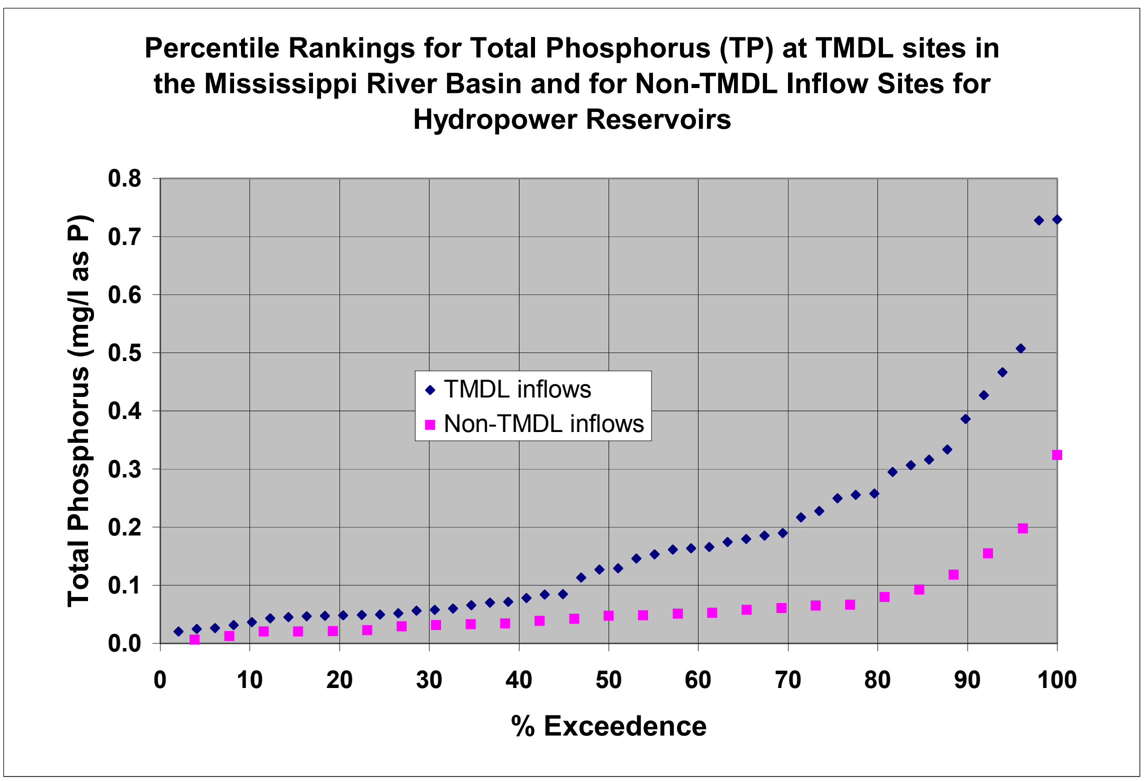

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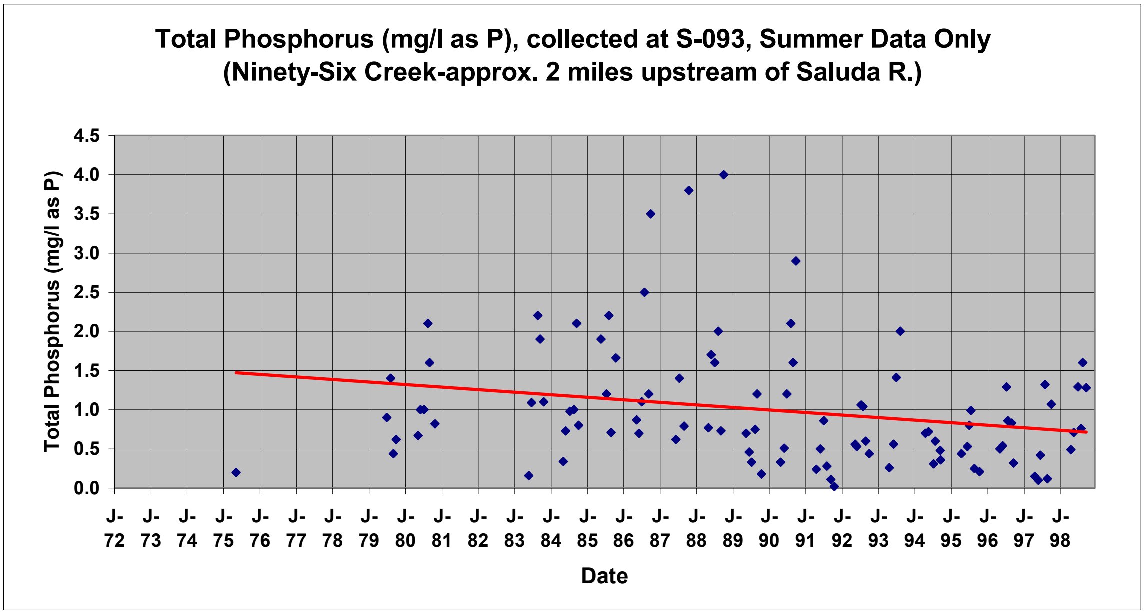

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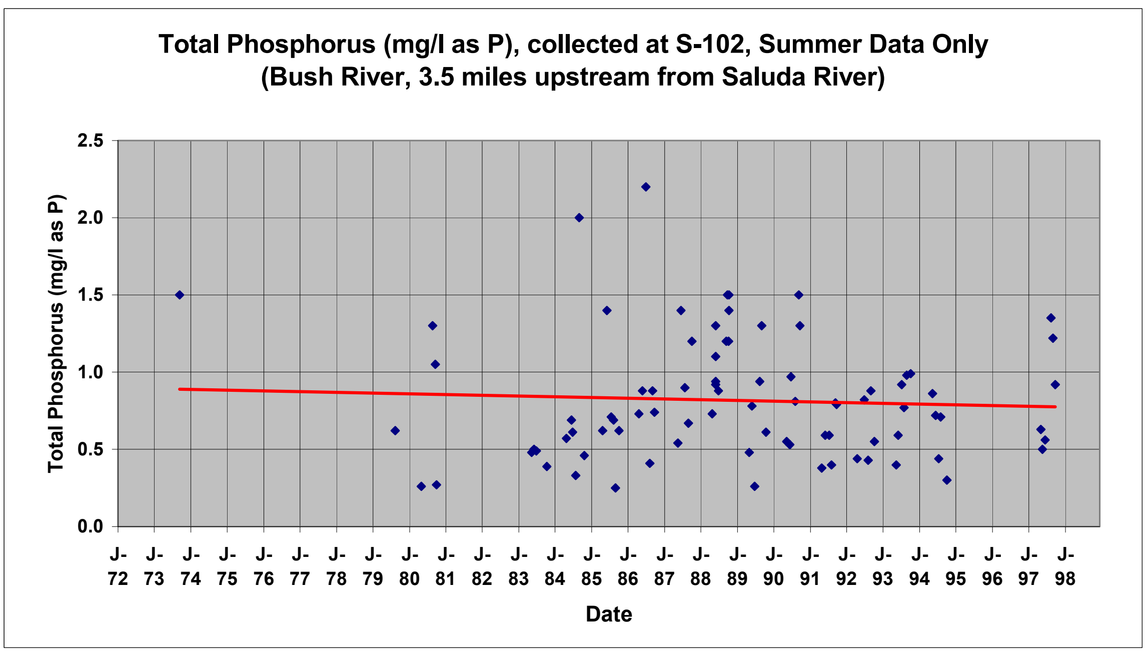

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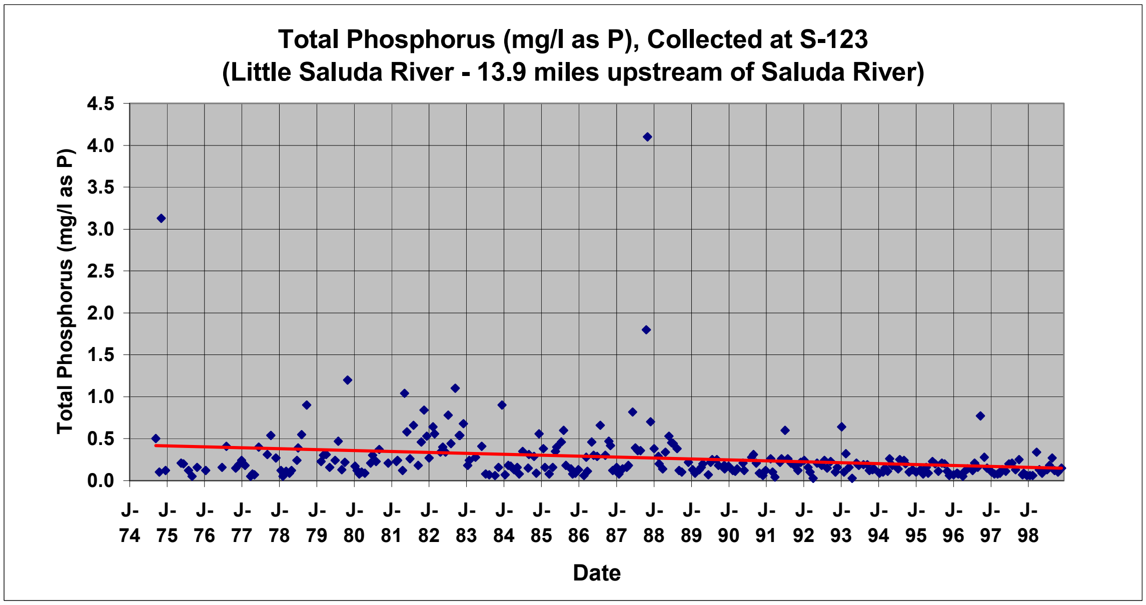

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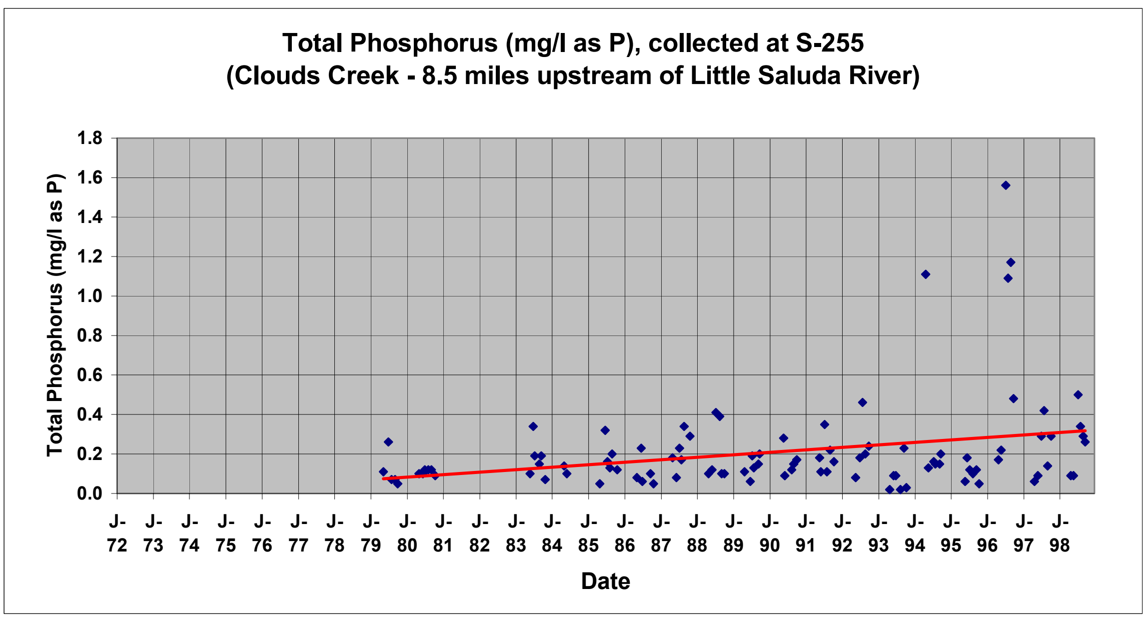

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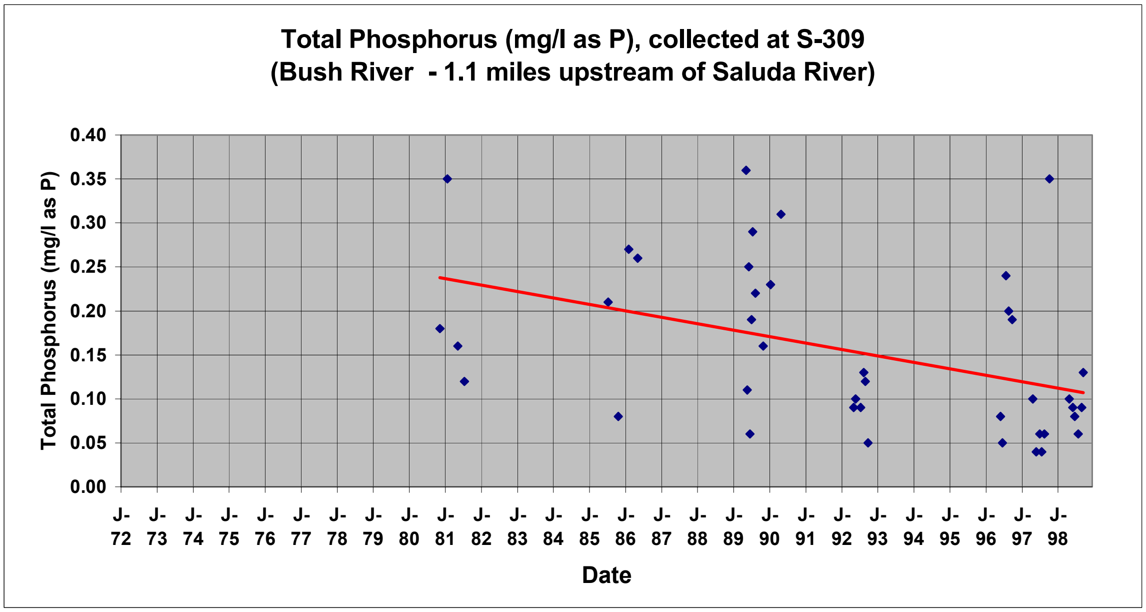

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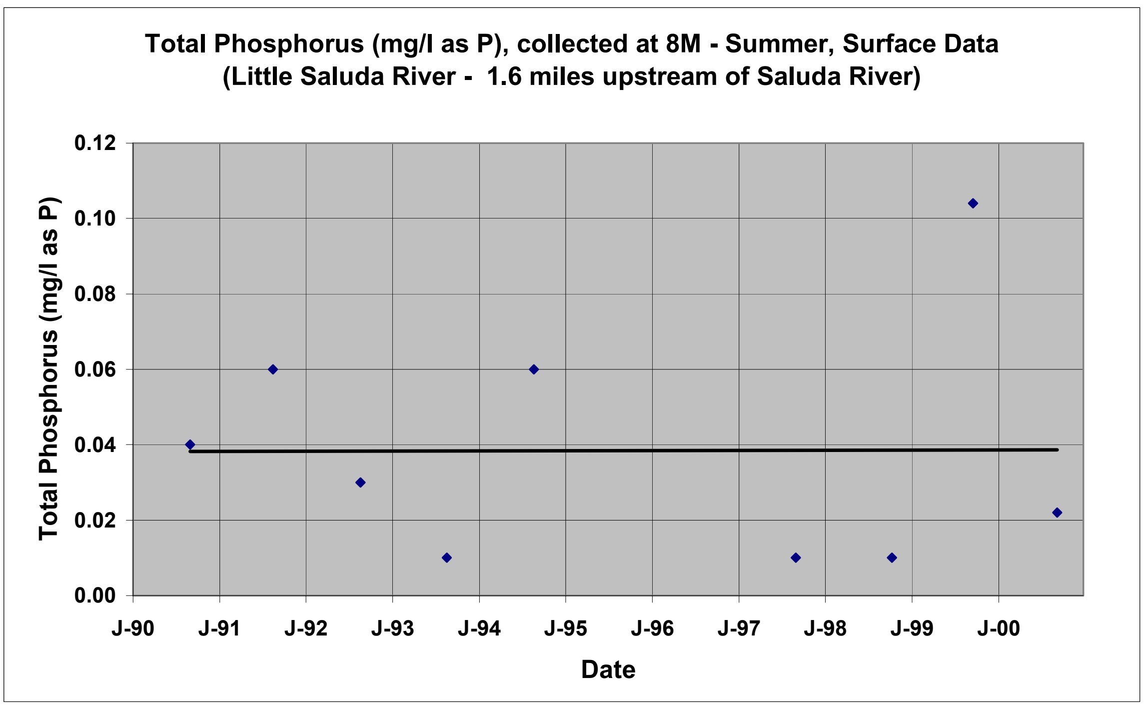

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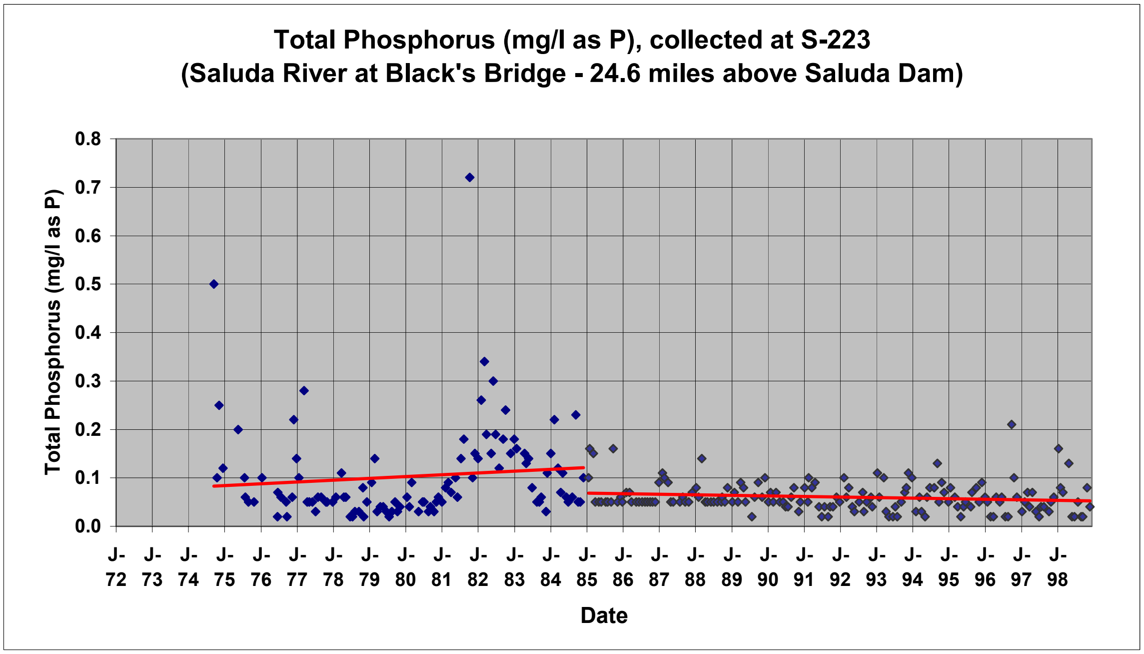

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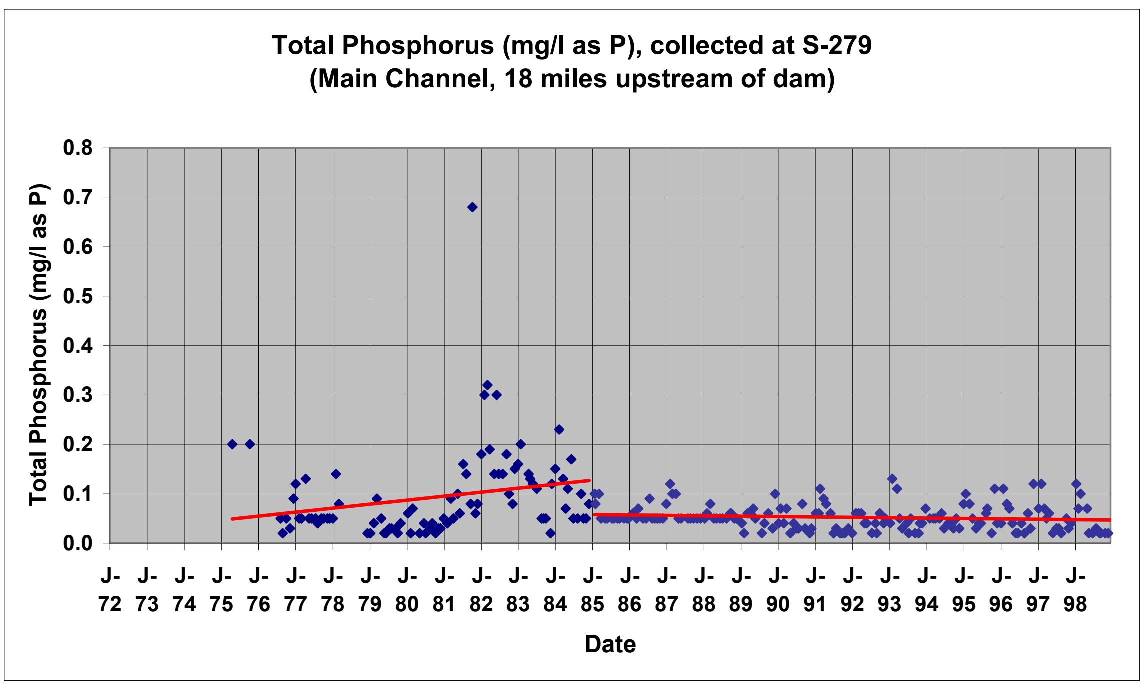

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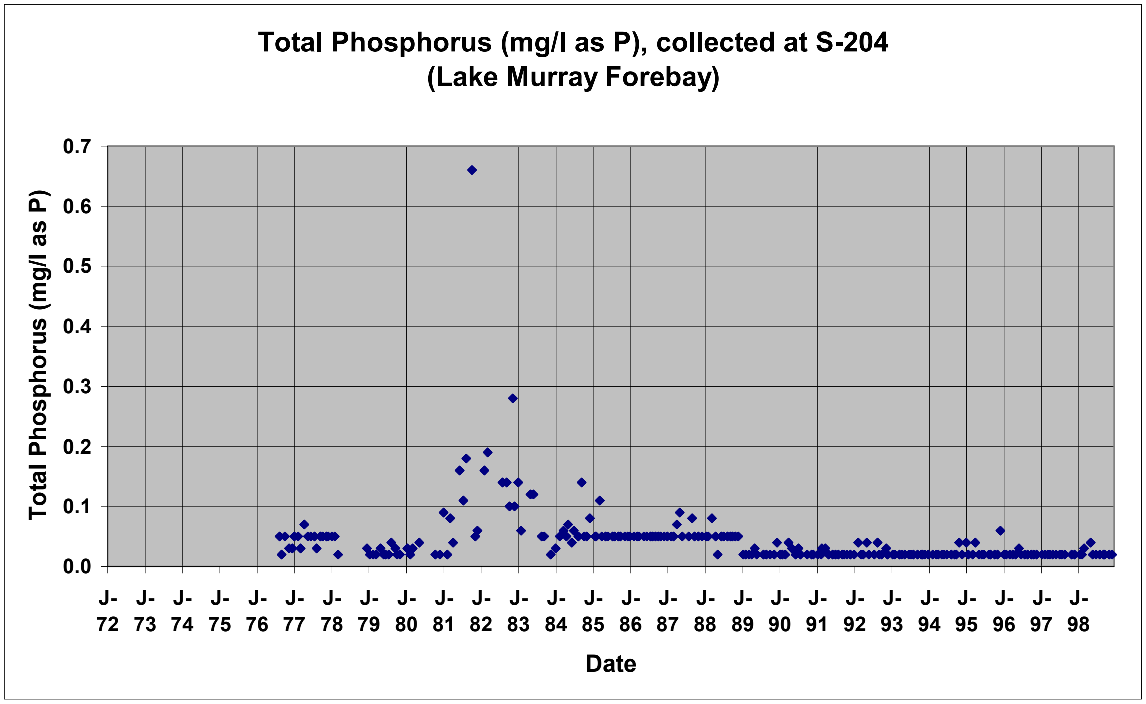

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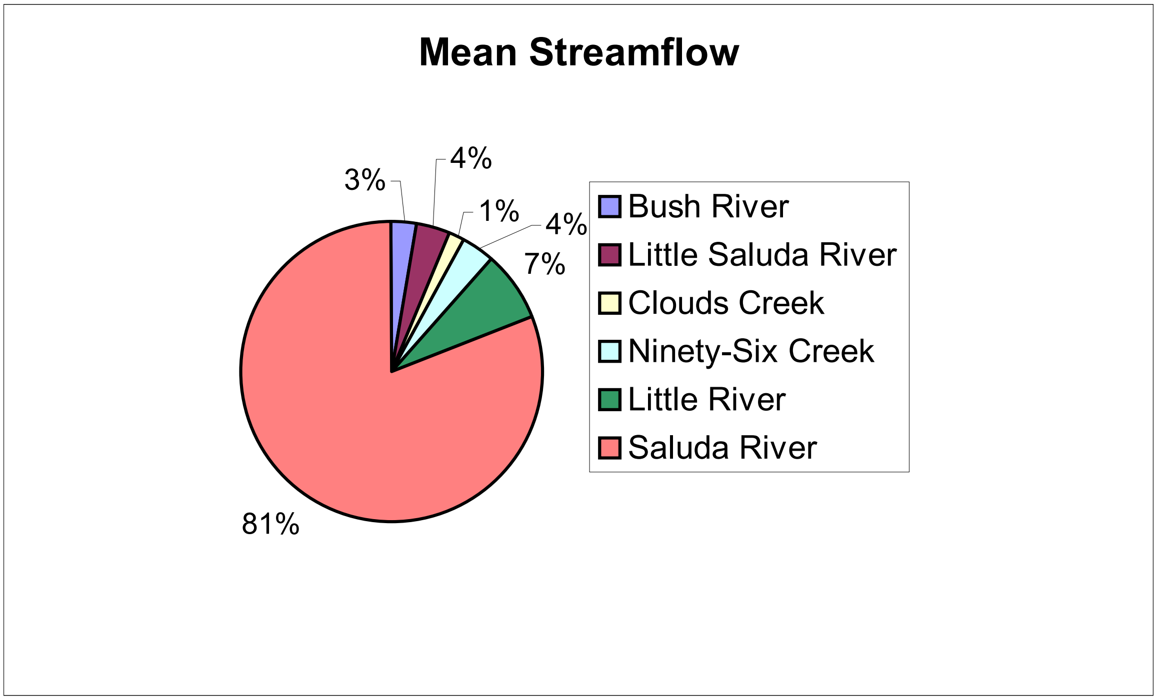

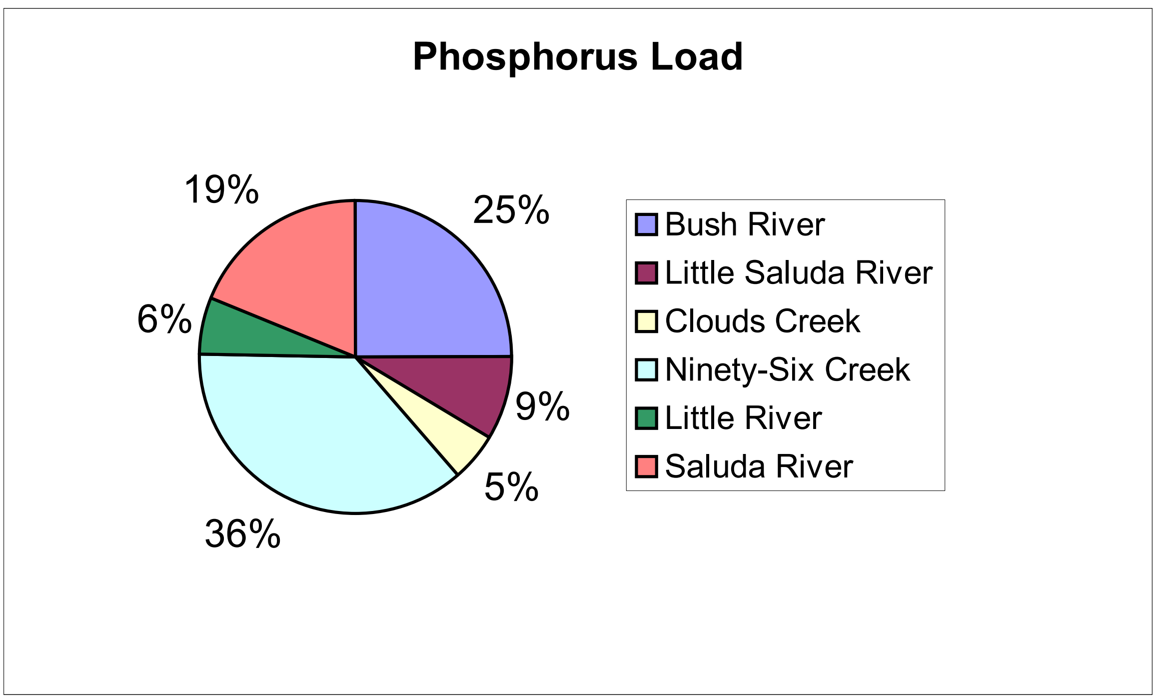

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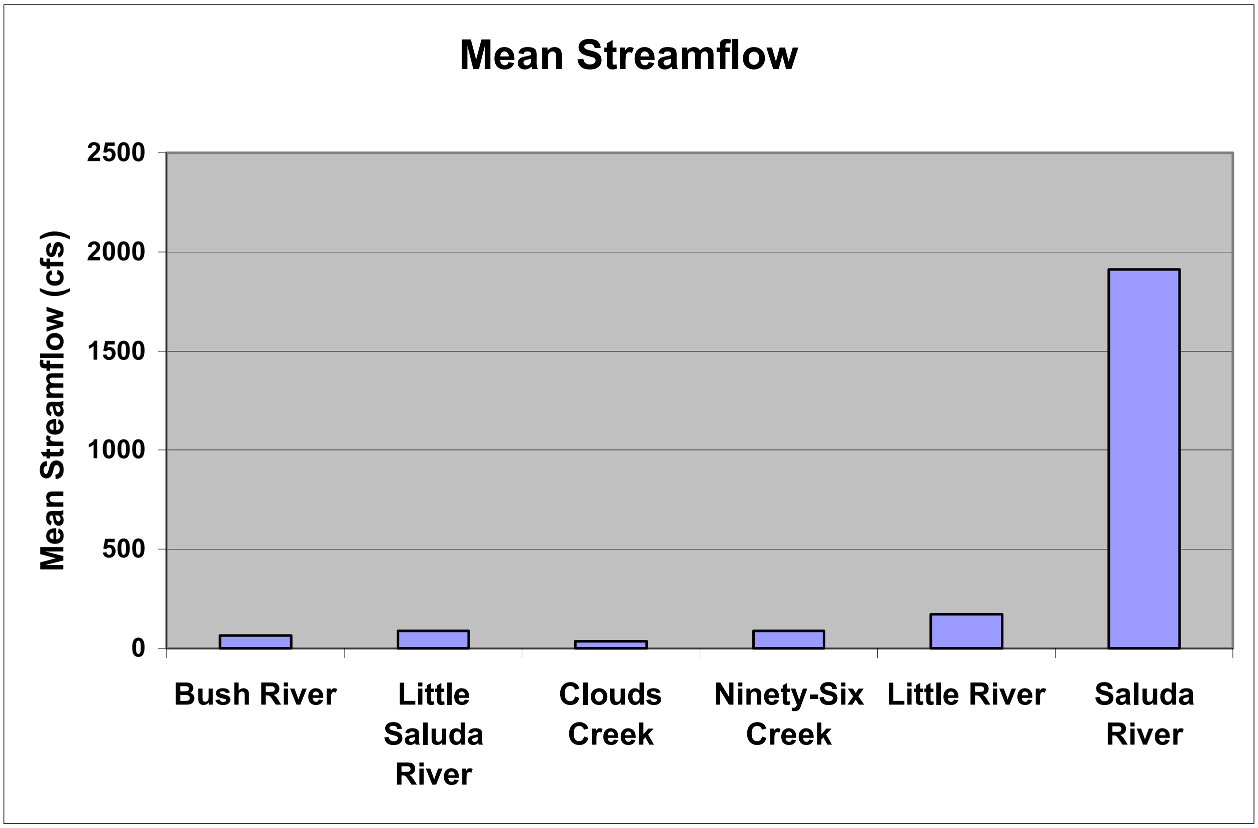

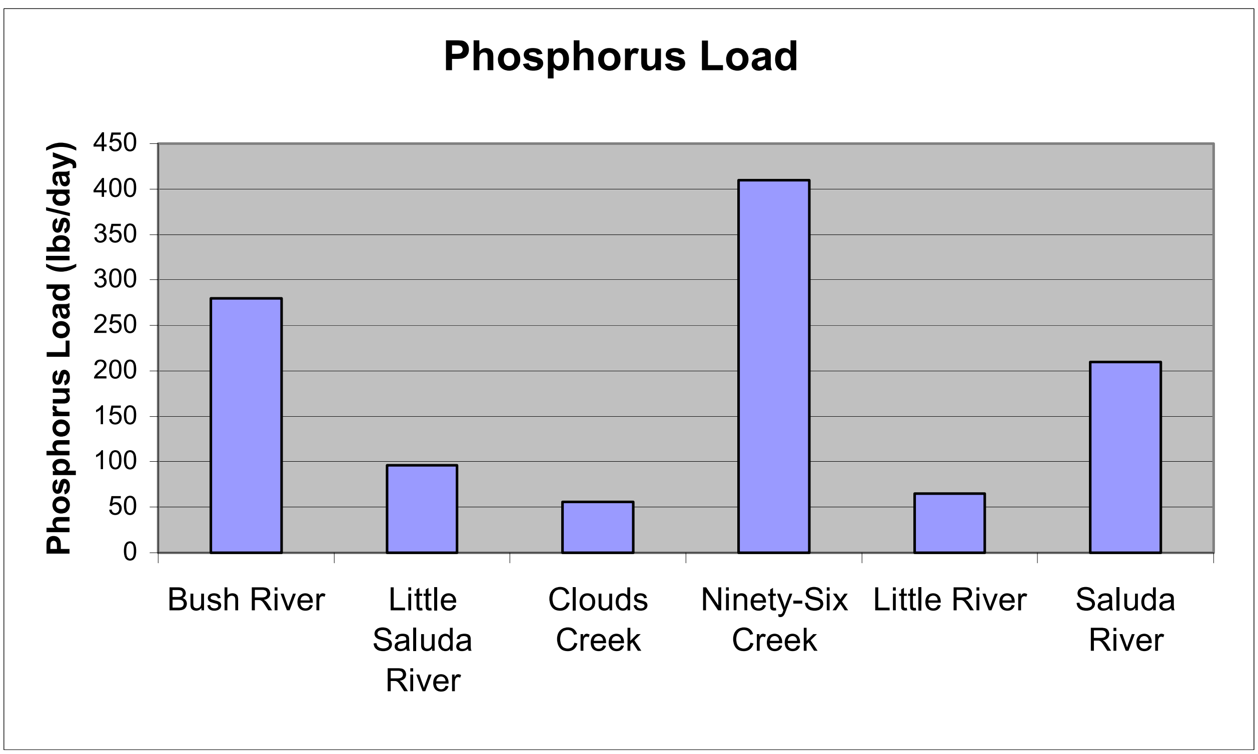

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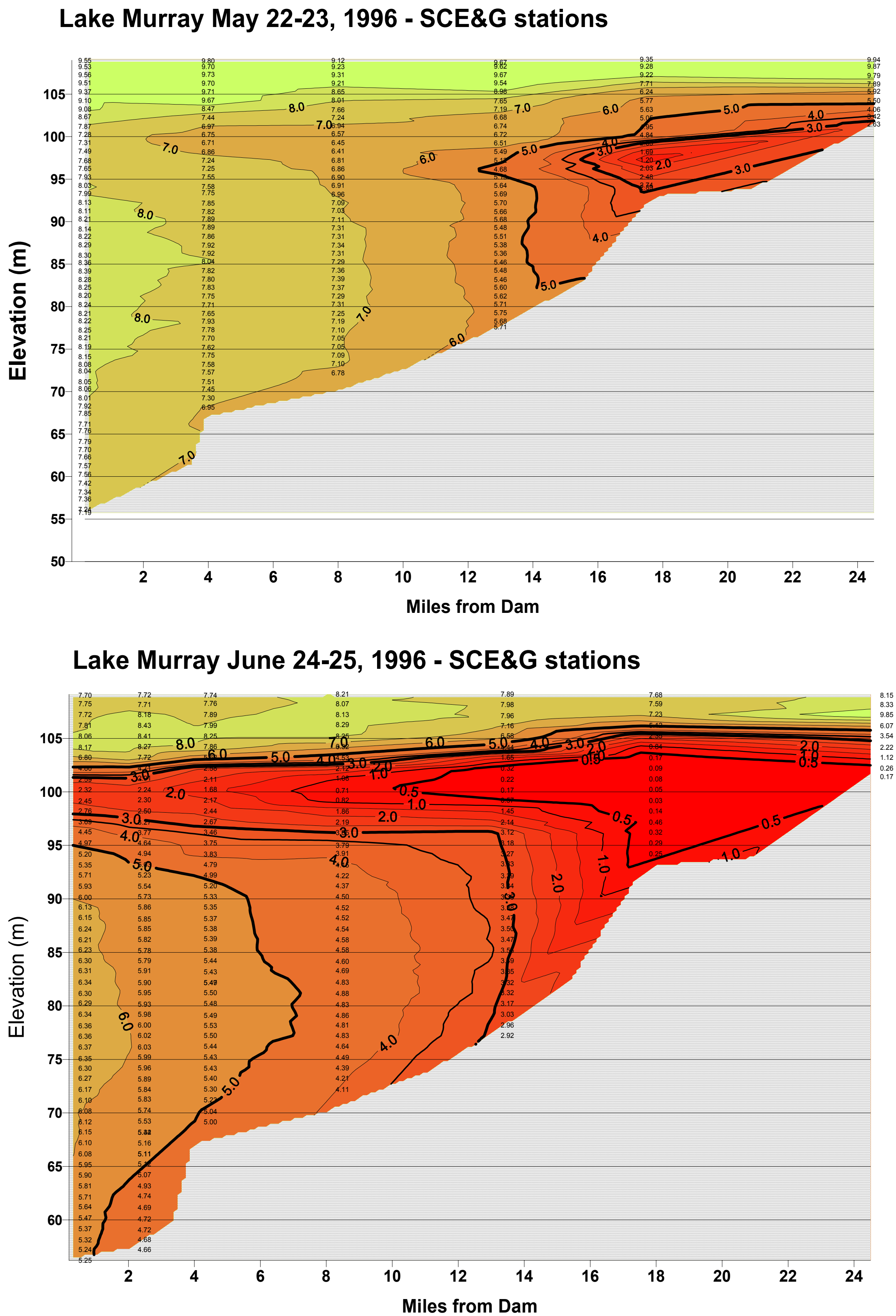
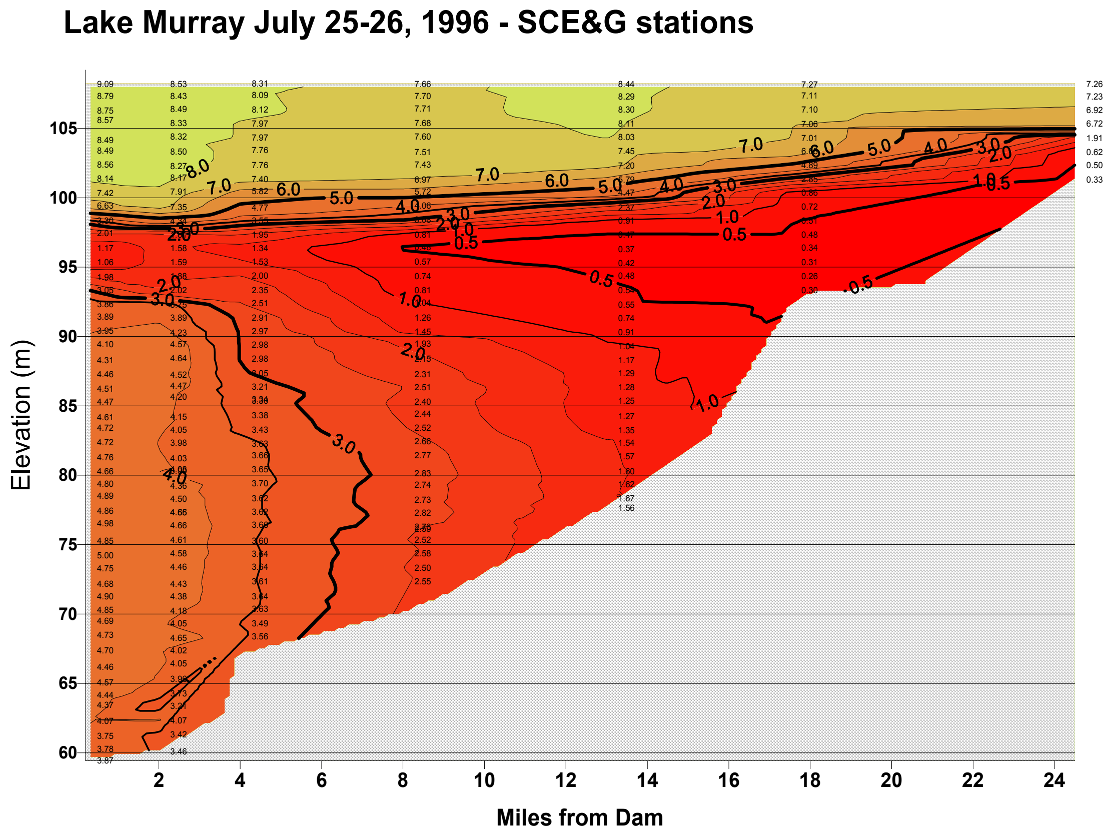


Figure 24: **Longitudinal Contour Plot of DO in Lake Murray for 1996**



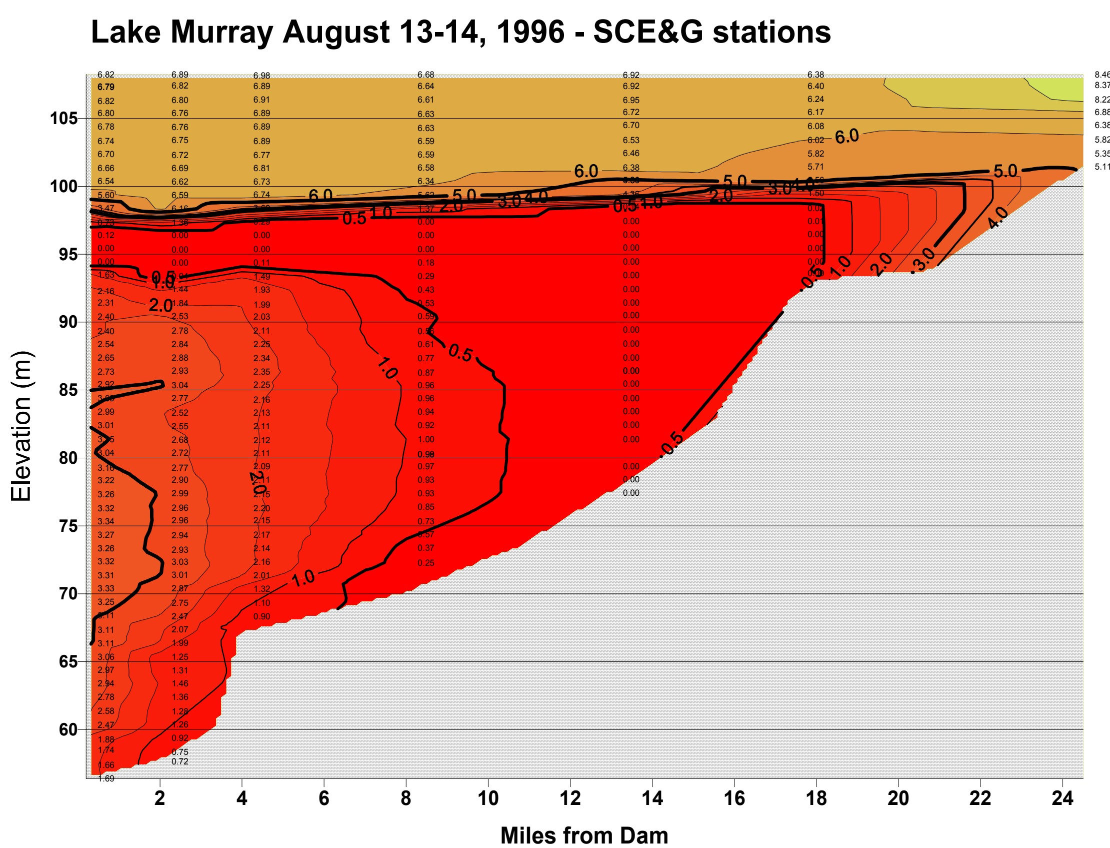
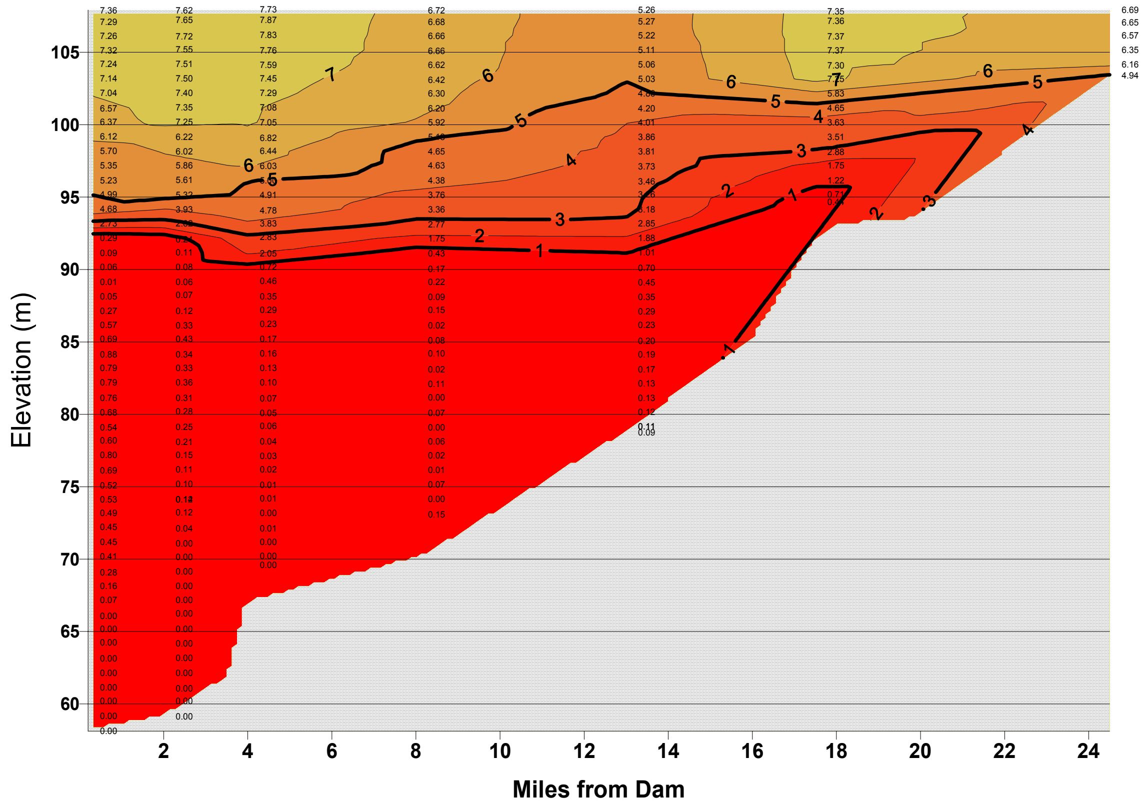
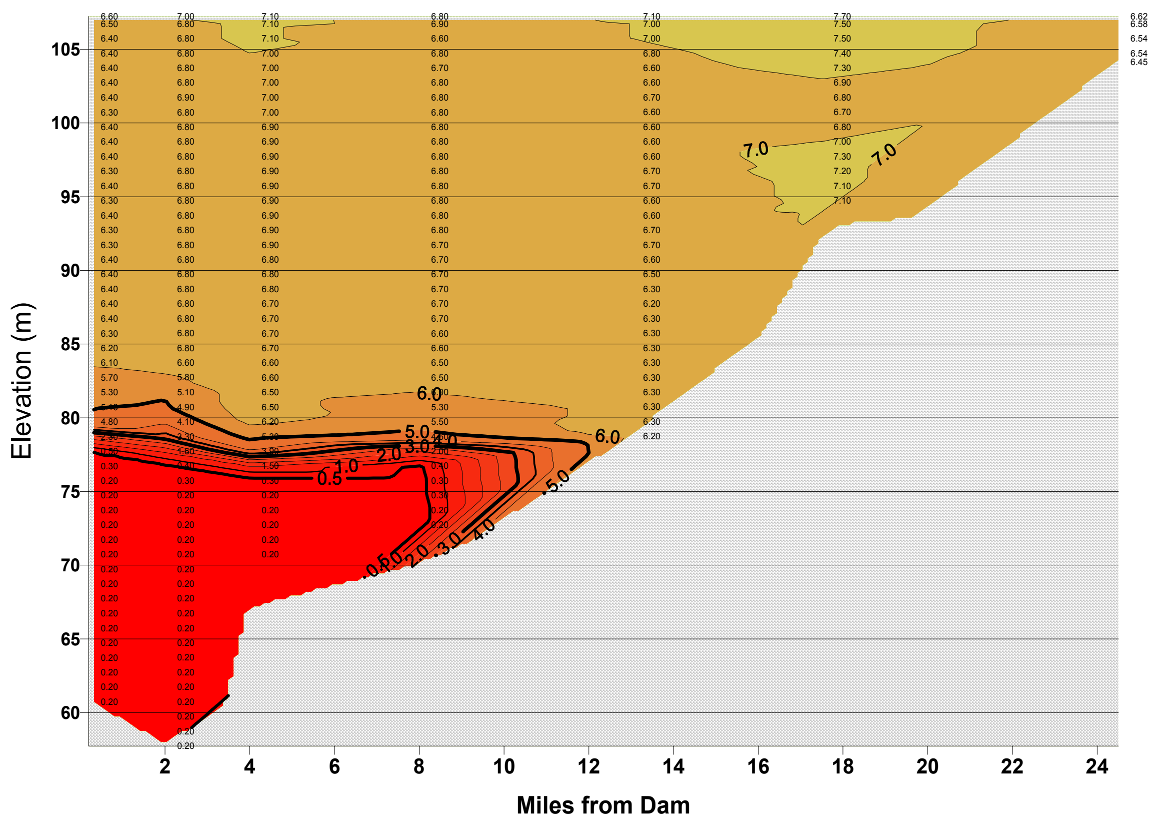


Figure 24: Longitudinal Contour Plot of DO in Lake Murray for 1996 (continued)

Lake Murray September 11-13, 1996 - SCE&G stations



Lake Murray October 9-10, 1996 - SCE&G stations



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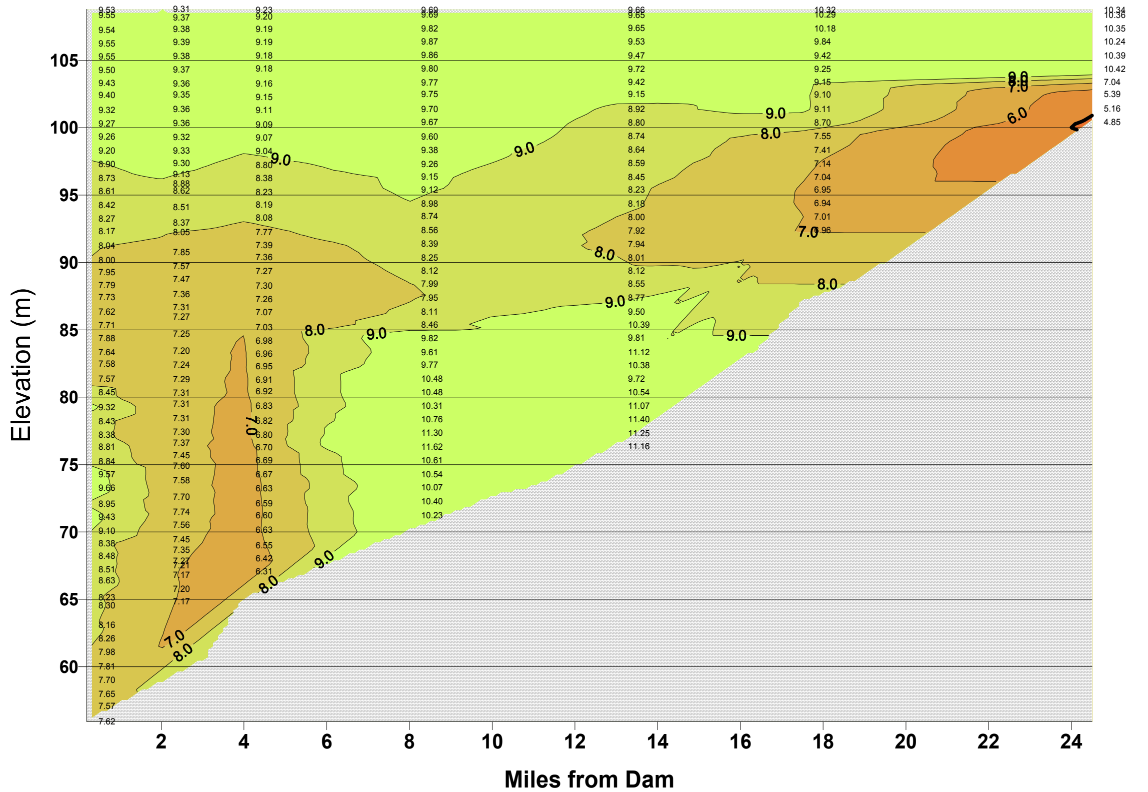
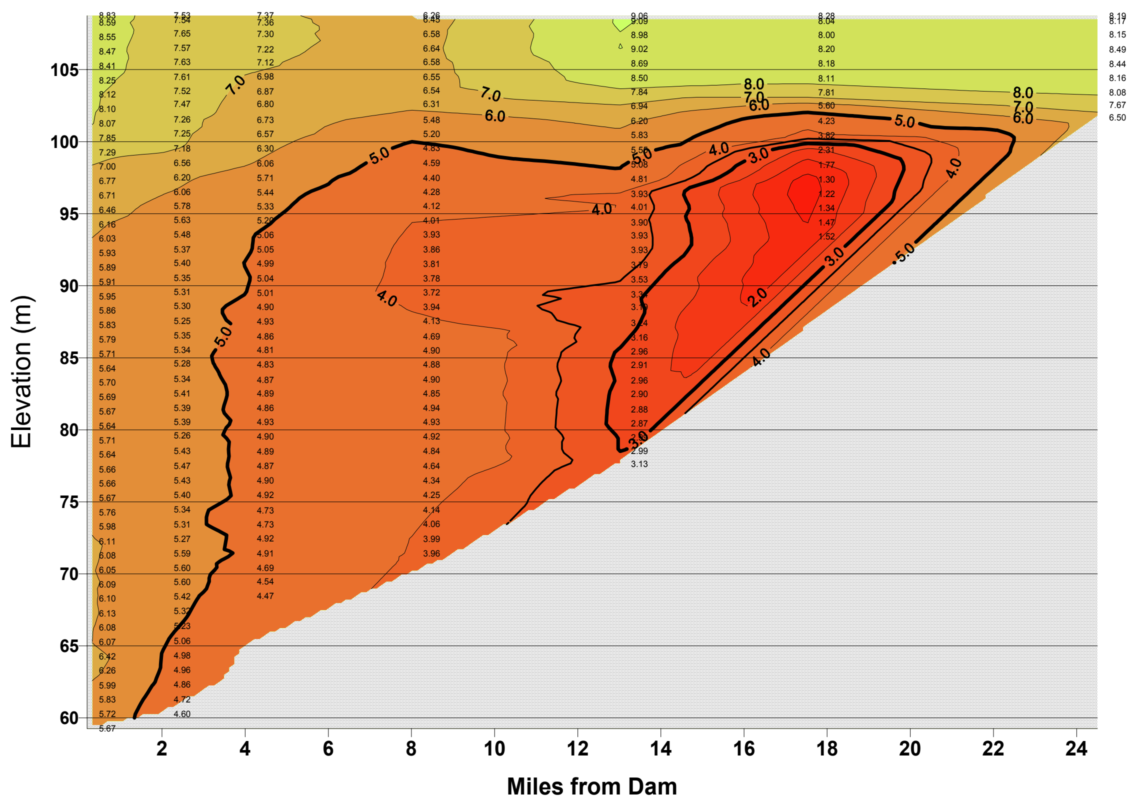
Lake Murray May 6-7, 1997 - SCE&G stations



Lake Murray June 3-4, 1997 - SCE&G stations



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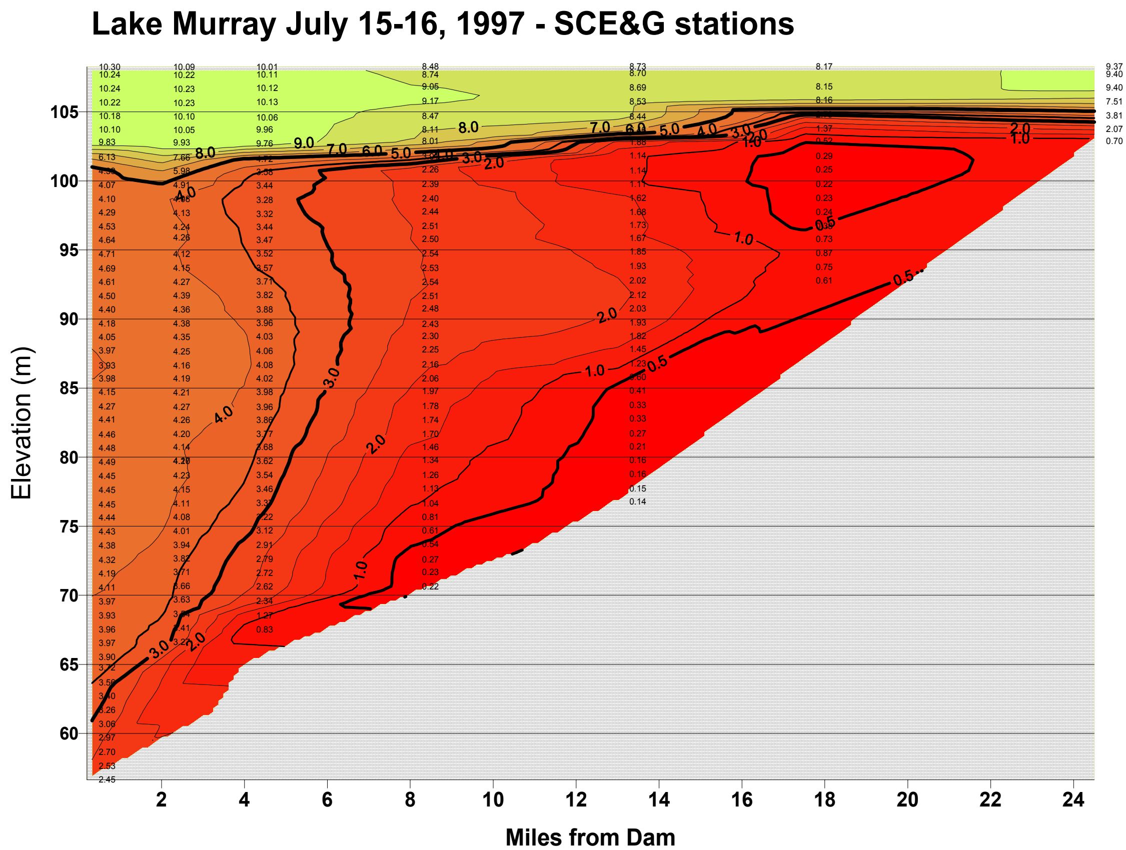

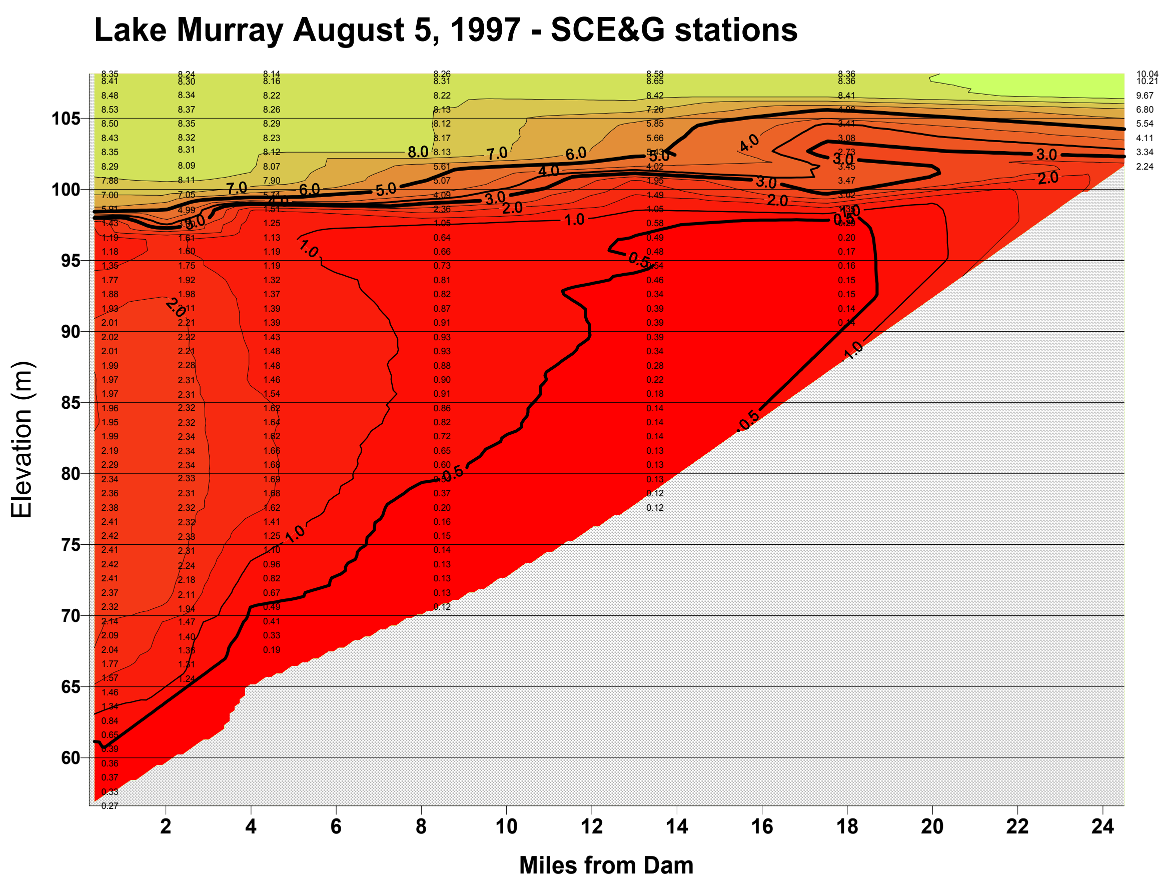

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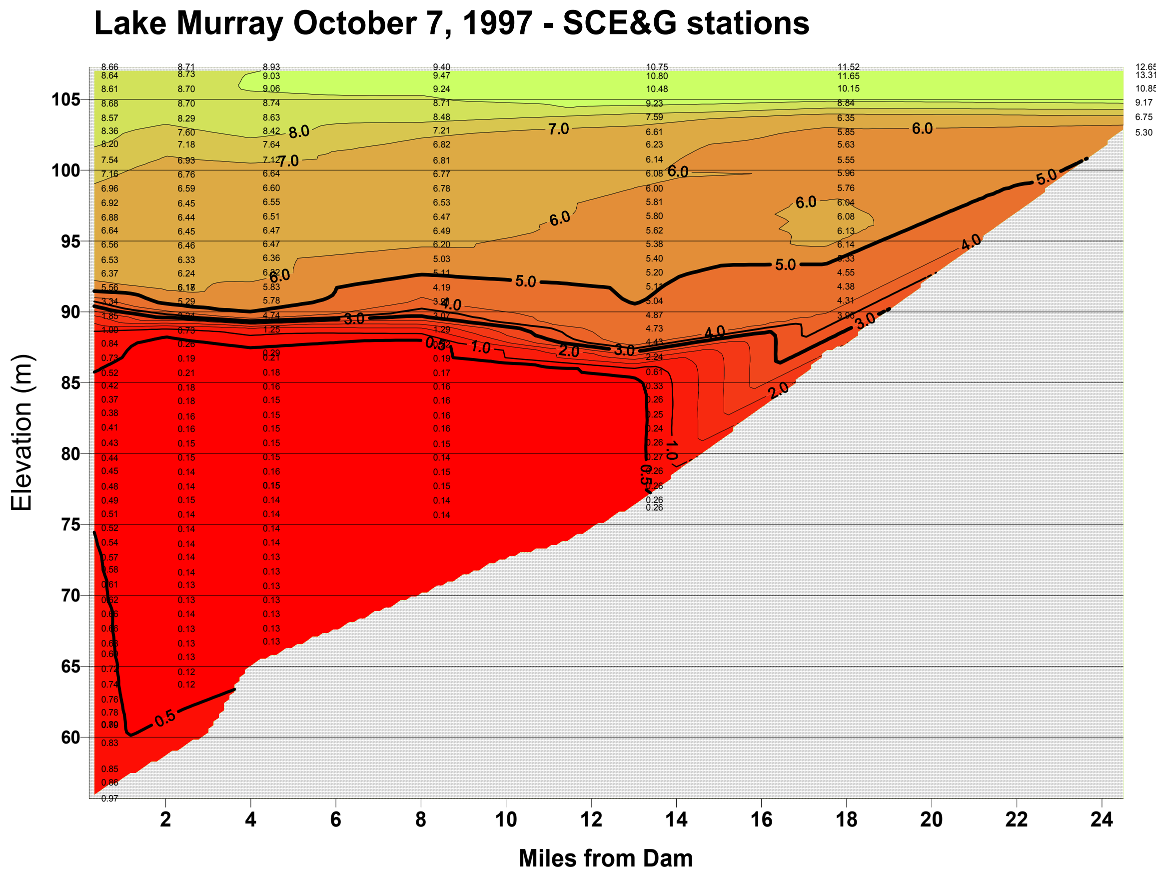
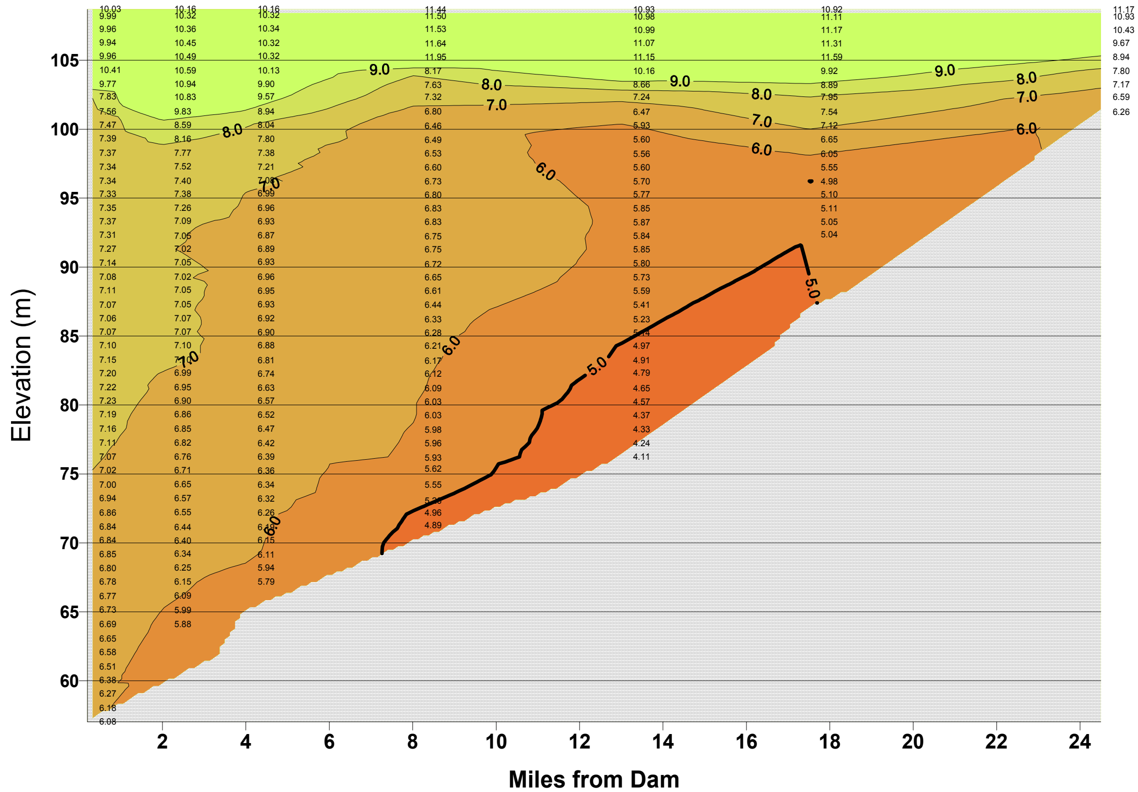
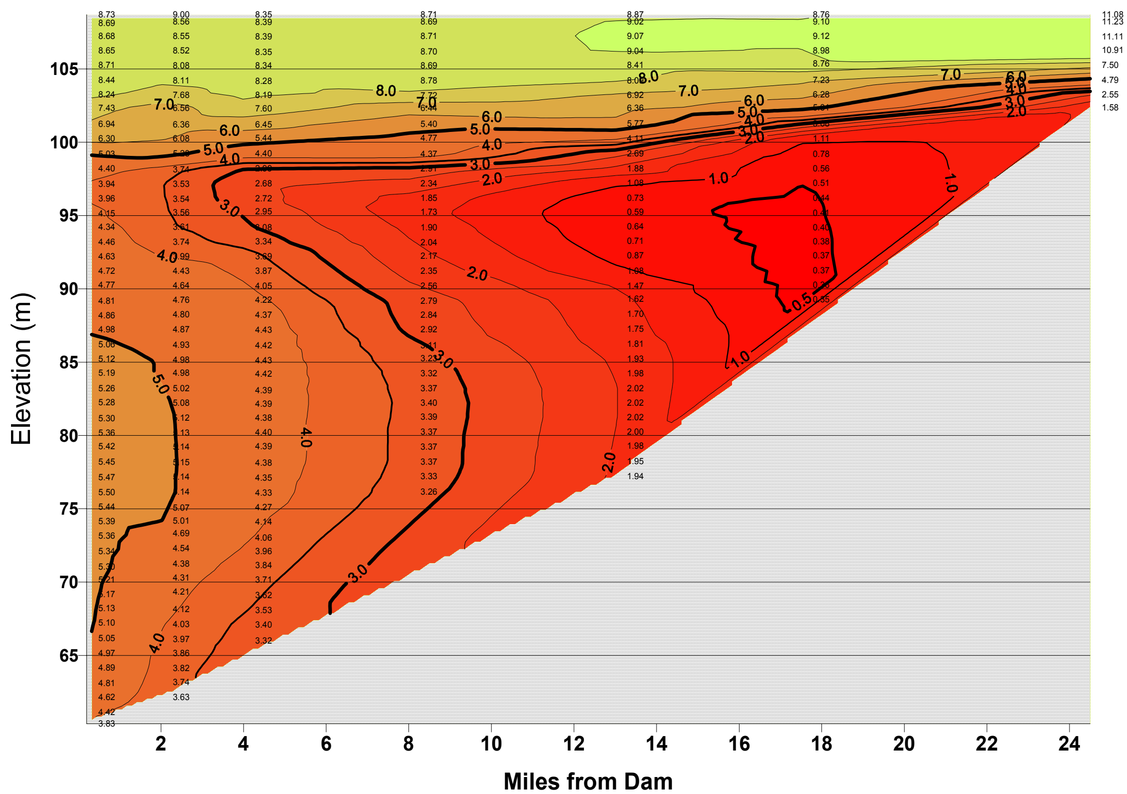


Figure 25: Longitudinal Contour Plot of DO in Lake Murray for 1997 (continued)

Lake Murray May 19-20, 1998-SCE&G stations



Lake Murray June 23, 1998-SCE&G stations



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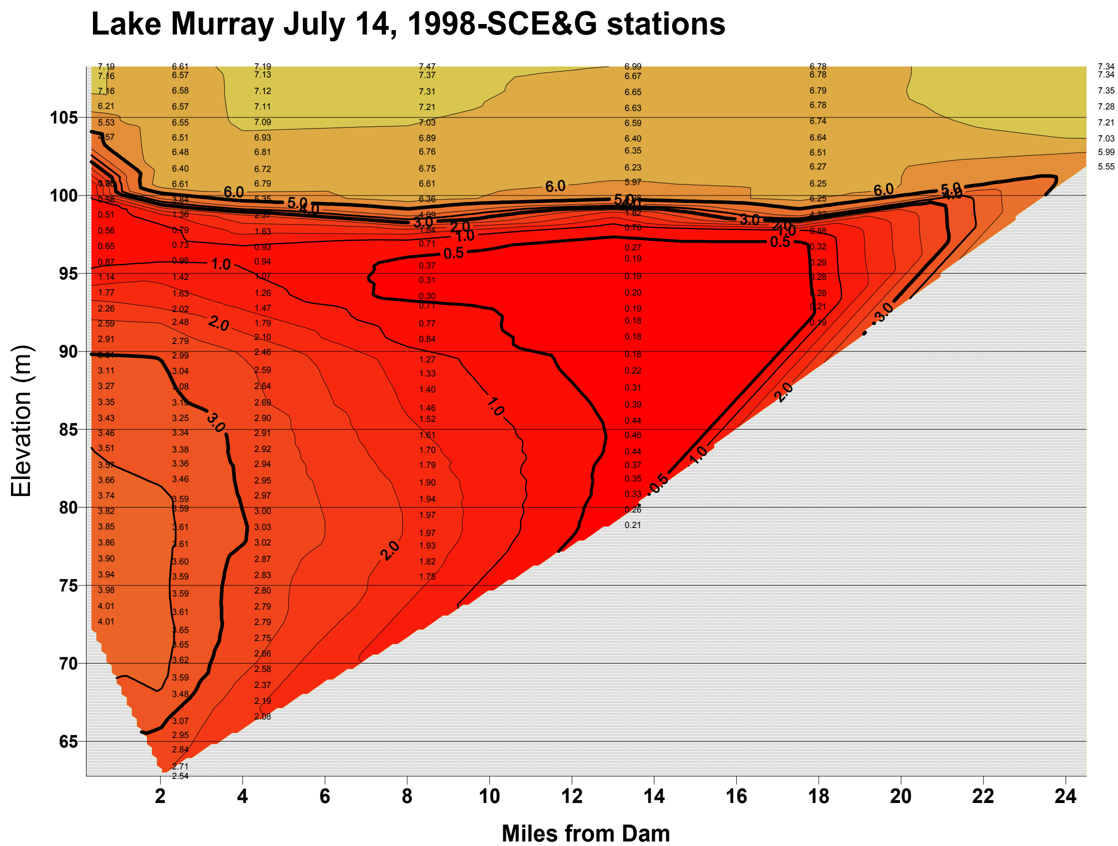


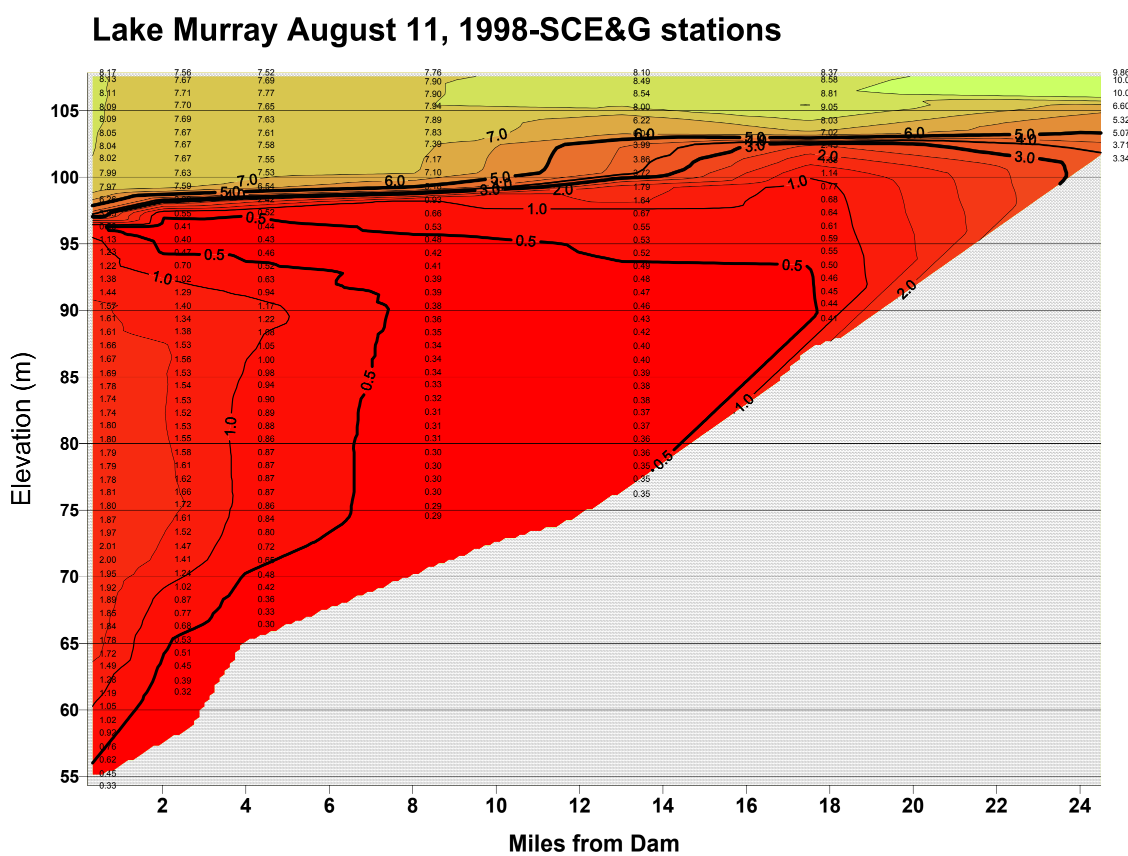
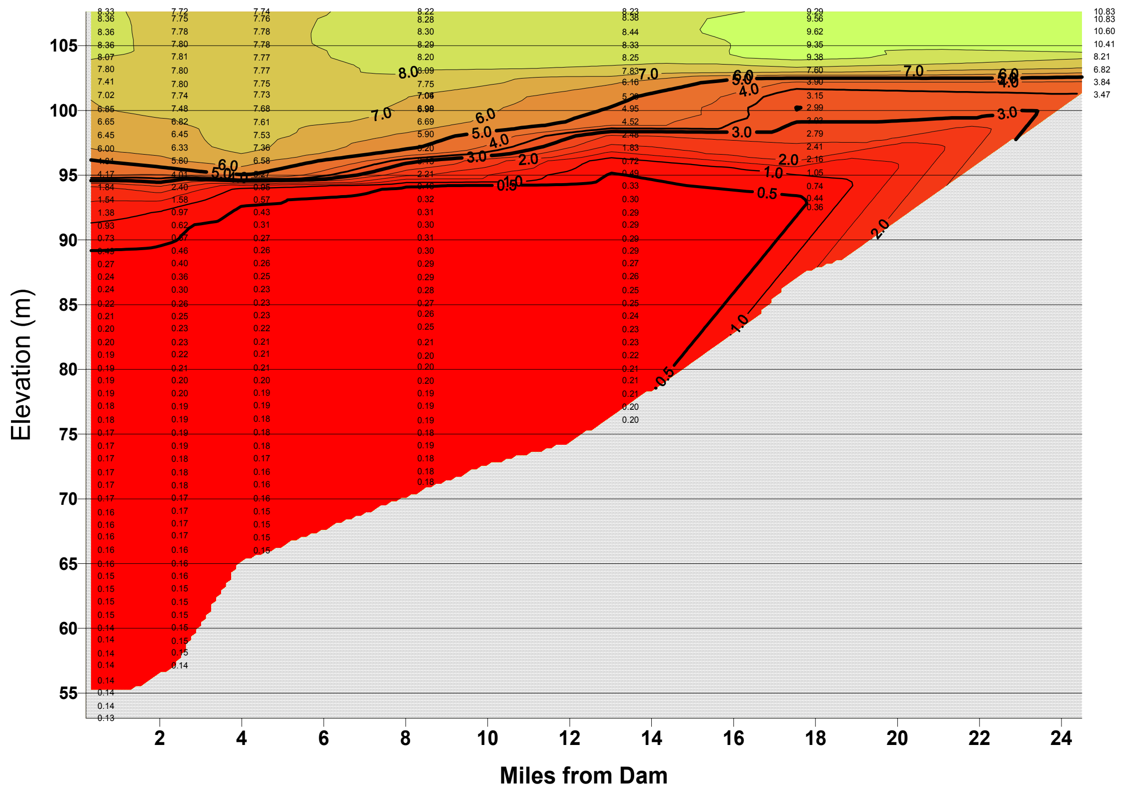


Figure 26: Longitudinal Contour Plot of DO in Lake Murray for 1998 (continued)

Lake Murray September 17, 1998-SCE&G stations



Lake Murray October 14-15, 1998 - SCE&G stations

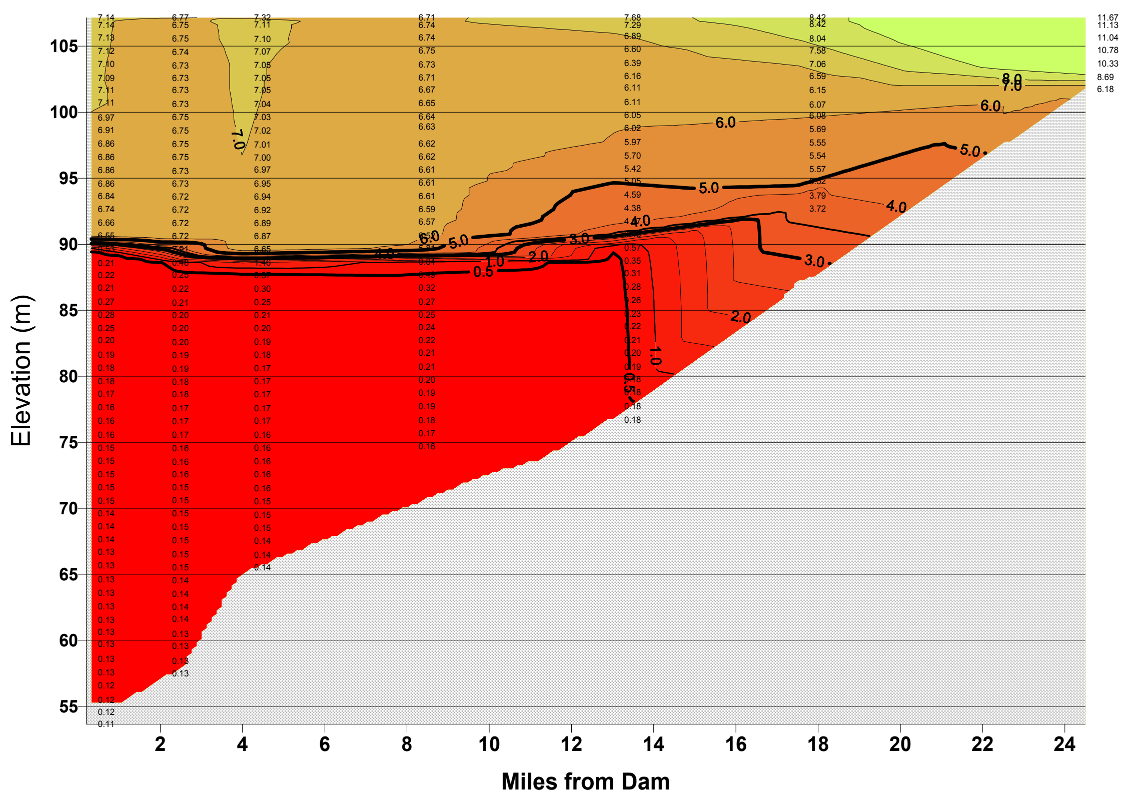
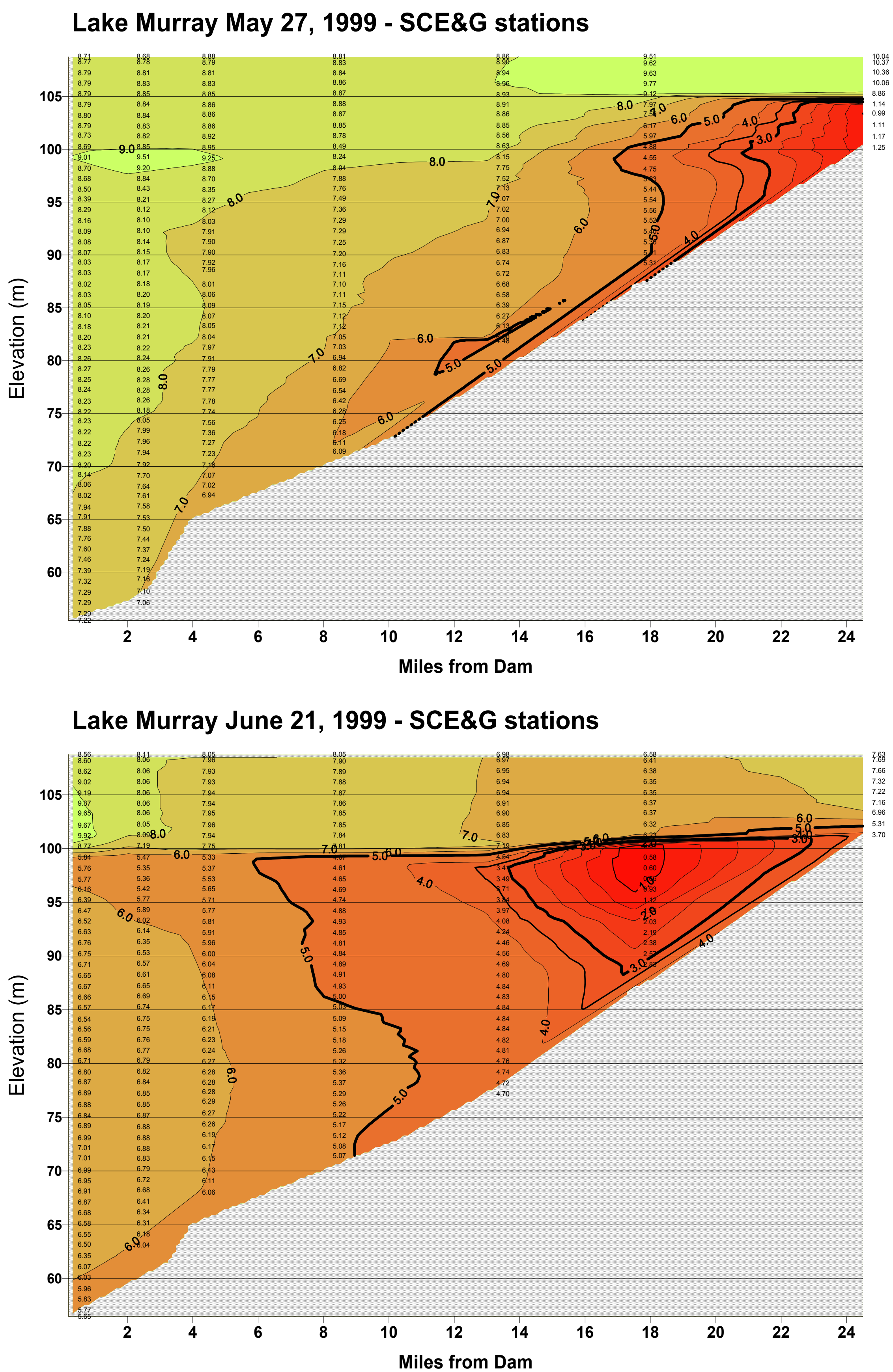


Figure 26: Longitudinal Contour Plot of DO in Lake Murray for 1998 (continued)



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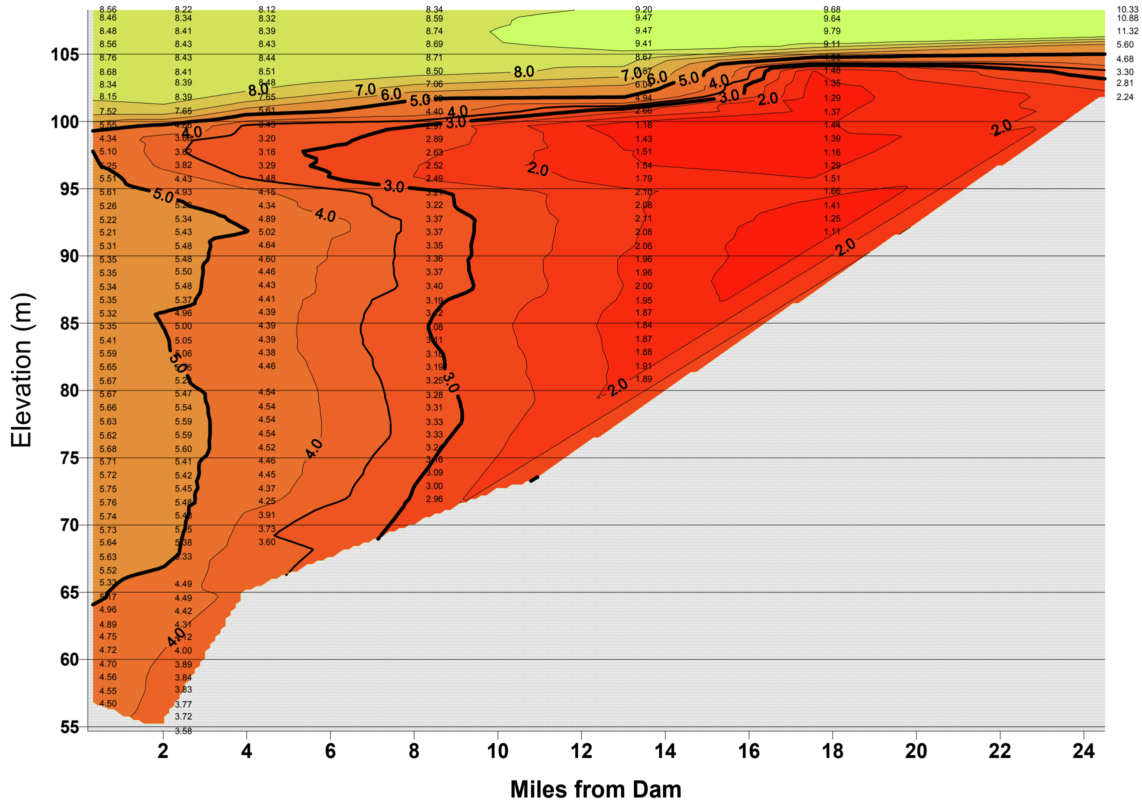
Lake Murray July 21, 1999 - SCE&G stations



Lake Murray August 5, 1999 - SCE&G stations

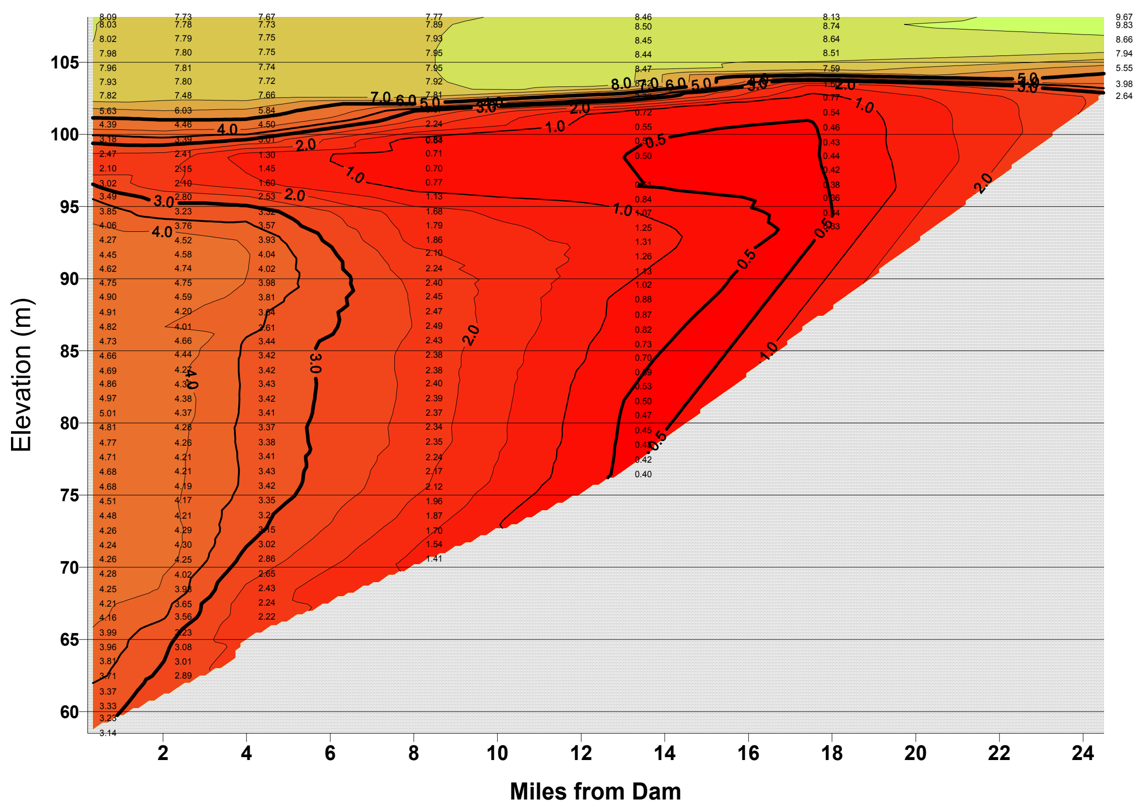
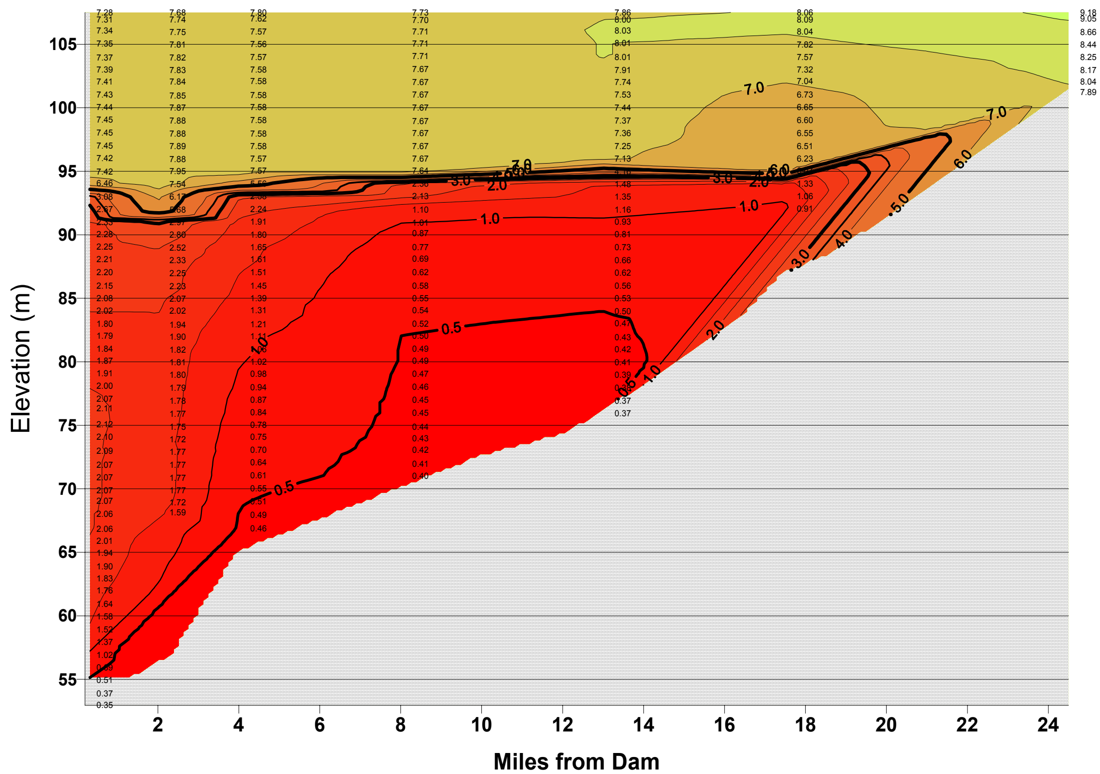


Figure 27: Longitudinal Contour Plot of DO in Lake Murray for 1999 (continued)

Lake Murray September 23, 1999 - SCE&G stations



Lake Murray October 26, 1999 - SCE&G stations

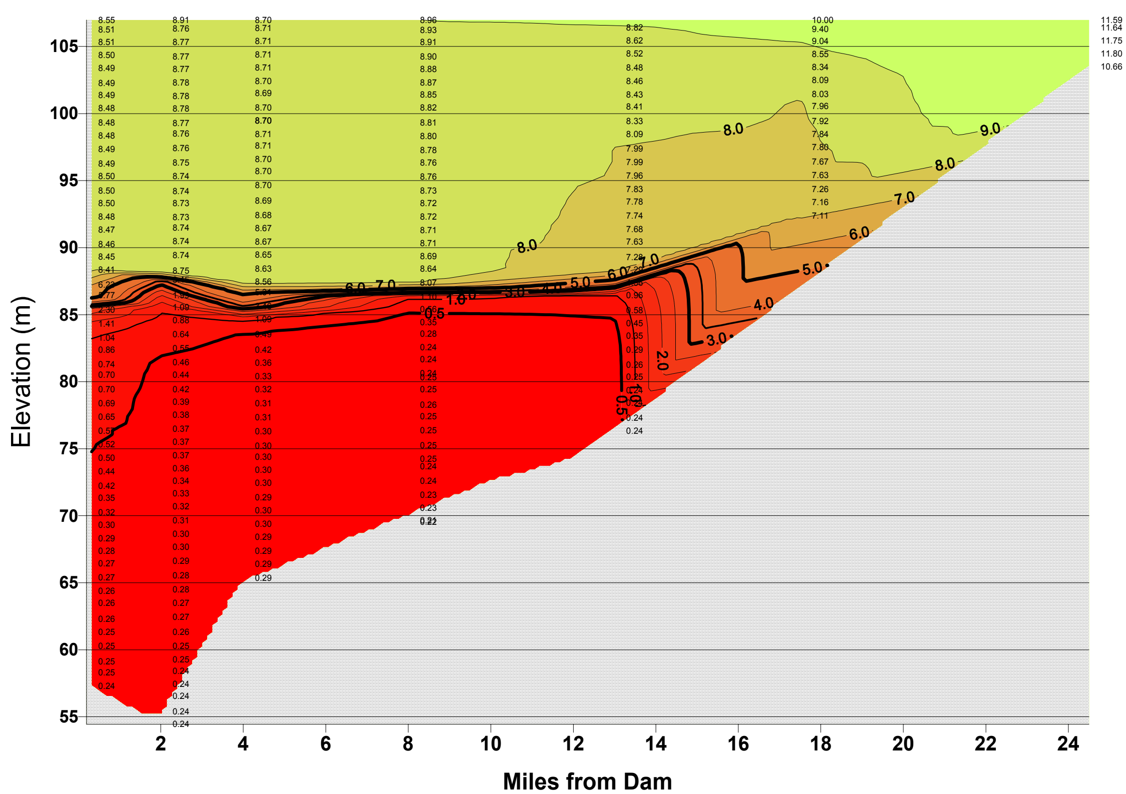
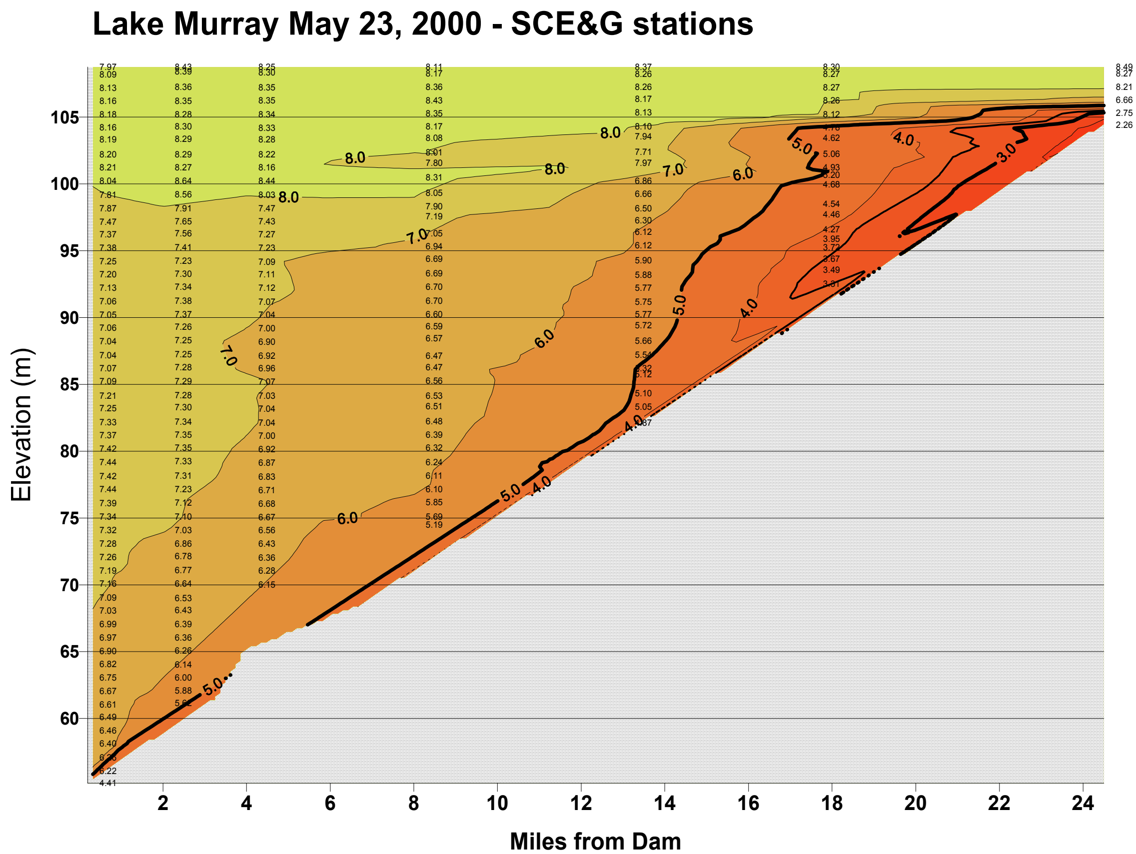


Figure 27: Longitudinal Contour Plot of DO in Lake Murray for 1999 (continued)



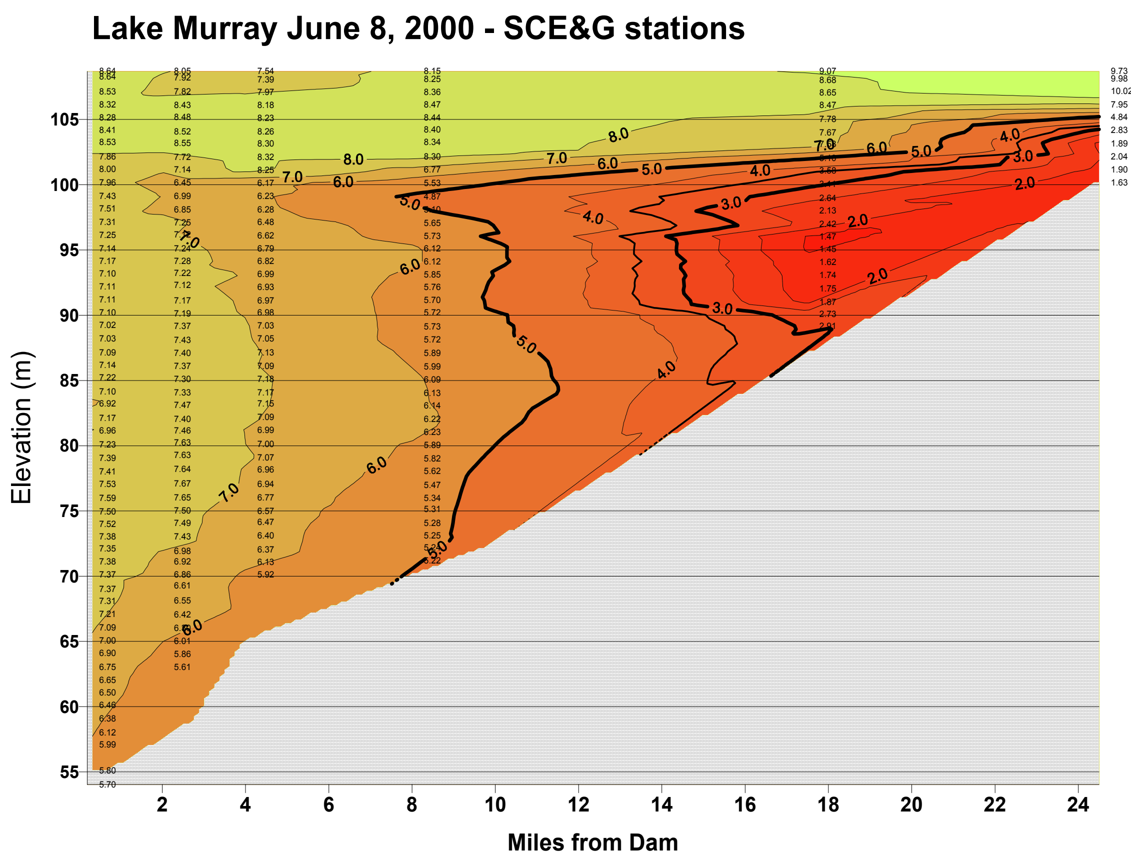
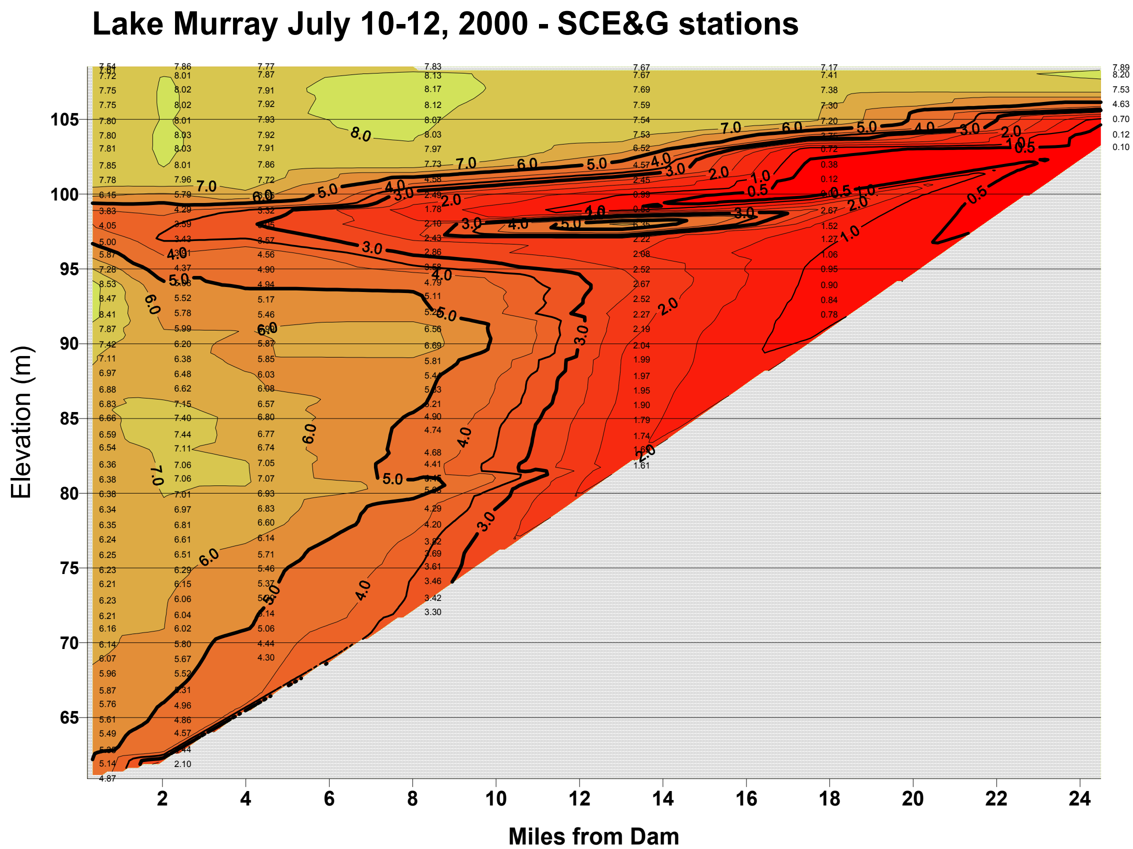


Figure 28: Longitudinal Contour Plot of DO in Lake Murray for 2000



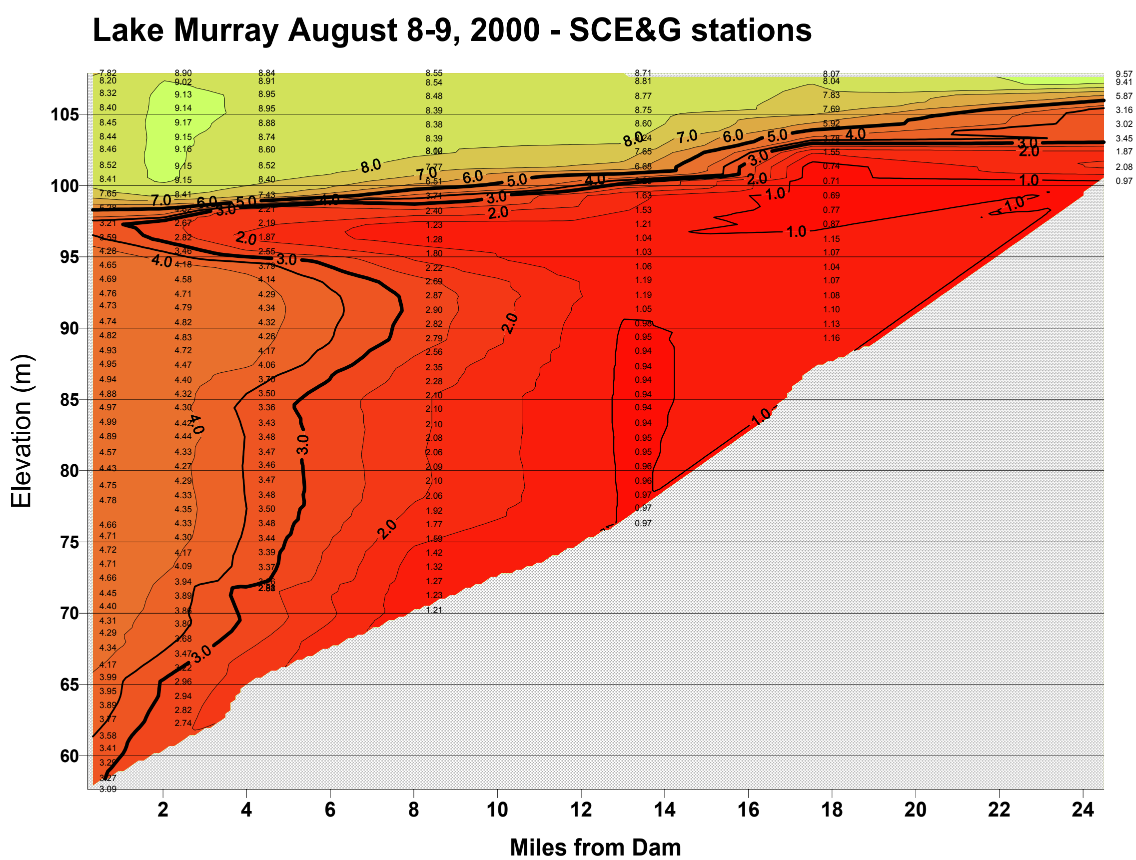
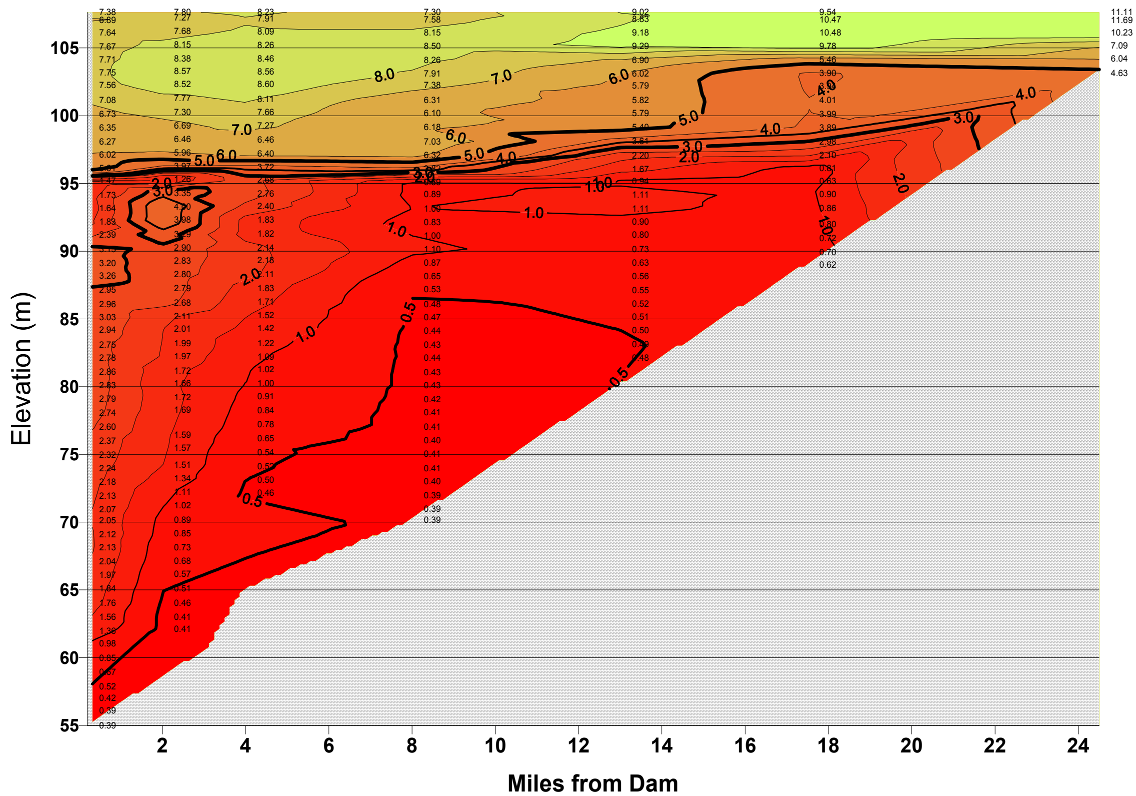


Figure 28: Longitudinal Contour Plot of DO in Lake Murray for 2000 (continued)

Lake Murray September 13-14, 2000 - SCE&G stations



Lake Murray October 12, 2000 - SCE&G stations

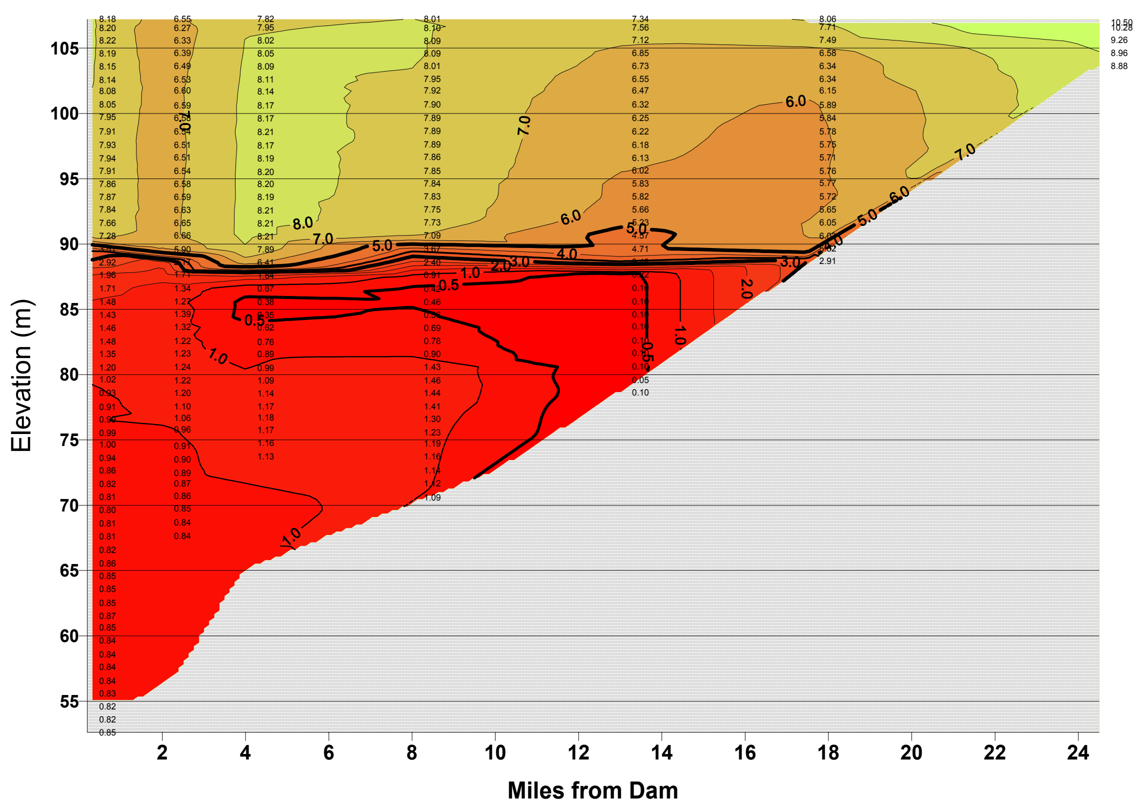


Figure 28: Longitudinal Contour Plot of DO in Lake Murray for 2000 (continued)

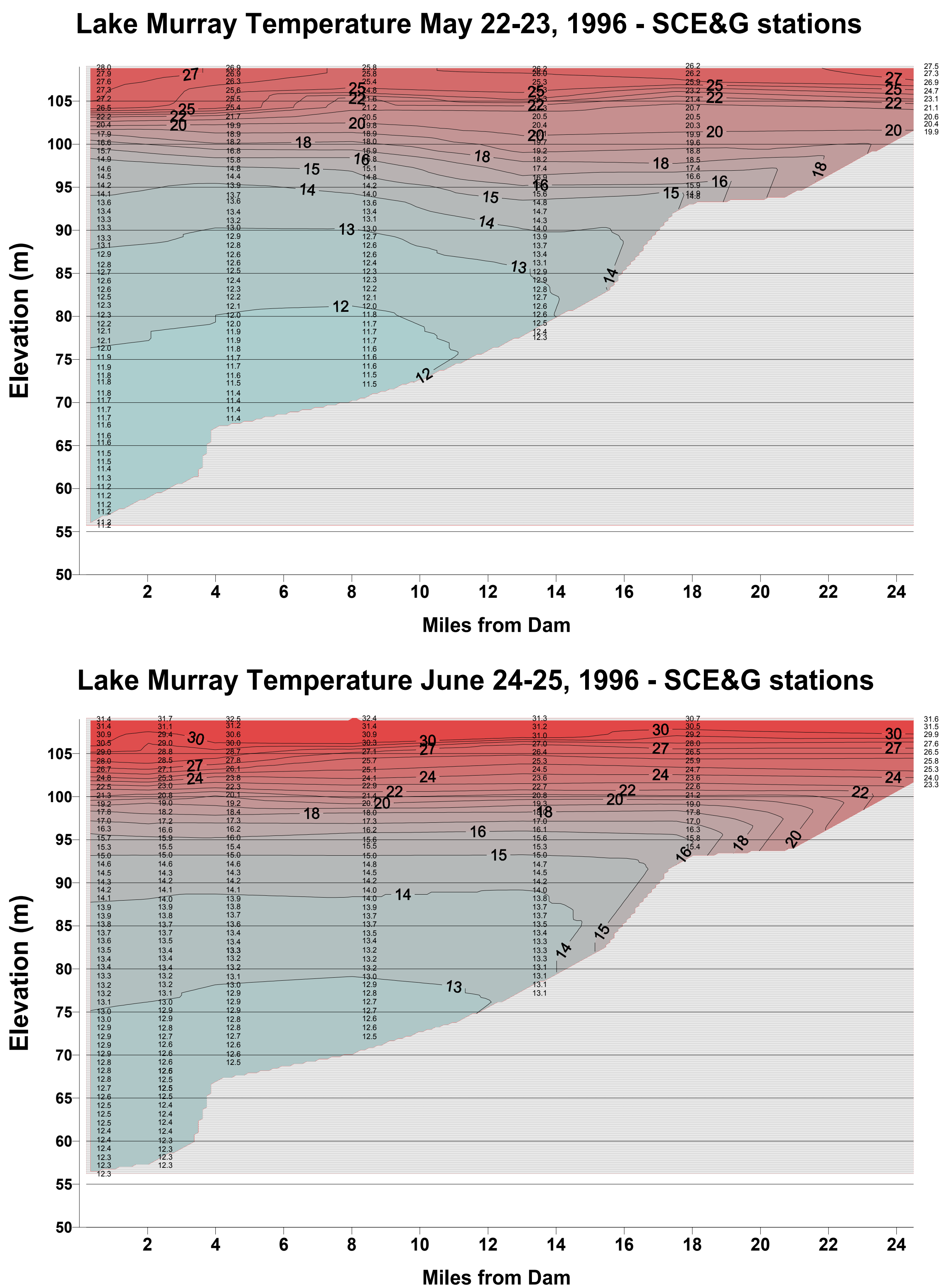


Figure 29: Longitudinal Contour Plots of Temperature for 1996

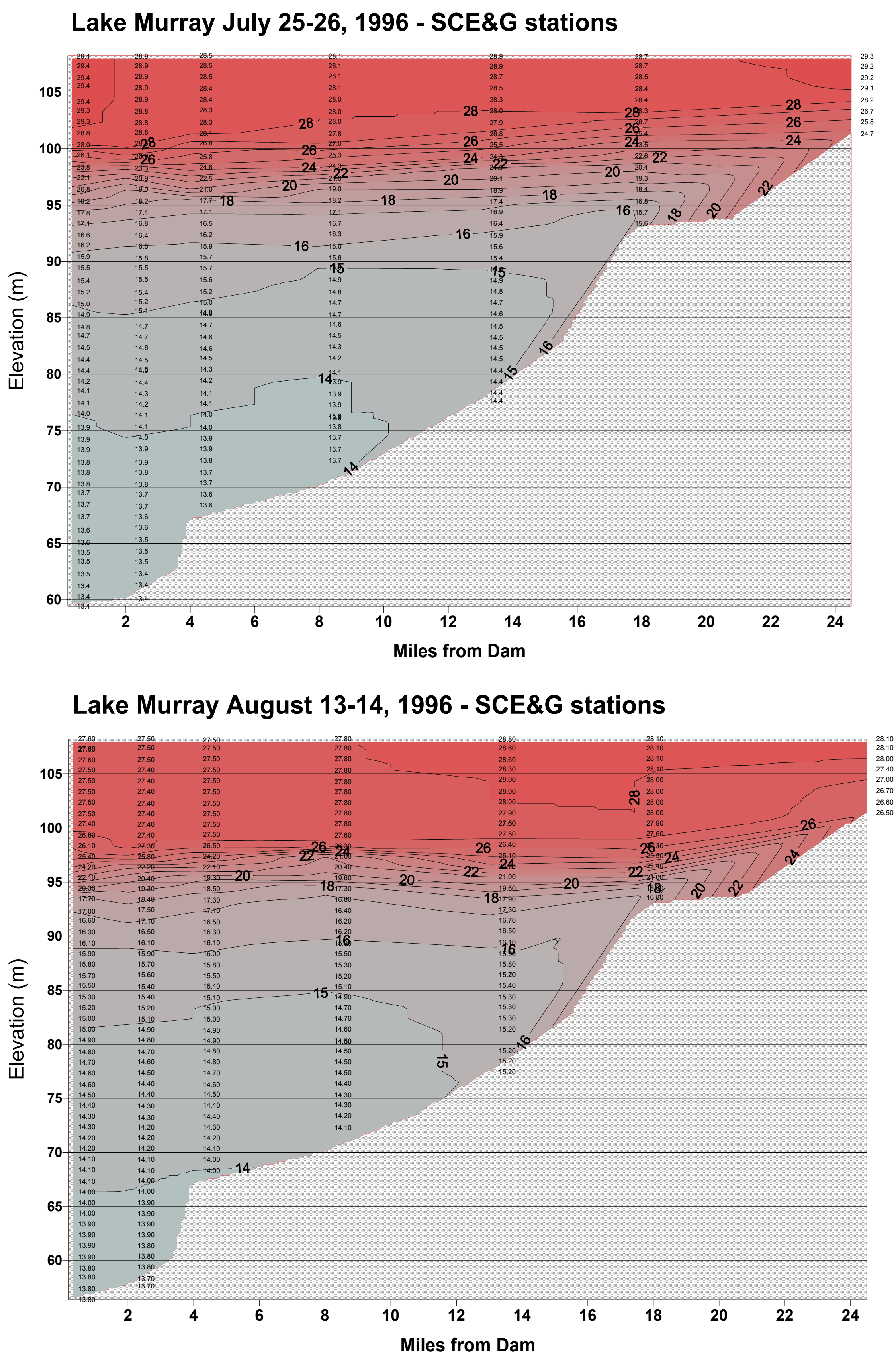
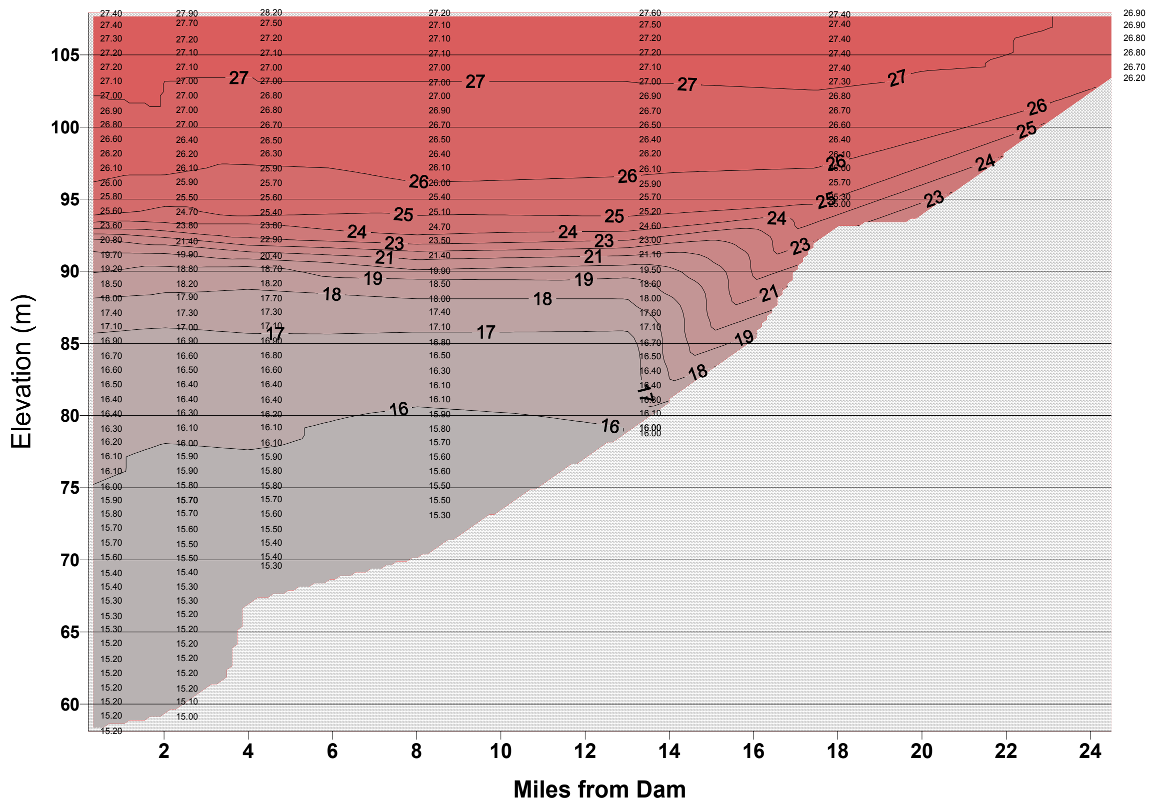


Figure 29: Longitudinal Contour Plots of Temperature for 1996 (continued)

Lake Murray September 11-13, 1996 - SCE&G stations



Lake Murray October 9-10, 1996 - SCE&G stations

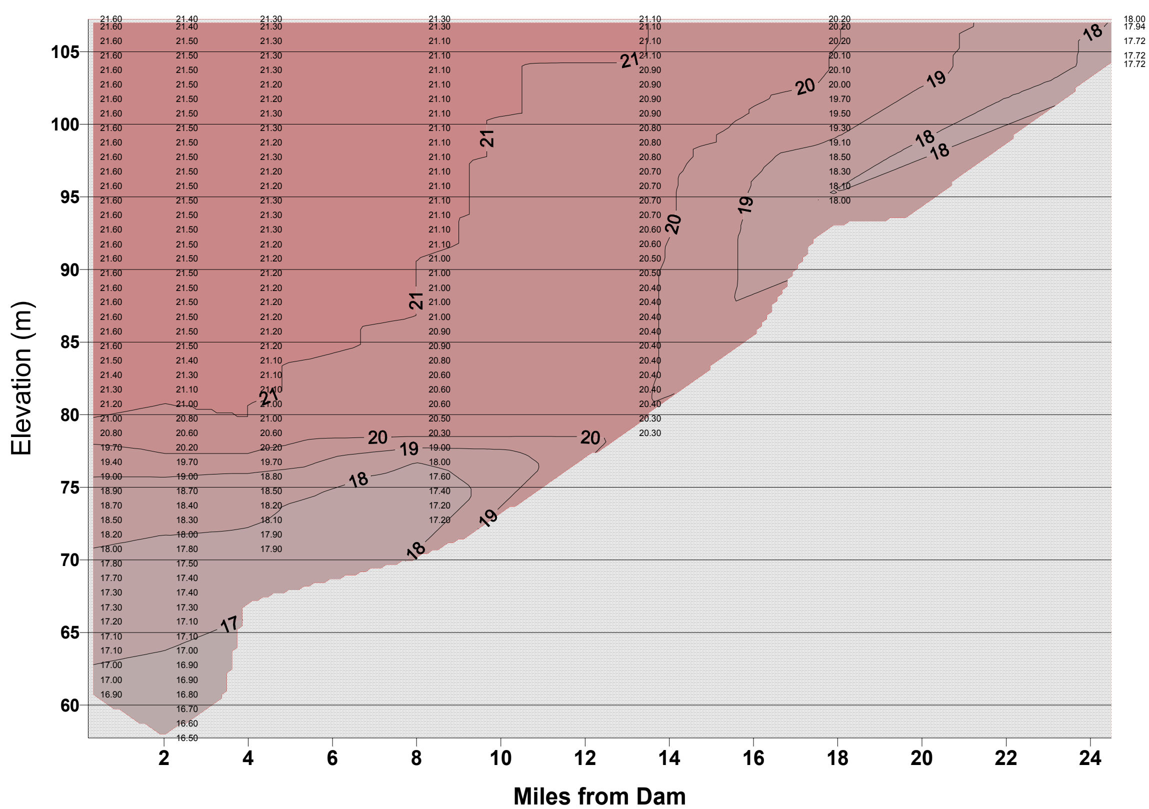
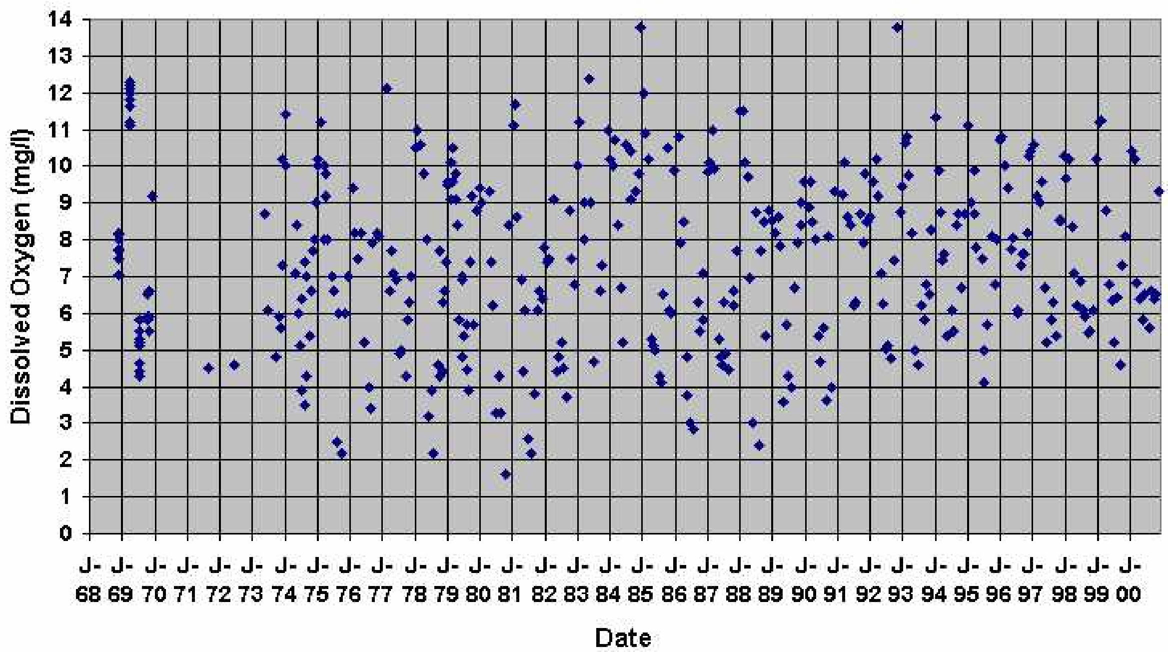


Figure 29: Longitudinal Contour Plots of Temperature for 1996 (continued)

Figure 30. Dissolved Oxygen (mg/l), collected on the Saluda River Below Greenwood Dam (DHEC S-186) (excludes values greater than 14 mg/L)



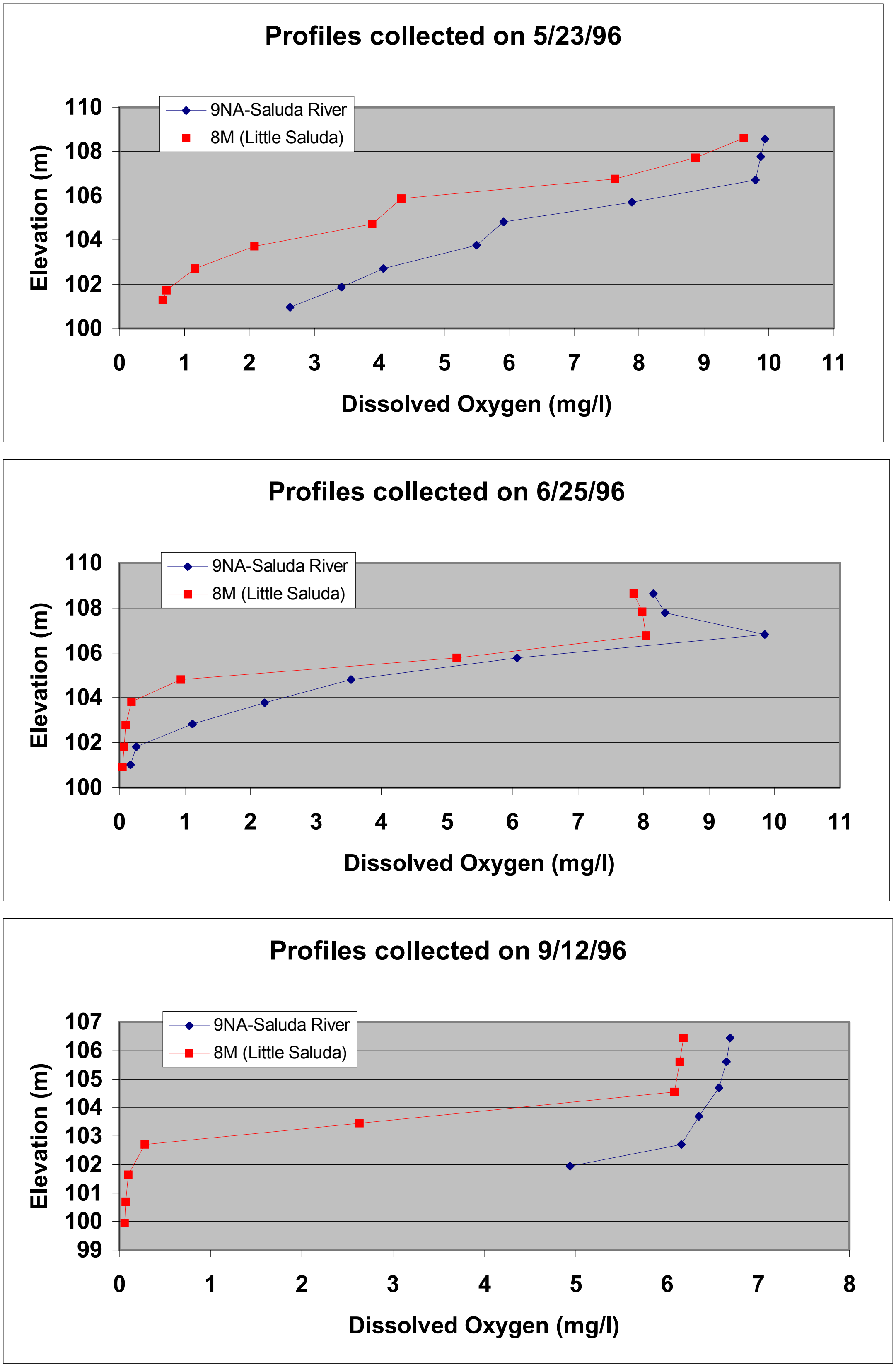
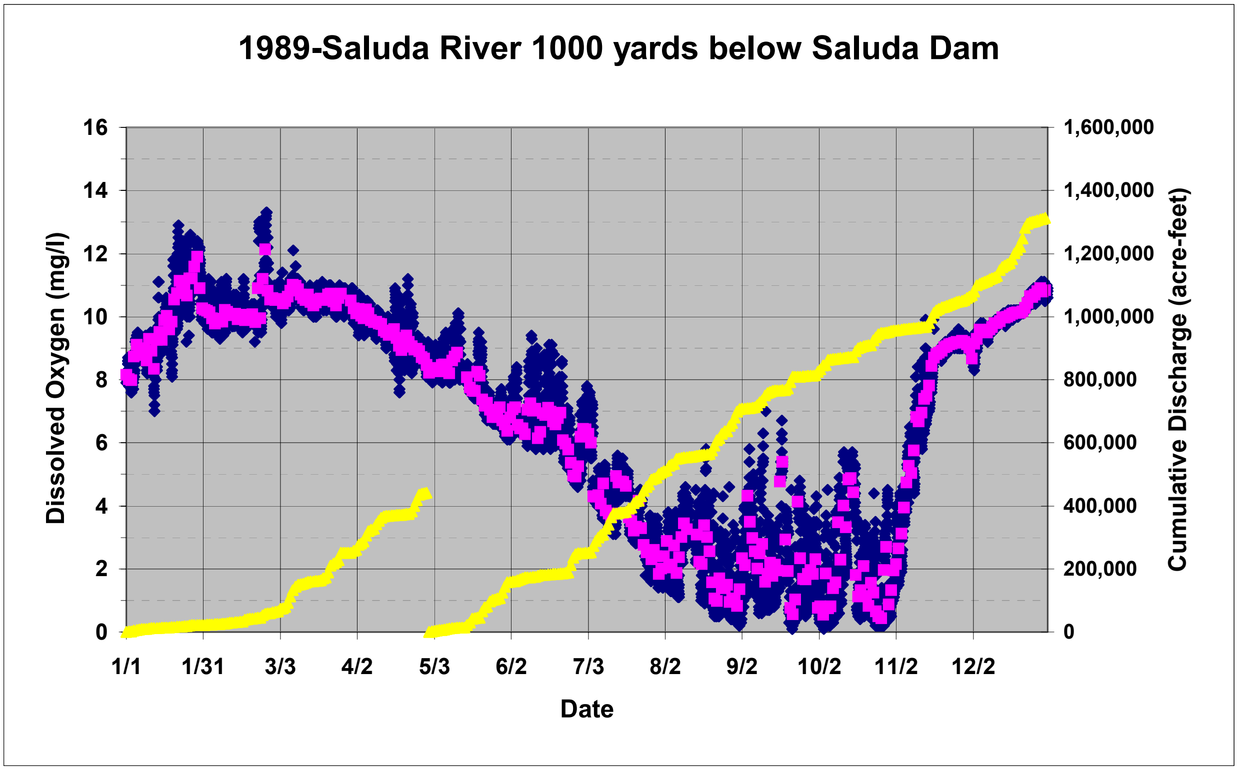


Figure 31: DO Tends to be Lower in the Little Saluda Embayment Than in the Main River



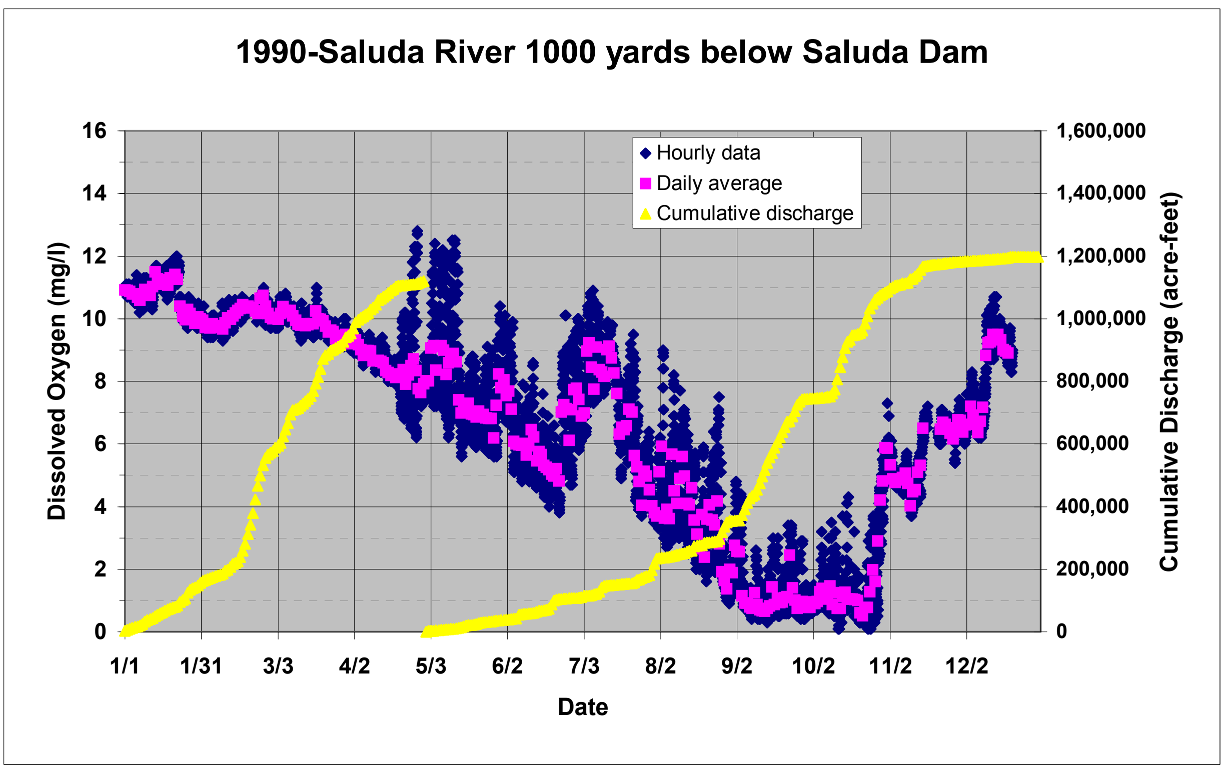
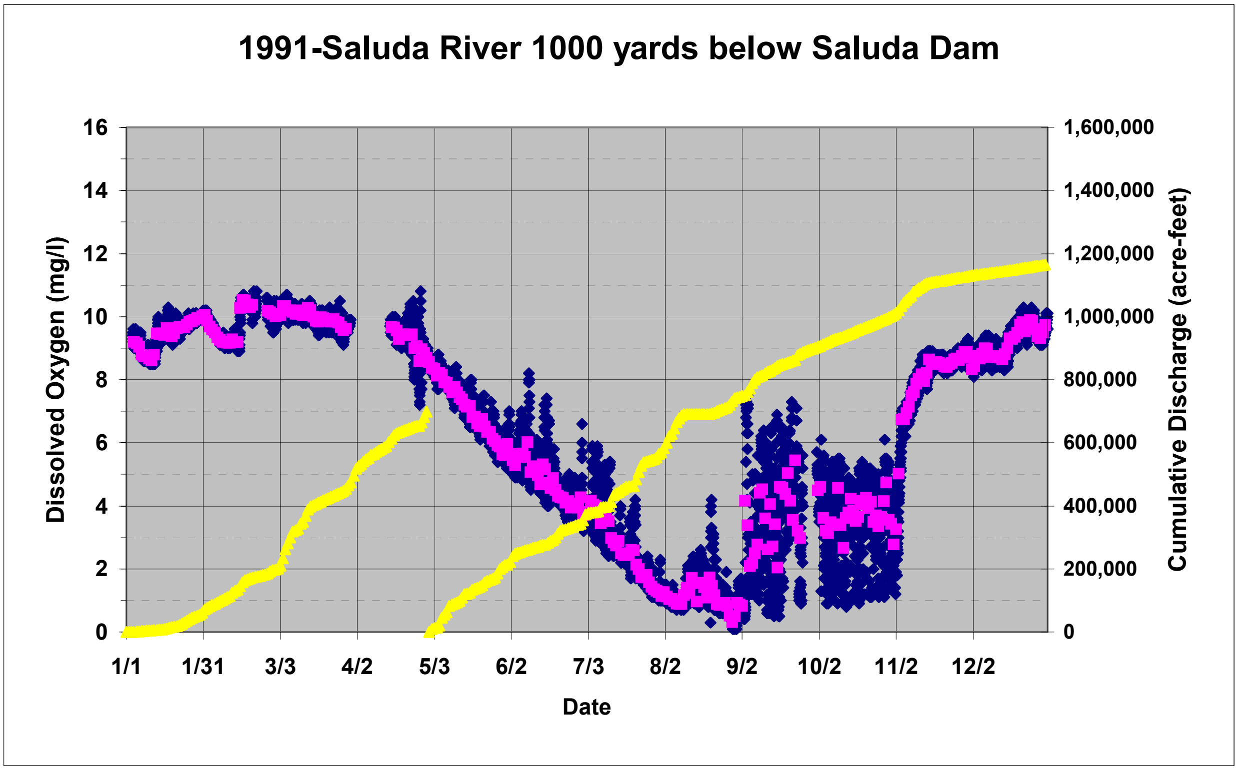


Figure 32: DO in the Saluda Hydro Turbine Discharges for the Years 1989 Through 2000, Plotted with Cumulative Discharge from January 1 and May 1



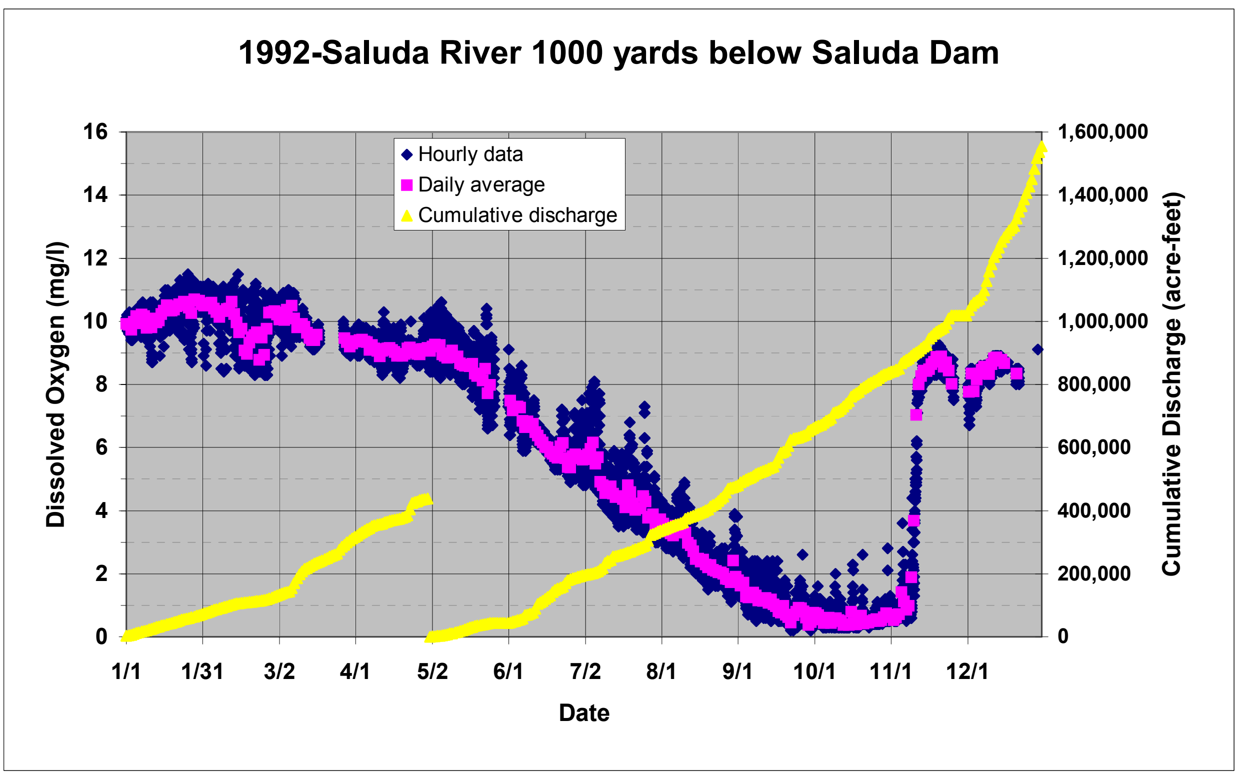
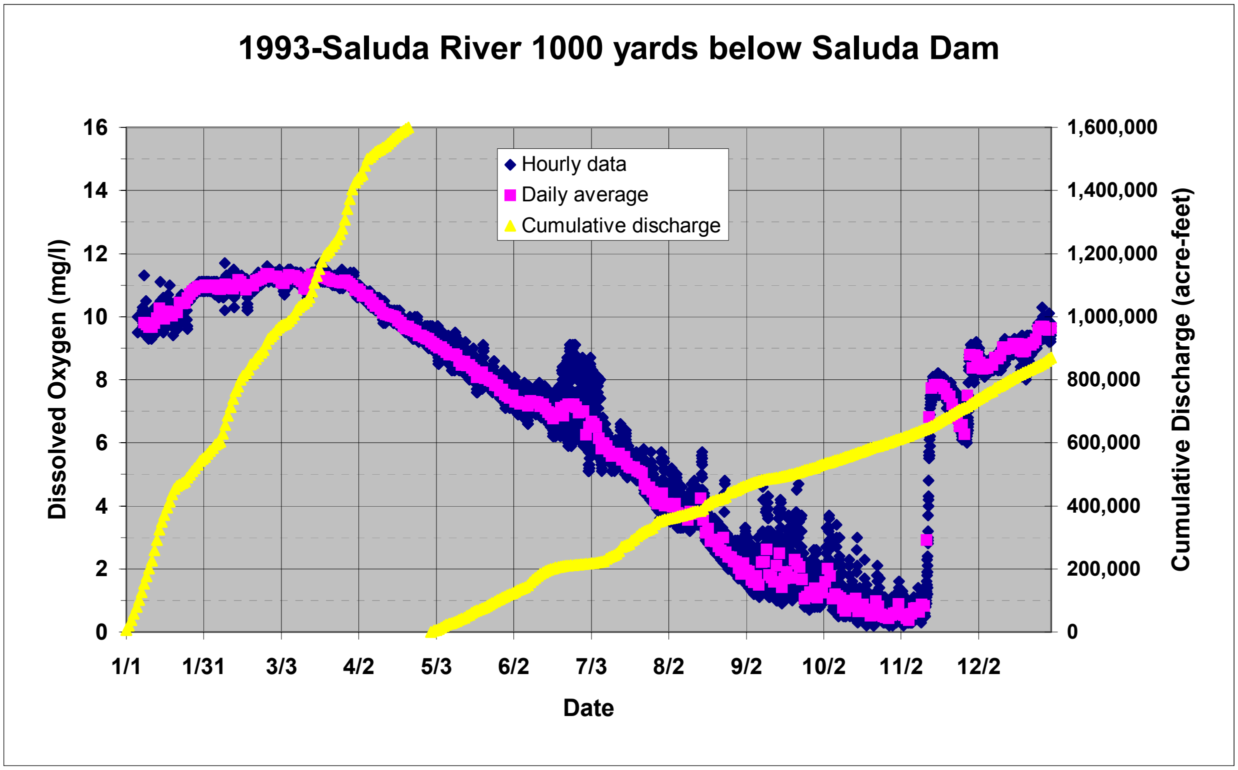


Figure 32: **DO in the Saluda Hydro Turbine Discharges for the Years 1989 Through 2000, Plotted with Cumulative Discharge from January 1 and May 1 (continued)**



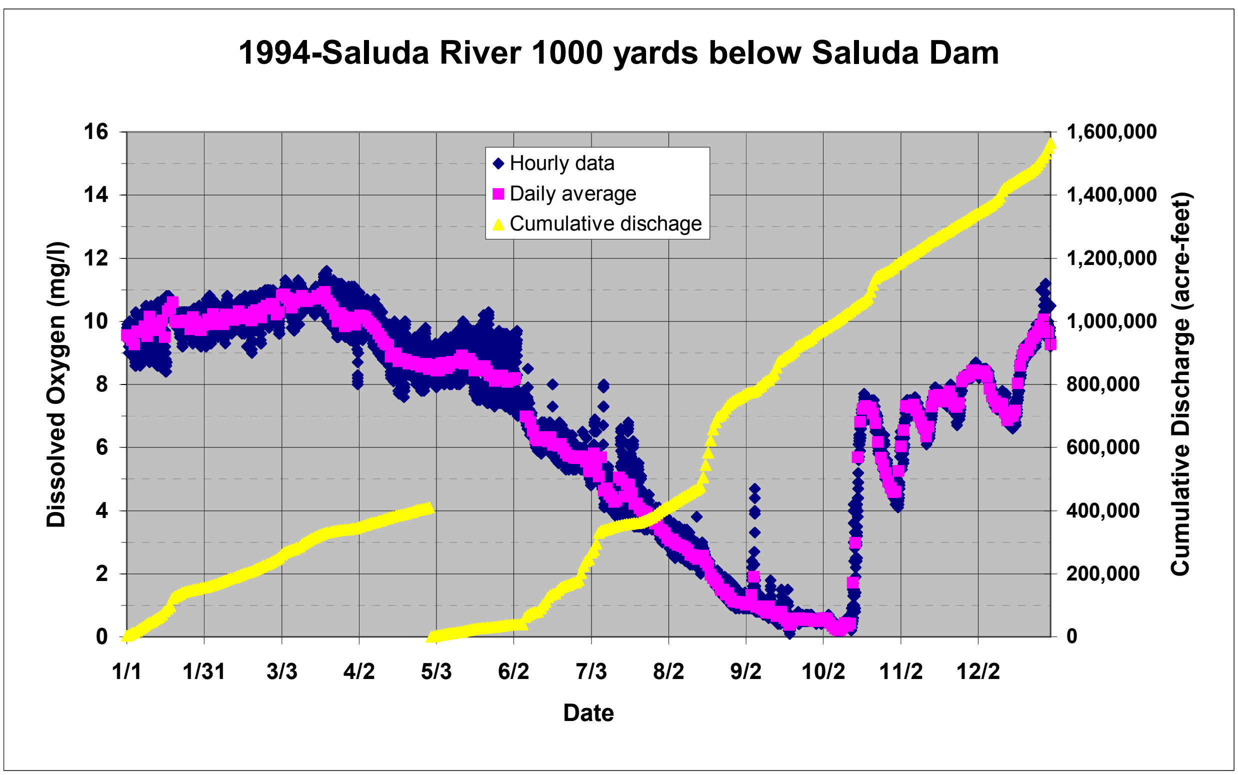
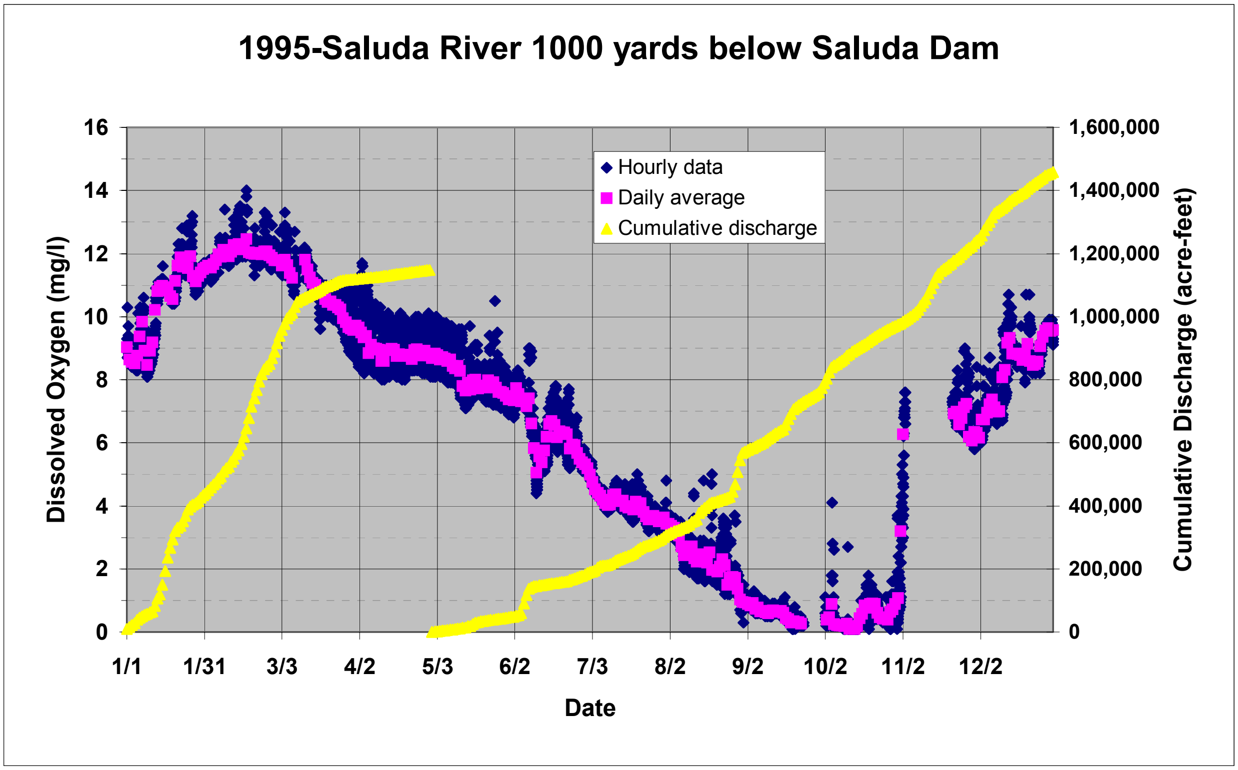


Figure 32: DO in the Saluda Hydro Turbine Discharges for the Years 1989 Through 2000, Plotted with Cumulative Discharge from January 1 and May 1 (continued)



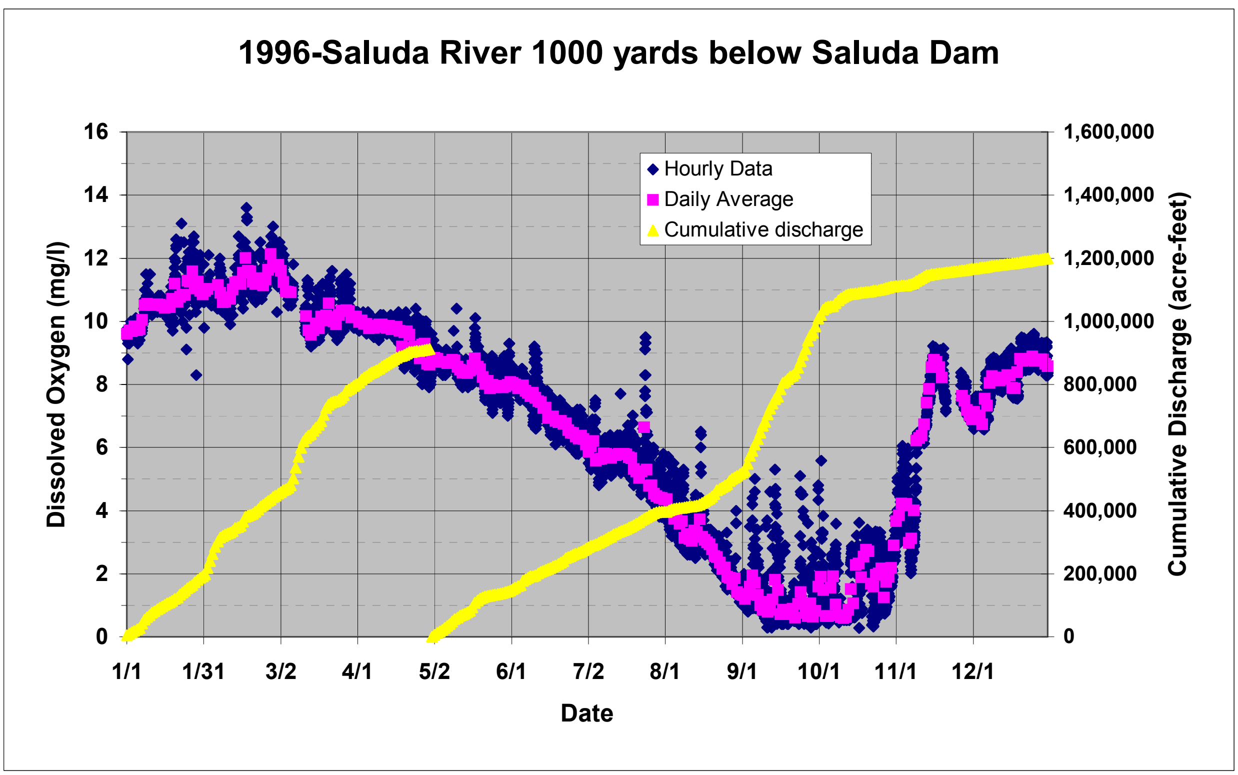
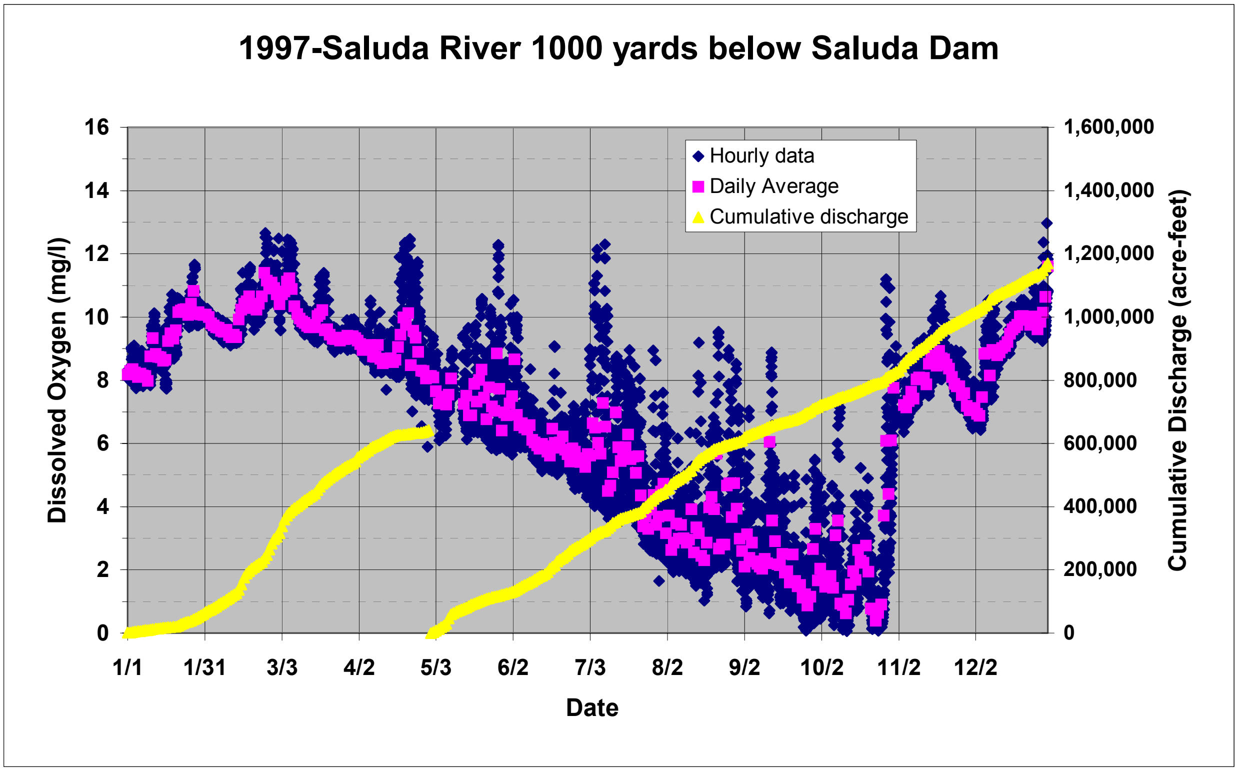


Figure 32: DO in the Saluda Hydro Turbine Discharges for the Years 1989 Through 2000, Plotted with Cumulative Discharge from January 1 and May 1 (continued)



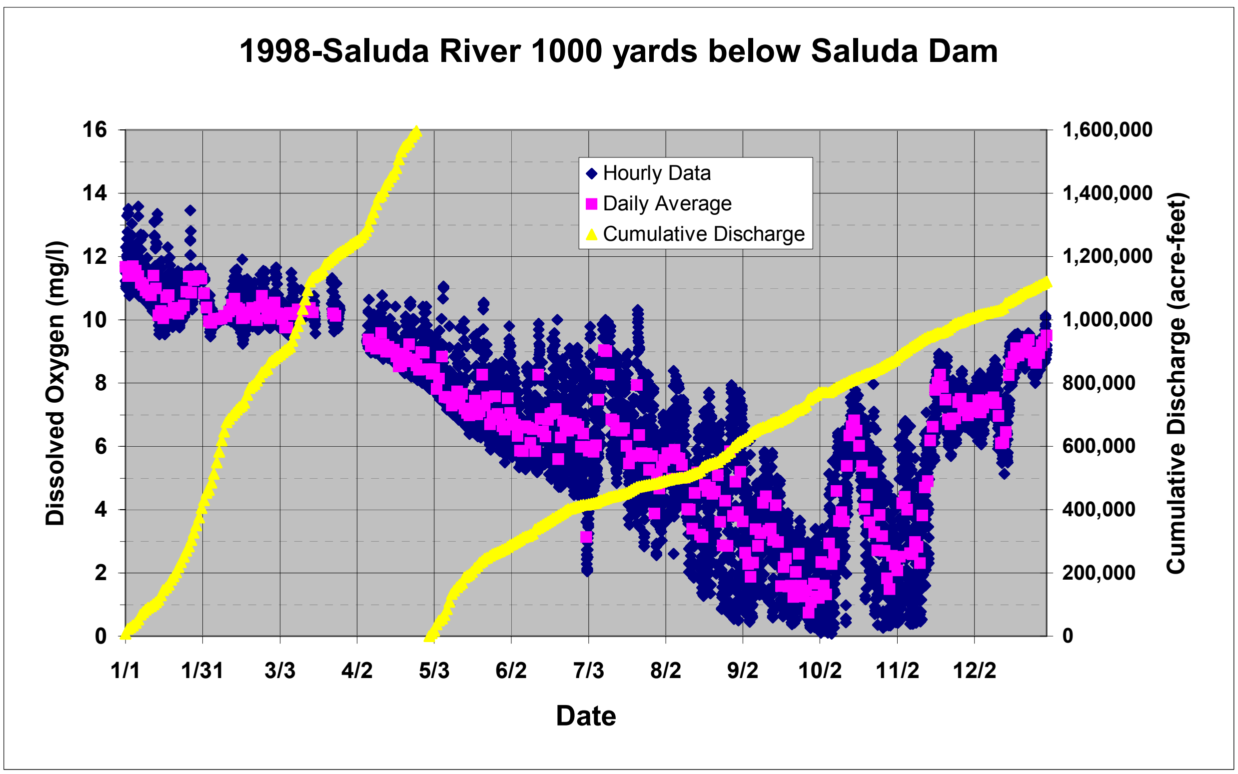
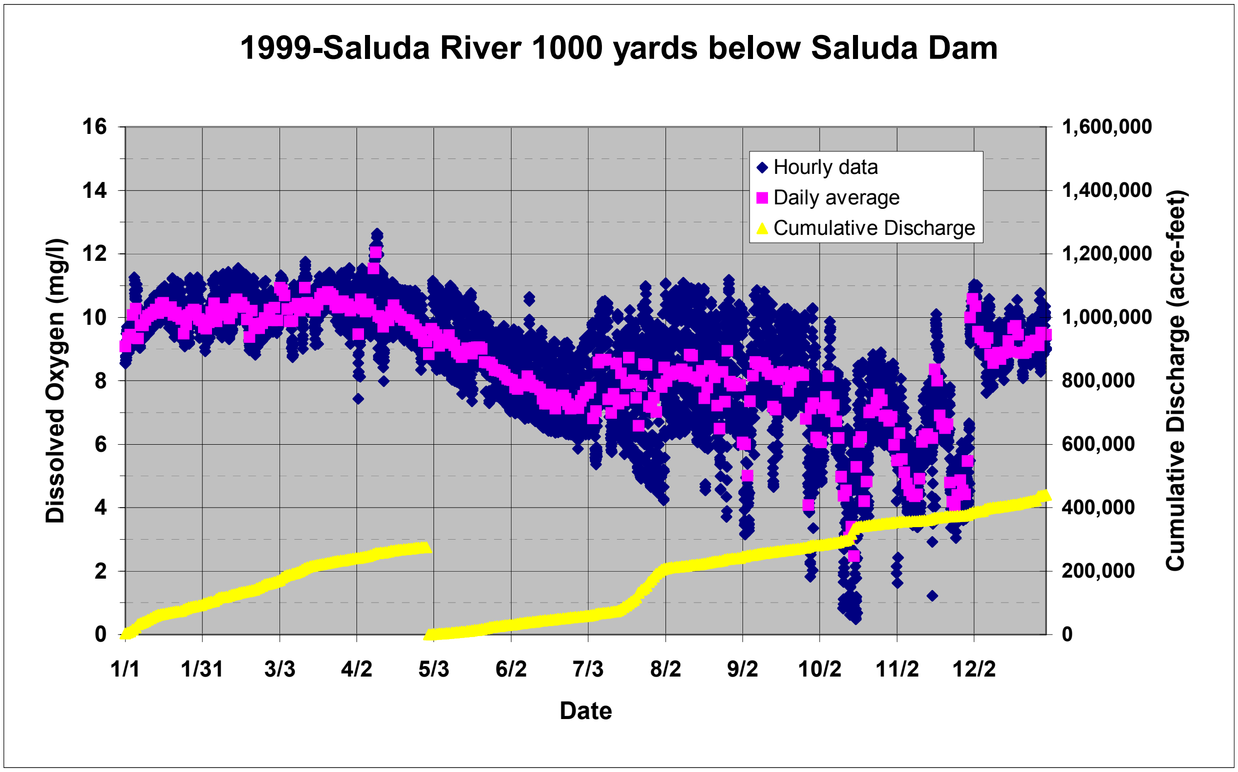


Figure 32: DO in the Saluda Hydro Turbine Discharges for the Years 1989 Through 2000, Plotted with Cumulative Discharge from January 1 and May 1 (continued)



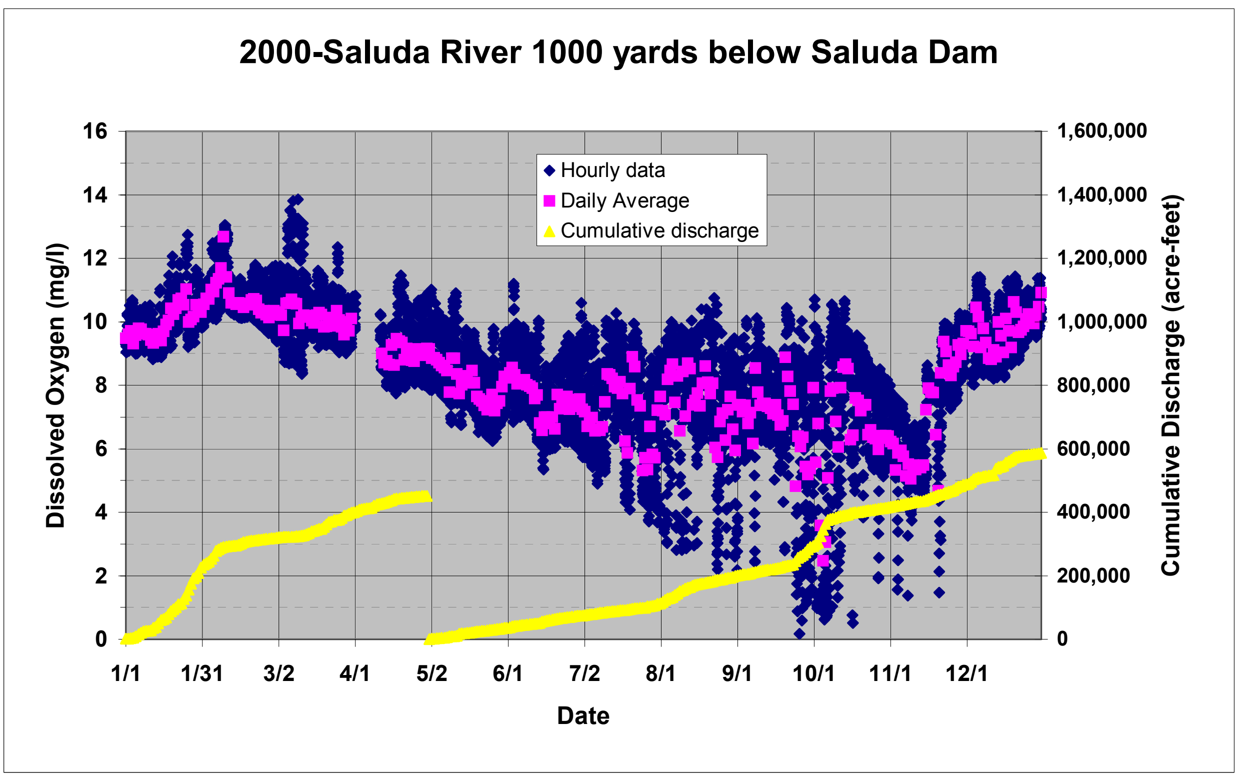
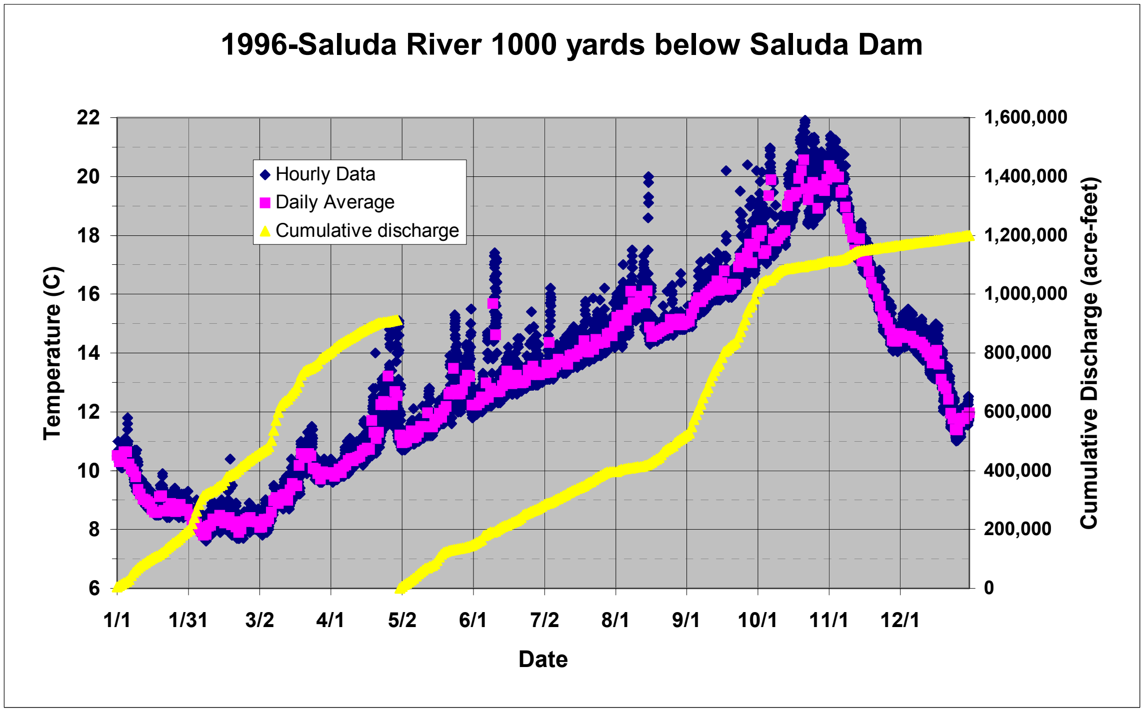


Figure 32: **DO in the Saluda Hydro Turbine Discharges for the Years 1989 Through 2000, Plotted with Cumulative Discharge from January 1 and May 1 (continued)**



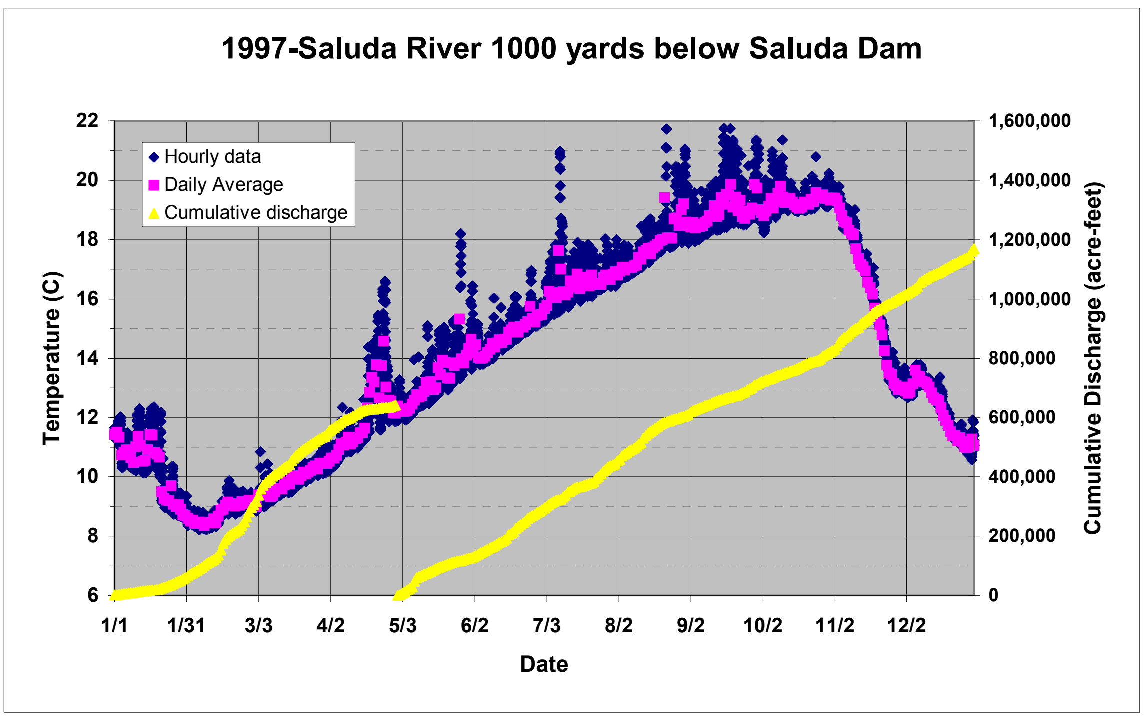
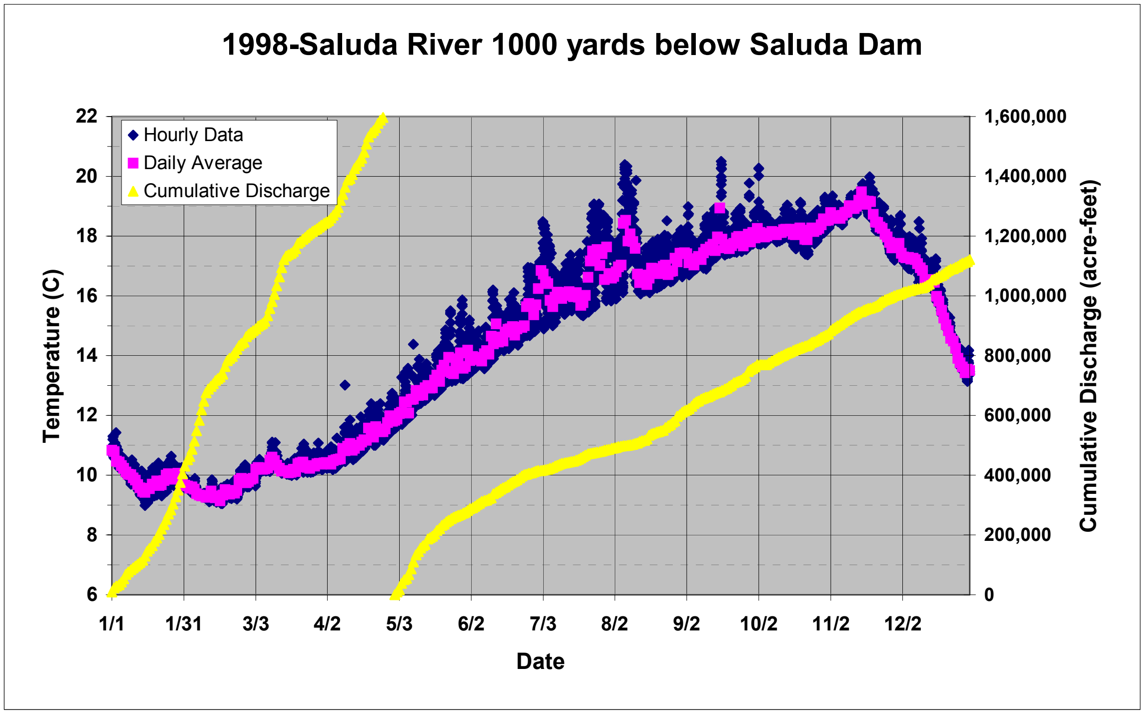


Figure 33: Temperature in the Saluda Hydro Turbine Discharges for the Years 1996 through 2000, Plotted with Cumulative Discharge from January 1 and May 1



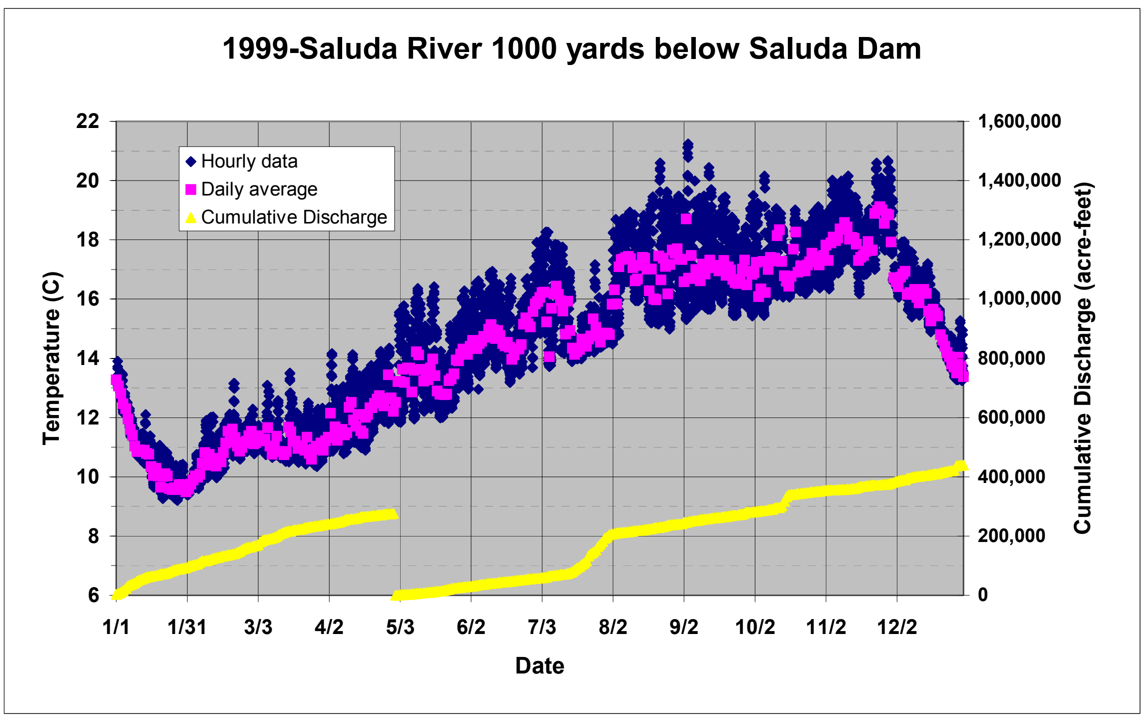


Figure 33: **Temperature in the Saluda Hydro Turbine Discharges for the Years 1996 through 2000, Plotted with Cumulative Discharge from January 1 and May 1 (continued)**

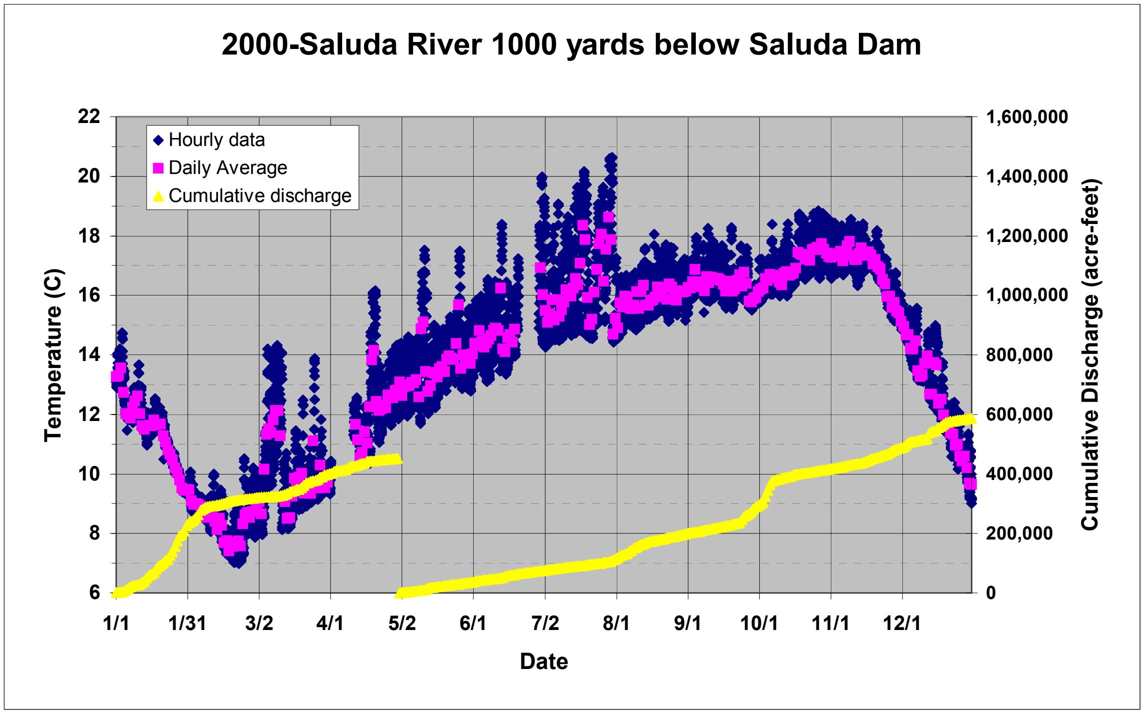
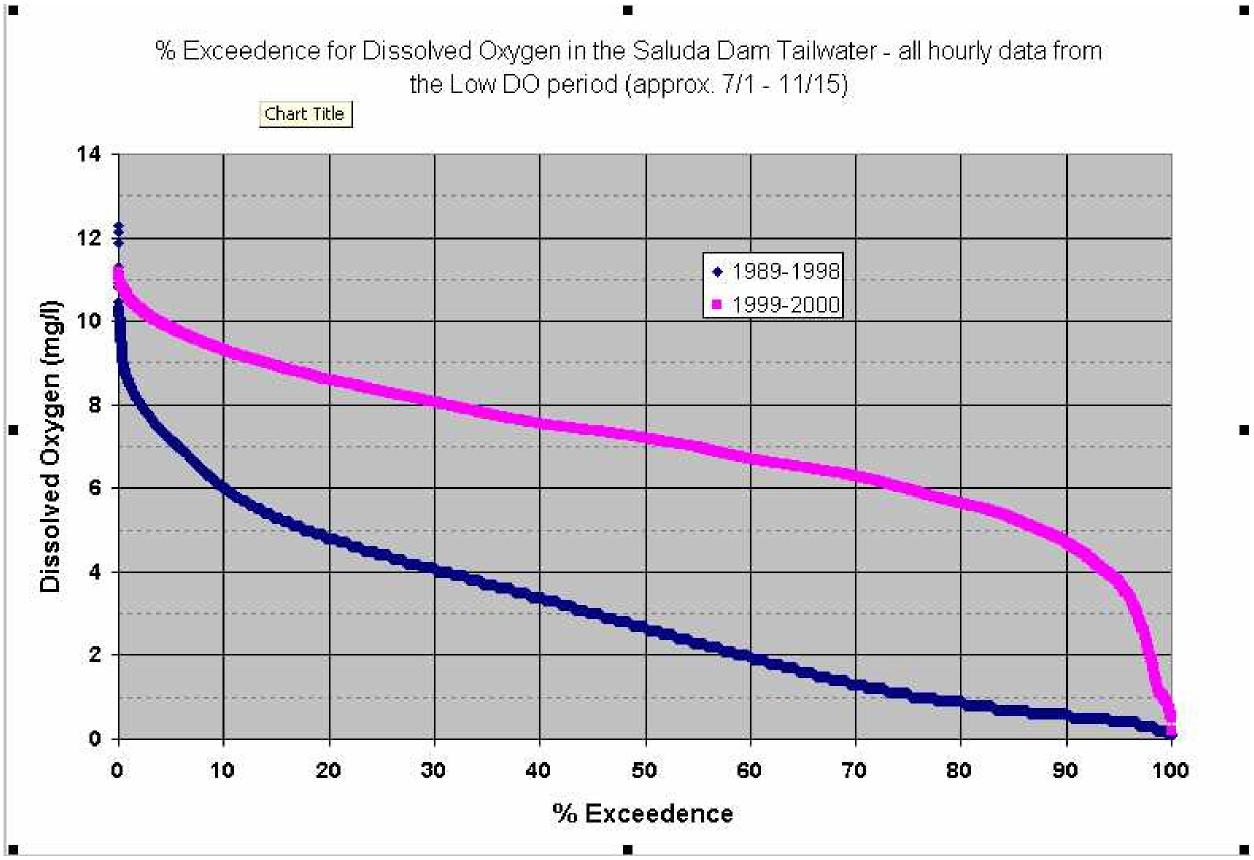


Figure 33: Temperature in the Saluda Hydro Turbine Discharges for the Years 1996 through 2000, Plotted with Cumulative Discharge from January 1 and May 1 (continued)



% Exceedence for Dissolved Oxygen in the Saluda Dam Tailwater - all hourly data from the Low DO period (approx. 7/1 - 11/15)
Chart Title
Dissolved Oxygen (mg/l)
14
12
10
8
6
4
2
0
1989-1998
1999-2000
0
10
20
30
40
50
60
70
80
90
100
% Exceedence

Figure 34

Table 1: Physical Characteristics of Lake Murray

	U.S. CUSTOMARY SYSTEM	METRIC SYSTEM
Maximum depth	175 feet	53.3 m
Mean Depth	46 feet	14 m
Drainage area	2260 square miles	5860 km^2
Area of Lake surface	70 square miles	182 km^2
Ratio of DA : lake area	32.2	32.2
Shoreline Length	524 miles	844 km
Shoreline Development Ratio	17.7	17.7
Total lake volume	2,317,000 ac-ft	2,636 hm^3
Useful lake volume	1,654,000 ac-ft	2,041 hm^3
Average Annual Flow	2778 cfs	78.7 cms
Nominal Residence Time	417 days	417 days
Depth of outlets, Units 1-4	175 feet	53 m
Depth of outlets, Unit 5	110 feet	33.5 m
Power Capacity per Unit, Units 1-4	32.5 MW	32.5 MW
Flow Capacity per Unit, Units 1-4	2750 cfs	77.9 cms
Power Capacity, Unit 5	70 MW	70 MW
Flow Capacity, Unit 5	7000 cfs	198 cms

Table 2: Mean Flows at Various Points in the Lake Murray System and Distribution of Inflows to Lake Murray

	MEAN STREAM FLOW, CFS	PERCENT OF TOTAL FLOW
Saluda Hydro	2778	100
Lake Murray Direct Inflows		
Saluda River at inflow	2243	80.74
Bush River	65	2.34
Little Saluda River	89	3.20
Clouds Creek	35	1.26
Big Creek	24	0.86
Beaver Dam Creek	28	1.01
West Creek	21	0.76
Camping Creek	11	0.40
Hollow Creek	15	0.54
Horse Creek	13	0.47
Upstream Inflows		
96 Creek	89	
Little River	172	

Table 3a. Summary of water quality parameter groups at various locations in Lake Murray and its watershed, 1970-85

Miles from Saluda Dam or	Stations	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0.1 - 0.7 - Forebay	**1SP, S-204, S-207,CL-083, 450701**					F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, C, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, C, S
2.0 - 2.5	**1-NA, S-283**				F, O, N, T, M	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A					
3.8 - 4.3 - Spence Islands	**2-NA, S-273, LMU18, 450702**				F, O, N, T, M	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A
6.7 - 8.3 - Shull Island	**3M, LMU16, 450703**				F, N, T, A, C												
11.2 - 12.2 - Dreher Island	**S-280, 450704**				F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S
13.1	**3NA**																
14.1 - 14.5	**S-277, S-212, LMU10**	F, O, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC			F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, FC
17.0 - 17.7 - Rocky Creek	**4NA, S-279, 450705**				F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC
22.2 - 23.7	**450706, LMU3**				F, N, T, A, C												
24.6 - Blacks Bridge	**9NA, S-223**		F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC
27.0 - 30.1 - Bush River	**S-310, S-105, LMU1**	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, N, C				F, N, C
36.7	**S-047**	F, O, T, A, FC	F, O, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC									
47.0 - 48.4 - Chappells	**S-295, 2167000**		F, FC	F, FC	F, FC												
55.5	**S-186**		F, O, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC
Ballentine Embayment	**S-274, 450707, LMU19**				F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S
Turners Cove Embayment	**4N, S-282**				F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC					
Bear Creek Embayment	**5M, S-275. LMU17**				F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC					

Table 3a (cont.) Summary of water quality parameter groups at various locations in Lake Murray and its watershed, 1970-2001

Miles from Saluda Dam or	Stations	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Hollow Creek Embayment	**7N, S-281, LMU11, LMU12**																
Hollow Creek	**S-306, LMU 11-12**																
Camping Creek Embayment	**6M, S-213, S-276, LMU 13-14**	F, O, T, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC			F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, FC
Camping Creek	**S-290**									F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S
Buffalo Creek Embayment	**S-211, S-278, LMU9**			F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC			F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, FC
Little Saluda River Embayment	**8M, S-222, CL-082, LMU 4-6**		F, O, T, A, FC	F, O, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC	F, N, C				F, N, C
Little Saluda River	**S-123, S-050, S-121**	F, O, T, FC	F, O, T, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S
Clouds Creek	**S-113, S-255, S-111, LMU5**	F, O, T, A, FC	F, O, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC			F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC
Bush River Embayment	**S-309, LMU2**											F, N, C	F, N, C				F, N, C
Bush River	**S-102, S-046, S-042**	F, O, T, A,	F, O, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC
Scott Creek	**S-044**	F, O, A	F, O, A, FC	F, O, N, A, FC	F, O, N, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC			F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, A, FC
Little River	**S-305, S-099, S-038, S-297, S-034**	F, O, T, A	F, O, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC
North Creek	**S-135**	F, O, A		F, O, N, A, FC	F, O, N, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC			F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, FC
Ninety Six Creek	**S-093**	F, O, T, A	F, O, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S			F, O, N, T, M, A, FC, S	F, O, N, T, A, FC, S	F, O, N, T, A, FC, S
Coronaca Creek	**S-092, S-184**			F, O, N, M, A, FC	F, O, N, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A			F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC
Wilson Creek	**S-235, S-233**	F, O, T, A	F, O, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S			F, O, N, T, M, A, FC, S	F, O, N, T, A, FC, S	F, O, N, T, A, FC, S

Table 3b. Summary of water quality parameter groups at various locations in Lake Murray and its watershed, 1986-2001

Miles from Saluda Dam or	Stations	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0.1 - 0.7 - Forebay	**1SP, S-204, S-207,CL-083, 450701**	F, O, N, T, M, A, FC, C, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, C, S	F, O, N, T, M, A, FC, C, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C
2.0 - 2.5	**1-NA, S-283**					F	F	F	F	F	F	F	F	F	F	F	F
3.8 - 4.3 - Spence Islands	**2-NA, S-273, LMU18, 450702**	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F, O, N, T, M, A	F	F	F
6.7 - 8.3 - Shull Island	**3M, LMU16, 450703**		F, N, A, C	F, N, A, C		F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C
11.2 - 12.2 - Dreher Island	**S-280, 450704**	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S			
13.1	**3NA**					F	F	F	F	F	F	F	F	F	F	F	F
14.1 - 14.5	**S-277, S-212, LMU10**	F, O, N, T, FC	F, O, N, T, A, FC, C	F, O, N, T, A, FC, C	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC, E	F, O, N, T, FC, E			
17.0 - 17.7 - Rocky Creek	**4NA, S-279, 450705**	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F	F	F
22.2 - 23.7	**450706, LMU3**		F, N, A, C	F, N, A, C													
24.6 - Blacks Bridge	**9NA, S-223**	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F	F	F
27.0 - 30.1 - Bush River	**S-310, S-105, LMU1**	F, N, C	F, N, A, C	F, O, N, T, A, C	F, N, C	F, N, C		F, O, N, T, A, FC, C					F, O, N, T, M, A, FC, C				
36.7	**S-047**		O, N, M					F, O, N, T, M, A, FC				F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, E				
47.0 - 48.4 - Chappells	**S-295, 2167000**			F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC			
55.5	**S-186**	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC			
Ballentine Embayment	**S-274, 450707, LMU19**	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S, C	F, O, N, T, M, A, FC, S, C	F, O, N, T, M, A, FC, S, C, E	F, O, N, T, M, A, FC, S, C, E			
Turners Cove Embayment	**4N, S-282**					F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C
Bear Creek Embayment	**5M, S-275. LMU17**		F, N, A, C	F, N, A, C		F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C

Table 3b. (cont.) Summary of water quality parameter groups at various locations in Lake Murray and its watershed, 1986-2001

Miles from Saluda Dam or	Stations	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Hollow Creek Embayment	**7N, S-281, LMU11, LMU12**		F, N, A, C	F, N, A, C		F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C
Hollow Creek	**S-306, LMU 11-12**		F, N, A, C	F, N, A, C				F, O, N, T, M, A, FC				F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, C, E				
Camping Creek Embayment	**6M, S-213, S-276, LMU 13-14**	F, O, N, T, FC	F, O, N, T, A, FC, C	F, O, N, T, A, FC, C	F, O, N, T, FC	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C, E	F, O, N, T, M, A, FC, C, E	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C
Camping Creek	**S-290**	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S, E	F, O, N, T, M, A, FC, S, E			
Buffalo Creek Embayment	**S-211, S-278, LMU9**	F, O, N, T, FC	F, O, N, T, A, FC, C	F, O, N, T, A, FC, C	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC, E	F, O, N, T, FC, E			
Little Saluda River Embayment	**8M, S-222, CL-082, LMU 4-6**	F, N, C	F, N, A, C	F, N, A, C	F, N, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C, E	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C	F, O, N, T, M, A, FC, C
Little Saluda River	**S-123, S-050, S-121**	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S			
Clouds Creek	**S-113, S-255, S-111, LMU5**	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, A, FC			
Bush River Embayment	**S-309, LMU2**	F, N, C	F, N, A, C	F, N, A, C	F, N, C	F, N, C		F, O, N, T, A, FC, C				F, O, N, T, A, FC, C	F, O, N, T, M, A, FC, C, E	F, O, N, T, A, FC, C, E			
Bush River	**S-102, S-046, S-042**	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, E	F, O, N, T, M, A, FC, E			
Scott Creek	**S-044**	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC			
Little River	**S-305, S-099, S-038, S-297, S-034**	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC	F, O, N, T, M, A, FC, E	F, O, N, T, M, A, FC, E			
North Creek	**S-135**	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, FC			
Ninety Six Creek	**S-093**	F, O, N, T, A, FC, S	F, O, N, T, A, FC, S	F, O, N, T, FC, S	F, O, N, T, FC, S	F, O, N, T, FC, S	F, O, N, T, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S			
Coronaca Creek	**S-092, S-184**	F, O, N, T, A, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC	F, O, N, T, A, FC	F, O, N, T, FC			
Wilson Creek	**S-235, S-233**	F, O, N, T, A, FC, S	F, O, N, T, A, FC, S	F, O, N, T, FC, S	F, O, N, T, FC, S	F, O, N, T, FC, S	F, O, N, T, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S	F, O, N, T, M, A, FC, S			

Table 3 Parameter Group Key

F: Field Parameters (Temp., DO, pH etc.),
O: Organics
N: Nutrients
T: Turbidity
M: Metals
A: Alkalinity
FC: Fecal Coliform
S: Sediment
C: Chlorophyll
E: Ecoli

Table 4: Station Info for DASLER Stations

DASLER ID code
Digit 1 - Agency - 1-SCE&G, 2-DHEC, 3-USGS, 4-EPA
Digits 2-4 - Reservoir - MUR-Murray
Digit 5 - Station Type - F=Free Flowing, L=Lake
Digits 6-9 - Original Station Name
Digit 10 - General Location Type - M=Main Stem, E=Embayment, T=Tributary, TW=Tailwater
Digits 11-12 - Miles from Saluda Dam to the station or the mouth of the tributary where the station is located

*** - Not Determined**

DASLER ID	Location Description	Minor Basin	Stream Code	Water Body	Saluda River Mile	Miles from dam	Miles up Trib.
2MURFS152TW0	Saluda River just below Lake Murray Dam	Murray Tailwater	1	Saluda	8.8	TW	NA
2MURFLM22TW1	Saluda River below Lake Murray Dam	Murray Tailwater	1	Saluda	10.1	TW	NA
1MURL1SP0M00	Lake Murray at penstock 5	MLM 0-10.0	1	Saluda	10.3	0.1	NA
2MURLLM21M00	Intake towers-Lake Murray	MLM 0-10.0	1	Saluda	10.3	0.1	NA
4MURI0701M00	EPA station 450701	MLM 0-10.0	1	Saluda	10.3	0.1	NA
2MURLS204M00	Lake Murray at dam at spillway (marker 1)	MLM 0-10.0	1	Saluda	10.5	0.3	NA
2MURLS207M00	Lake Murray at SCE&G park on SC 6-north side	MLM 0-10.0	1	Saluda	10.5	0.3	NA
2MURLCL83M00	Lake Murray 100 m W dam (public park SC 6 N dam)	MLM 0-10.0	1	Saluda	10.7	0.5	NA
2MURLLM20E01	Sixteen Mile Creek-Lake Murray	MLM 0-10.0	1	Saluda	11.2	1.0	NA
1MURL1NA0M02	Lake Murray 2 miles upstream from dam	MLM 0-10.0	1	Saluda	12.2	2.0	NA
2MURLS283M03	Lake Murray at Marker 7	MLM 0-10.0		Saluda	13.2	3.0	NA
1MURL2NA0M04	Spence Island	MLM 0-10.0	1	Saluda	14	3.8	NA
4MURL0702M04	EPA station 450702	MLM 0-10.0	1	Saluda	14.1	3.9	NA
2MURLLM19E04	Susie Ebert Island-Lake Murray	MLM 0-10.0	1	Saluda	14.2	4.0	NA
2MURLS274E04	Lake Murray at marker 143	MLM 0-10.0	1	Saluda	14.2	4.0	NA
4MURL0707E04	EPA station 450707	MLM 0-10.0	1	Saluda	14.2	4.0	NA
2MURLS273M05	Lake Murray at marker 166	MLM 0-10.0	1	Saluda	14.4	4.2	NA
2MURLLM18M04	Spence Islands-Lake Murray	MLM 0-10.0	1	Saluda	14.5	4.3	NA
4MURL0703M07	EPA station 450703	MLM 0-10.0	1	Saluda	16.9	6.7	NA
2MURLS282E07	Lake Murray at marker 25	MLM 0-10.0	*	*	17.5	7.3	1.3
1MURL4N00E07	Turners Cove	MLM 0-10.0	*	*	17.5	7.3	2.9
1MURL3M00M08	Shull Island	MLM 0-10.0	1	Saluda	18.2	8.0	NA
2MURLLM16M08	Counts Island-Lake Murray	MLM 0-10.0	1	Saluda	18.5	8.3	NA
2MURLS275E09	Lake Murray at marker 128	Bear	2	Bear	19.2	9.0	2.5
1MURL5M00E09	Bear Creek	Bear	2	Bear	19.2	9.0	3.0
2MURLLM17E09	Bear Creek-Lake Murray	Bear	2	Bear	19.2	9.0	3.4
4MURL0704M11	EPA station 450704	MLM 10.1-20.0	1	Saluda	21.4	11.2	NA
2MURLS281E12	Lake Murray at marker 43	Hollow	3	Hollow	22.4	12.2	1.6
2MURLLM11E12	Hollow Creek-Lake Murray	Hollow	3	Hollow	22.4	12.2	2.3
1MURL7N00E12	Hollow Creek	Hollow	3	Hollow	22.4	12.2	4.1
2MURFS306T12	Hollow Creek at S-32-54	Hollow	3	Hollow	22.4	12.2	7.2
2MURLLM12E12	Big Horse Creek-Lake Murray	Hollow	22	Big Horse	22.4	12.2	0.5
2MURLS280M12	Lake Murray at marker 102	MLM 10.1-20.0	1	Saluda	22.4	12.2	NA
1MURL6M00E12	Camping Creek	Camping	4	Camping	22.5	12.3	2.1
2MURLLM13E12	Crystal Lake-Lake Murray	Camping	4	Camping	22.5	12.3	2.7
2MURLS276E12	Lake Murray at marker 93	Camping	4	Camping	22.5	12.3	3.0
2MURLS213E12	Lake Murray at S-36-15	Camping	4	Camping	22.5	12.3	5.6
2MURLLM14E12	Camping Creek-Lake Murray	Camping	4	Camping	22.5	12.3	6.5
2MURFS290T12	Camping at S-36-202	Camping	4	Camping	22.5	12.3	12.5
1MURL3NA0M13	Big Gap	MLM 10.1-20.0	1	Saluda	23.3	13.1	NA
2MURLLM10M14	Billy Dreher Island-Lake Murray	MLM 10.1-20.0	1	Saluda	24.3	14.1	NA
2MURLS277M14	Lake Murray at marker 57	MLM 10.1-20.0	1	Saluda	24.3	14.1	NA

Table 4: (cont.)

2MURLS278E17	Lake Murray at marker 78	Buffalo	14	Buffalo	27.2	17.0	1.8
2MURLLM09E17	Buffalo Creek-Lake Murray	Buffalo	14	Buffalo	27.2	17.0	2.6
1MURL4NA0M18	Rocky Creek	MLM 10.1-20.0	1	Saluda	27.8	17.6	NA
2MURLLM08E18	Rocky Creek-Lake Murray	Rocky Creek	21	Rocky	27.9	17.7	1.8
2MURLS279M18	Lake Murray at Marker 63	MLM 10.1-20.0	1	Saluda	27.9	17.7	NA
2MURLLM07M20	Saluda River after confluence with Little Saluda River	MLM 10.1-20.0	1	Saluda	30	19.8	NA
4MURL0706M22	EPA station 450706	MLM 20.1-33.0	1	Saluda	32.4	22.2	NA
2MURLLM06E23	Little Saluda River before confluence	Little Saluda	5	Little Saluda	32.9	22.7	0.4
2MURLS222E23	Lake Murray Little Saluda River arm at SC 391	Little Saluda	5	Little Saluda	32.9	22.7	1.4
1MURL8M00E23	Little Saluda River at Hwy 391 Bridge	Little Saluda	5	Little Saluda	32.9	22.7	1.6
2MURLCL82E23	Lake Murray Little Saluda River 450m W SC 391 bridge	Little Saluda	5	Little Saluda	32.9	22.7	1.6
2MURLLM04E23	Little Saluda River (above Clouds Creek)	Little Saluda	5	Little Saluda	32.9	22.7	4.4
2MURFS123T23	Little Saluda River at S-41-39 NE Saluda	Little Saluda	5	Little Saluda	32.9	22.7	13.9
2MURFS050T23	Little Saluda River at 378 E Saluda	Little Saluda	5	Little Saluda	32.9	22.7	18.9
2MURFS121T23	Little Saluda River at US 178 SE Saluda	Little Saluda	5	Little Saluda	32.9	22.7	21.0
2MURLLM05E23	Clouds Creek	Little Saluda	6	Clouds	32.9	22.7	1.1
2MURFS113T23	Bridge over Clouds Creek on Rd No 25	Little Saluda	6	Clouds	32.9	22.7	3.1
2MURFS255T23	Clouds Creek at S-41-26 4mi NW of Batesburg	Little Saluda	6	Clouds	32.9	22.7	8.5
2MURFS051T23	West Creek on S-41-150 N of Batesburg	Little Saluda	15	West	32.9	22.7	7.0
2MURFS110T23	Mine Creek at S-41-165 3.4mi S of Saluda	Little Saluda	16	Mine	32.9	22.7	4.0
2MURFS293T23	Harris Branch at S-41-25	Little Saluda	17	Harris	32.9	22.7	1.1
2MURFS108T23	Bridge over Big Creek on SC No 194	Little Saluda	18	Big	32.9	22.7	2.3
2MURFS128T23	Tributary to West Creek on SC-391 1.7mi NW Leesville	Little Saluda	*	*	32.9	22.7	
2MURLLM03M24	Saluda River before confluence	MLM 20.1-33.0	1	Saluda	33.9	23.7	NA
1MURL9NA0M25	Saluda River at Hwy 391	MLM 20.1-33.0	1	Saluda	34.8	24.6	NA
2MURLS223M25	Lake Murray at SC 391 Blacks Bridge	MLM 20.1-33.0	1	Saluda	34.8	24.6	NA
2MURLS309E27	Lake Murray Bush River 4.6km upstream SC 391 bridge	Bush	7	Bush	36.9	26.7	1.1
2MURLLM02E27	Bush River	Bush	7	Bush	36.9	26.7	1.4
2MURFS102T27	Bridge over Bush River on road No 56	Bush	7	Bush	36.9	26.7	3.4
2MURFS539T27	Bush River at SC 395, 5.0 miles S of Newberry	Bush	7	Bush	36.9	26.7	8.4
2MURFS538T27	Bush River at CO rd 66, 2.5 miles S Newberry	Bush	7	Bush	36.9	26.7	10.3
2MURFS046T27	Bush River at bridge on SC 34	Bush	7	Bush	36.9	26.7	12.3
2MURFS042T27	Bush River at SC 560 S Joanna	Bush	7	Bush	36.9	26.7	26.8
2MURFS770E27	Lake Murray in the Bush River cove	Bush	7	Bush	36.9	26.7	*
2MURFS768T27	Newberry Bush River WTP	Bush	7	Bush	36.9	26.7	*
2MURFS044T27	Scott Creek at SC 34 S of Newberry	Bush	13	Scott	36.9	26.7	1.5
2MURFS764T27	Timothy Creek at bridge unnum rd off of SC Hwy 3	Bush	23	Timothy	36.9	26.7	0.7
2MURFS769T27	Newberry County No 1 WTP	Bush	23	Timothy	36.9	26.7	3.8
2MURFS763T30	Big Beaver Dam Creek at bridge on CO rd 56	Bush	24	Big Beaver Dam	36.9	26.7	1.0
2MURLS310M27	Lake Murray Saluda River 3.8km upstream SC 391 bridge	MLM 20.1-33.0	1	Saluda	37.3	27.1	NA
2MURLLM01M28	Saluda River-upstream of Bush River	MLM 20.1-33.0	1	Saluda	38.2	28.0	NA
2MURLS105M30	Saluda River at SC 395 NE Saluda	MLM 20.1-33.0	1	Saluda	40.3	30.1	NA
2MURFS730T30	Beaverdam Creek at unbrd rd prior to Saluda confluence	Beaverdam	19	Beaverdam	40.8	30.6	1.2
2MURLLM15E30	Beaverdam Creek-Lake Murray	*	19	Beaverdam	40.8	30.6	*
2MURFS047M37	Saluda River south of Silver Street	Saluda Free Flowi	1	Saluda	46.9	36.7	NA
2MURFS305T38	Little River at SC 34	Little	8	Little	47.9	37.7	2.7
2MURFS099T38	Little River at S-36-22 8.3mi NW Silverstreet	Little	8	Little	47.9	37.7	10.9
2MURFS038T38	Little River at bridge on SC 560	Little	8	Little	47.9	37.7	14.8
2MURFS036T38	Little River at SC 72	Little	8	Little	47.9	37.7	22.2
2MURFS721T38	Little River at S-30-102	Little	8	Little	47.9	37.7	25.2
2MURFS035T38	Little River at CO rd 37	Little	8	Little	47.9	37.7	27.6
2MURFS297T38	Little River at SC 127	Little	8	Little	47.9	37.7	30.0
2MURFS034T38	Little River above Laurens sewage plt	Little	8	Little	47.9	37.7	31.0
2MURFS135T38	North Creek at US-76, 2.8mi W of Clinton	Little	9	North	47.9	37.7	8.9
2MURFS724T38	Burnt Mill Creek at S-30-4Z	Little	25	Burnt Mill	47.9	37.7	1.0
2MURFS723T38	Unnamed tributary to Little River at US 76 Bus	Little	*	*	47.9	37.7	*
3MURF7000M48	USGS station 2167000	Saluda Free Flowi	1	Saluda	58.2	48.0	NA
2MURFS295M48	Saluda River at SC Route 39	Saluda Free Flowi	1	Saluda	58.6	48.4	NA
2MURFS093T55	Ninety Six Creek SC 702, 5.2mi ESE of Ninety-Six	Ninety-Six	10	Ninety-Six	65.3	55.1	2.3
2MURFS718T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	2.5
2MURFS235T55	Wilson Creek at S-24-124	Ninety-Six	11	Wilson	65.3	55.1	5.4
2MURFS717T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	5.4
2MURFS716T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	7.0
2MURFS715T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	8.1
2MURFS233T55	Wilson Creek at S-24-101	Ninety-Six	11	Wilson	65.3	55.1	9.0
2MURFS714T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	9.1
2MURFS710T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	10.8
2MURFS711T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	10.8
2MURFS708T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	13.2
2MURFS709T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	*
2MURFS719T55	Wilson Creek	Ninety-Six	11	Wilson	65.3	55.1	*
2MURFS092T55	Coronaca Creek at S-24-100, 4mi NW of Ninety-Six	Ninety-Six	12	Coronaca	65.3	55.1	0.3
2MURFS713T55	Unnamed tributary to Wilson Creek	Ninety-Six	*	*	65.3	55.1	*
2MURFS186M55	Saluda River at SC 34 ESE Ninety-Six, Below Lake Greenwood	Saluda Free Flowi	1	Saluda	65.7	55.5	NA

Table 5a. Total number of water quality observations of all parameters at each station for 1970-1988

DASLER ID	Minor Basin Name	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
2MURLLM22TW1	Lake Murray Tailwater																		178	82
2MURFS152TW0	Lake Murray Tailwater			50	69	81	59	69	66	54	66	61			60	63	60	60	64	60
1MURL1SP0M00	Murray Lake Mile 0-10.0																			
2MURLLM21M00	Murray Lake Mile 0-10.0																		179	82
4MURL0701M00	Murray Lake Mile 0-10.0				400															
2MURLS204M00	Murray Lake Mile 0-10.0		17	30	44	111	289	235	226	176	211	437	1112	1188	1272	1274	1208	1100	1209	1188
2MURLS207M00	Murray Lake Mile 0-10.0		17	30	51	127	290	244	238	188	222	157								
2MURLCL83M00	Murray Lake Mile 0-10.0											98	269				199	160		
2MURLLM20E01	Murray Lake Mile 0-10.0																		175	82
1MURL1NA0M02	Murray Lake Mile 0-10.0																			
2MURLS283M03	Murray Lake Mile 0-10.0				9	49	158	206	227	174	211	86								
1MURL2NA0M04	Murray Lake Mile 0-10.0																			
4MURL0702M04	Murray Lake Mile 0-10.0				361															
2MURLLM19E04	Murray Lake Mile 0-10.0																		180	82
2MURLS274E04	Murray Lake Mile 0-10.0				42	125	282	235	227	173	211	411	1028	1039	993	951	997	867	991	850
4MURL0707E04	Murray Lake Mile 0-10.0				249															
2MURLS273M05	Murray Lake Mile 0-10.0				42	126	293	257	247	408	352	510	763	676	1058	864	835	879	1000	829
2MURLLM18M04	Murray Lake Mile 0-10.0																		179	82
4MURL0703M07	Murray Lake Mile 0-10.0				306															
2MURLS282E07	Murray Lake Mile 0-10.0				9	49	160	206	226	209	219	90								

Table 5a. (cont.) Total number of water quality observations of all parameters at each station for 1970-1988

DASLER ID	Minor Basin Name	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
1MURL4N00E07	Murray Lake Mile 0-10.0																			
1MURL3M00M08	Murray Lake Mile 0-10.0																			
2MURLLM16M08	Murray Lake Mile 0-10.0																		192	82
2MURLS275E09	Bear Creek				9	49	180	205	227	168	211	157								
1MURL5M00E09	Bear Creek																			
2MURLLM17E09	Bear Creek																		195	82
4MURL0704M11	Murray Lake Mile 10.1-20.0				277															
2MURLS281E12	Hollow Creek				18	49	160	205	226	175	209	86								
2MURLLM11E12	Hollow Creek																		194	74
1MURL7N00E12	Hollow Creek																			
2MURFS306T12	Hollow Creek																			
2MURLLM12E12	Hollow Creek																		194	78
2MURLS280M12	Murray Lake Mile 10.1-20.0				42	126	277	236	227	175	212	311	585	548	504	525	586	670	708	666
1MURL6M00E12	Camping Creek																			
2MURLLM13E12	Camping Creek																		194	82
2MURLS276E12	Camping Creek				42	126	212	204	226	175	211	86								
2MURLS213E12	Camping Creek	5	27	33	61	94	50	69	67	55	66	62			60	63	64	59	50	60
2MURLLM14E12	Camping Creek																		196	82
2MURFS290T12	Camping Creek									116	214	207	216	224	215	230	233	229	235	231
1MURL3NA0M13	Murray Lake Mile 10.1-20.0																			

Table 5a. (cont.) Total number of water quality observations of all parameters at each station for 1970-1988

DASLER ID	Minor Basin Name	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
2MURLLM10M14	Murray Lake Mile 10.1-20.0																		193	82
2MURLS277M14	Murray Lake Mile 10.1-20.0				42	121	277	236	226	230	222	161								
2MURLS212E14	Murray Lake Mile 10.1-20.0	6	29	49	60	86	50	69	67	54	66	61			60	63	64	60	50	60
4MURL0705M17	Murray Lake Mile 10.1-20.0				232															
2MURLS211E17	Buffalo Creek			51	60	94	58	69	67	54	66	62			60	63	64	60	50	60
2MURLS278E17	Buffalo Creek				42	126	274	235	223	175	211	157								
2MURLLM09E17	Buffalo Creek																		192	82
1MURL4NA0M18	Murray Lake Mile 10.1-20.0																			
2MURLLM08E18	Rocky Creek																		179	74
2MURLS279M18	Murray Lake Mile 10.1-20.0				35	120	274	248	238	186	224	356	899	917	939	762	808	805	843	596
2MURLLM07M20	Murray Lake Mile 10.1-20.0																		180	82
4MURL0706M22	Murray Lake Mile 20.1-33.0				177															
2MURLLM06E23	Little Saluda																		176	82
2MURLS222E23	Little Saluda		28	42	79	76	68	282	226	190	224	156								
1MURL8M00E23	Little Saluda																			
2MURLCL82E23	Little Saluda											29	92				55	58		
2MURLLM04E23	Little Saluda																		173	78
2MURFS123T23	Little Saluda	24	14	72	114	150	151	176	154	164	188	172	193	208	192	226	218	217	224	227
2MURFS050T23	Little Saluda	18	8	52	79	37	36	34	62	131	128	98			57	48	53	39	39	37
2MURFS121T23	Little Saluda	33	14	51	135	76	67	144	176	193	242	161	15							

Table 5a. (cont.) Total number of water quality observations of all parameters at each station for 1970-1988

DASLER ID	Minor Basin Name	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
2MURLLM05E23	Little Saluda																		178	82
2MURFS113T23	Little Saluda	22	25	147	156	106	77	31												
2MURFS255T23	Little Saluda			14	56		30	56	56	27	99	96			98	30	66	52	62	60
2MURFS051T23	Little Saluda	44	17	89	92	60	58	61	61	27	99	69			85	73	66	31	62	20
2MURFS110T23	Little Saluda	22	8	51	129	221	249	178	61	27	99	46			70	74	68	32	52	20
2MURFS293T23	Little Saluda																32	10	51	10
2MURFS108T23	Little Saluda		12	50	105	221	260	151				62								
2MURFS128T23	Little Saluda		7	43	68	84	50	69	96	79	92	79			93	94	134	20		
2MURLLM03M24	Murray Lake Mile 20.1-33.0																		178	82
1MURL9NA0M25	Murray Lake Mile 20.1-33.0																			
2MURLS223M25	Murray Lake Mile 20.1-33.0		16	27	129	223	226	369	246	343	327	409	639	496	580	520	392	396	384	434
2MURLS309E27	Bush River											17	62				46	43		
2MURLLM02E27	Bush River																		178	74
2MURFS102T27	Bush River	14	25	50	76	91	50	69	66	54	67	84			60	63	64	60	58	115
2MURFS539T27	Bush River												135							66
2MURFS538T27	Bush River												135							121
2MURFS046T27	Bush River	16	19	51	82	90	49	24					135							64
2MURFS042T27	Bush River		28	84	222	284	395	325	222	180	213	222	226	231	231	238	218	237	224	344
2MURFS770E27	Bush River																			115
2MURFS768T27	Bush River																			121

Table 5a. (cont.) Total number of water quality observations of all parameters at each station for 1970-1988

DASLER ID	Minor Basin Name	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
2MURFS044T27	Bush River	12	20	45	61	63	41	60	60	53	60	64			58	59	61	60	58	61
2MURFS764T27	Bush River																			121
2MURFS769T27	Bush River																			121
2MURFS763T30	Bush River																			121
2MURLS310M27	Murray Lake Mile 20.1-33.0											20	68				55	43		
2MURLLM01M28	Murray Lake Mile 20.1-33.0																		173	78
2MURLS105M30	Murray Lake Mile 20.1-33.0	29	17	51	113	123	262	306	213	241	235	149								5
2MURLLM15E30	unnamed																		193	82
2MURFS047M37	Saluda River Free Flowing	30	25	51	56	60	58	23											15	
2MURFS305T38	Little River																			
2MURFS099T38	Little River		28	57	86	59	51	69	66	53	66	64			61	61	60	60	58	61
2MURFS038T38	Little River	24		21	74	49	69	12												
2MURFS036T38	Little River	21		19	60	6									133					
2MURFS721T38	Little River														135					
2MURFS035T38	Little River	28		15	13	50	70	42	66	27	55	19			157	61	59	59	61	60
2MURFS297T38	Little River																			
2MURFS034T38	Little River			19	43	193	307	280	233	192	218	215	231	225	426	239	237	237	235	225
2MURFS135T38	Little River	18		13	33	37	87	38	60	27	50	19			22	61	58	59	60	61
2MURFS723T38	Little River														135					
3MURF7000M48	Saluda River Free Flowing		6	51	42															

Table 5a. (cont.) Total number of water quality observations of all parameters at each station for 1970-1988

DASLER ID	Minor Basin Name	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
2MURFS295M48	Saluda River Free Flowing																			111
2MURFS093T55	Ninety-Six Creek	12	5	5	18	37	39	35	34	20	48	55			57	48	40	38	32	36
2MURFS718T55	Ninety-Six Creek											124	39						78	
2MURFS235T55	Ninety-Six Creek	12	5	11	19	38	33	38	34	15	48	28			57	48	42	38	33	40
2MURFS717T55	Ninety-Six Creek											124	39						71	
2MURFS716T55	Ninety-Six Creek											124	39						71	
2MURFS715T55	Ninety-Six Creek											86	48						71	
2MURFS233T55	Ninety-Six Creek	12	5	25	31	40	39	35	35	20	46	58			57	50	45	39	35	43
2MURFS714T55	Ninety-Six Creek											128	48						71	
2MURFS710T55	Ninety-Six Creek											122	39						79	
2MURFS711T55	Ninety-Six Creek											79	32						70	
2MURFS708T55	Ninety-Six Creek											85	9							
2MURFS709T55	Ninety-Six Creek											81								
2MURFS719T55	Ninety-Six Creek											123	39						78	
2MURFS092T55	Ninety-Six Creek		12	35	34	82	79	66	61	26	88	106			100	74	66	62	64	60
2MURFS713T55	Ninety-Six Creek											79								
2MURFS186M55	Saluda River Free Flowing		8	11	63	229	200	133	166	218	315	204	207	207	193	227	219	219	232	215

Table 5b. Total number of water quality observations of all parameters at each station for 1989-2001

DASLER ID	Minor Basin Name	89	90	91	92	93	94	95	96	97	98	99	2000	2001
2MURLLM22TW1	Lake Murray Tailwater													
2MURFS152TW0	Lake Murray Tailwater	54	60	59	63	60	62	60	59	59	57			
1MURL1SP0M00	Murray Lake Mile 0-10.0		2285	2262	2665	1923	2077	1924	1830	2510	2584	2647	2612	1117
2MURLLM21M00	Murray Lake Mile 0-10.0													
4MURL0701M00	Murray Lake Mile 0-10.0													
2MURLS204M00	Murray Lake Mile 0-10.0	1100	1238	911	1196	1125	1212	1256	1266	1266	1034			
2MURLS207M00	Murray Lake Mile 0-10.0									1				
2MURLCL83M00	Murray Lake Mile 0-10.0	181	288											
2MURLLM20E01	Murray Lake Mile 0-10.0													
1MURL1NA0M02	Murray Lake Mile 0-10.0				1155	3353	3997	2611	1609	1551	1722	1778	1716	719
2MURLS283M03	Murray Lake Mile 0-10.0													
1MURL2NA0M04	Murray Lake Mile 0-10.0				323	1059	1440	1167	974	1415	1539	1518	1449	587
4MURL0702M04	Murray Lake Mile 0-10.0													
2MURLLM19E04	Murray Lake Mile 0-10.0													
2MURLS274E04	Murray Lake Mile 0-10.0	863	795	905	769	865	895	1015	925	796	663			
4MURL0707E04	Murray Lake Mile 0-10.0													
2MURLS273M05	Murray Lake Mile 0-10.0	839	977	562	741	575	745	991	763	779	854			
2MURLLM18M04	Murray Lake Mile 0-10.0													
4MURL0703M07	Murray Lake Mile 0-10.0													
2MURLS282E07	Murray Lake Mile 0-10.0													
1MURL4N00E07	Murray Lake Mile 0-10.0		588	429	671	589	783	728	562	771	870	824	871	354
1MURL3M00M08	Murray Lake Mile 0-10.0		630	1039	1323	1129	1468	1348	1309	1416	1414	1463	1442	624

Table 5b. (cont.) Total number of water quality observations of all parameters at each station for 1989-2001

DASLER ID	Minor Basin Name	89	90	91	92	93	94	95	96	97	98	99	2000	2001
2MURLLM16M08	Murray Lake Mile 0-10.0													
2MURLS275E09	Bear Creek													
1MURL5M00E09	Bear Creek		601	526	768	627	807	730	668	798	799	749	781	333
2MURLLM17E09	Bear Creek													
4MURL0704M11	Murray Lake Mile 10.1-20.0													
2MURLS281E12	Hollow Creek													
2MURLLM11E12	Hollow Creek													
1MURL7N00E12	Hollow Creek		601	559	517	158	464	418	364	489	484	485	473	201
2MURFS306T12	Hollow Creek				103				38	173				
2MURLLM12E12	Hollow Creek													
2MURLS280M12	Murray Lake Mile 10.1-20.0	694	563	530	545	507	496	491	490	545	562			
1MURL6M00E12	Camping Creek		759	698	844	647	831	768	604	815	847	851	796	402
2MURLLM13E12	Camping Creek													
2MURLS276E12	Camping Creek													
2MURLS213E12	Camping Creek	58	59	60	58	55	50	53	50	54	54			
2MURLLM14E12	Camping Creek													
2MURFS290T12	Camping Creek	223	211	233	214	230	219	195	214	204	227			
1MURL3NA0M13	Murray Lake Mile 10.1-20.0				280	831	1188	1095	1054	1116	1170	1137	992	461
2MURLLM10M14	Murray Lake Mile 10.1-20.0													
2MURLS277M14	Murray Lake Mile 10.1-20.0		18											
2MURLS212E14	Murray Lake Mile 10.1-20.0	59	59	60	58	56	51	54	54	49	53			
4MURL0705M17	Murray Lake Mile 10.1-20.0													

Table 5b. (cont.) Total number of water quality observations of all parameters at each station for 1989-2001

DASLER ID	Minor Basin Name	89	90	91	92	93	94	95	96	97	98	99	2000	2001
2MURLS211E17	Buffalo Creek	60	59	60	58	56	51	54	54	53	54			
2MURLS278E17	Buffalo Creek													
2MURLLM09E17	Buffalo Creek													
1MURL4NA0M18	Murray Lake Mile 10.1-20.0				150	418	588	534	515	615	660	681	678	299
2MURLLM08E18	Rocky Creek													
2MURLS279M18	Murray Lake Mile 10.1-20.0			477	714	694	758	813	646	525	534			
2MURLLM07M20	Murray Lake Mile 10.1-20.0													
4MURL0706M22	Murray Lake Mile 20.1-33.0													
2MURLLM06E23	Little Saluda													
2MURLS222E23	Little Saluda				245				64	423				
1MURL8M00E23	Little Saluda		325	333	404	288	379	325	270	414	414	418	392	183
2MURLCL82E23	Little Saluda	81	60											
2MURLLM04E23	Little Saluda													
2MURFS123T23	Little Saluda	218	204	211	213	219	219	227	207	210	207			
2MURFS050T23	Little Saluda	53	36	56	37	52	45	40	36	42	51			
2MURFS121T23	Little Saluda													
2MURLLM05E23	Little Saluda													
2MURFS113T23	Little Saluda				117				48	213				
2MURFS255T23	Little Saluda	60	50	69	58	65	61	64	61	56	54			
2MURFS051T23	Little Saluda								4					
2MURFS110T23	Little Saluda													
2MURFS293T23	Little Saluda	60	40	10										

Table 5b. (cont.) Total number of water quality observations of all parameters at each station for 1989-2001

DASLER ID	Minor Basin Name	89	90	91	92	93	94	95	96	97	98	99	2000	2001
2MURFS108T23	Little Saluda													
2MURFS128T23	Little Saluda													
2MURLLM03M24	Murray Lake Mile 20.1-33.0													
1MURL9NA0M25	Murray Lake Mile 20.1-33.0				75	187	182	288	250	258	278	266	260	95
2MURLS223M25	Murray Lake Mile 20.1-33.0	417	386	427	453	415	492	468	472	469	456			
2MURLS309E27	Bush River	194	45		127				115	169	157			
2MURLLM02E27	Bush River													
2MURFS102T27	Bush River	60	59	60	61	61	57		40	177				
2MURFS539T27	Bush River													
2MURFS538T27	Bush River													
2MURFS046T27	Bush River		40	59	65	60	60	59	58	62	64			
2MURFS042T27	Bush River	230	233	231	227	226	224	215	221	215	239			
2MURFS770E27	Bush River													
2MURFS768T27	Bush River													
2MURFS044T27	Bush River	61	60	59	59	54	54	55	56	53	54			
2MURFS764T27	Bush River													
2MURFS769T27	Bush River													
2MURFS763T30	Bush River													
2MURLS310M27	Murray Lake Mile 20.1-33.0	48	45		224				34	276				
2MURLLM01M28	Murray Lake Mile 20.1-33.0													
2MURLS105M30	Murray Lake Mile 20.1-33.0													
2MURLLM15E30	unnamed													

Table 5b. (cont.) Total number of water quality observations of all parameters at each station for 1989-2001

DASLER ID	Minor Basin Name	89	90	91	92	93	94	95	96	97	98	99	2000	2001
2MURFS047M37	Saluda River Free Flowing				107				38	165				
2MURFS305T38	Little River				109				38	164				
2MURFS099T38	Little River	60	60	55	58	45	54	54	54	53	59			
2MURFS038T38	Little River				107				15	196	38			
2MURFS036T38	Little River													
2MURFS721T38	Little River													
2MURFS035T38	Little River	59	19								4			
2MURFS297T38	Little River		40	60	56	64	60	60	61	54	45			
2MURFS034T38	Little River	223	230	229	217	231	231	221	221	216	199			
2MURFS135T38	Little River	59	59	60	56	60	60	60	52	58	52			
2MURFS723T38	Little River													
3MURF7000M48	Saluda River Free Flowing													
2MURFS295M48	Saluda River Free Flowing	220	220	220	215	220	220	225	222	205	208			
2MURFS093T55	Ninety-Six Creek	36	36	36	82	119	123	117	127	126	124			
2MURFS718T55	Ninety-Six Creek										1			
2MURFS235T55	Ninety-Six Creek	36	36	36	36	36	36	35	36	37	36			
2MURFS717T55	Ninety-Six Creek													
2MURFS716T55	Ninety-Six Creek													
2MURFS715T55	Ninety-Six Creek													
2MURFS233T55	Ninety-Six Creek	32	36	36	36	36	38	35	36	37	38			
2MURFS714T55	Ninety-Six Creek													
2MURFS710T55	Ninety-Six Creek													

Table 5b. (cont.) Total number of water quality observations of all parameters at each station for 1989-2001

DASLER ID	Minor Basin Name	89	90	91	92	93	94	95	96	97	98	99	2000	2001
2MURFS711T55	Ninety-Six Creek													
2MURFS708T55	Ninety-Six Creek													
2MURFS709T55	Ninety-Six Creek													
2MURFS719T55	Ninety-Six Creek													
2MURFS092T55	Ninety-Six Creek	52	61	60	60	62	64	60	68	55	54			
2MURFS713T55	Ninety-Six Creek													
2MURFS186M55	Saluda River Free Flowing	220	220	208	219	219	220	220	227	213	207			

Table 6: Summary of SC DHEC Reports on the Effects of Water Quality on Lake Uses for Lake Murray Stations

STATIONS AND LOCATIONS	AQUATIC LIFE		RECREATION		DHEC COMMENTS	
	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997
LAKE MURRAY						
S-310, near mouth of Bush River, 27 miles above dam	FS	FS	FS	FS	Among the most eutrophic sites on large lakes in SC; Category I	Intermediate trophic status compared to other SC reservoirs
S-223, Blacks Bridge, 24.7 miles above dam	FS	PS: Cu >acute toxicity	FS	FS	Among the most eutrophic sites on large lakes in SC; Category I	Very high concentration of Zn; sediments, very high Zn, high Ni, Cr, Cu, Pb, and DDT was detected; intermediate trophic status
S-279, Near Rocky Creek, 17.8 miles above dam	FS: high Zn; sediments, DDT detected	NS: Cu >acute toxicity, eutrophication	FS	FS	Increasing trend in BOD_5 and pH; increasing trend in fecal coliform; intermediate trophic condition compared to SC lakes; improved from Category I	Among the most eutrophic sites on large lakes in SC, due to algae; watershed mgt. is recommended to reduce P; very high Cr and Pb, increasing turbidity, increasing trend in fecal coliform; sediments, high Cr, Cu, Pb, Ni, Zn, and DDT, malathion detected

STATIONS AND LOCATIONS	AQUATIC LIFE		RECREATION		DHEC COMMENTS	
	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997
S-280, offshore of Billy Dreher Island, 12.3 miles above dam	FS sediments, very high Cr	NS: Cu >acute toxicity	FS	FS	Increasing trend in pH; increasing trend in fecal coliform	Decreasing trend in P; increasing trend in fecal coliform; sediments, very high Colorado River; among least eutrophic in SC
S-273, 4.8 miles upstream from dam	FS: high Zn in water; sediments, high Cr	NS: Cu >acute toxicity	FS	FS	Increasing trend in pH; increasing trend in fecal coliform	Decreasing trend in P, N, and turbidity; increasing trend in fecal coliform; sediments, very high Cr, Pb, Ni and high Cu, Zn and DDT detected; among least eutrophic in SC
S-204, forebay	PS high Zn in water; sediments, very high Cr and DDT was detected	PS: Cu >acute toxicity	FS	FS	Increasing trend in pH; increasing trend in fecal coliform	Decreasing trend in P and N; increasing trend in fecal coliform; sediments, high Cr, Cu, Pb, and DDT, a-BHC detected; among least eutrophic in SC
EMBAYMENTS OF LAKE MURRAY						
S-309, Bush River Arm	FS	NS: pH and nutrients	FS	FS	Among the most eutrophic sites on large lakes in SC; Category I	Among the most eutrophic embayments in the State due to high algae and P

STATIONS AND LOCATIONS	AQUATIC LIFE		RECREATION		DHEC COMMENTS	
	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997
S-222, Little Saluda Arm	FS	FS	FS	FS	Intermediate trophic condition compared to SC lakes; improved from Class I	Intermediate trophic condition compared to SC lakes
S-211, Buffalo Creek Arm	FS	FS	FS	FS		Decreasing trend in P; among least eutrophic in SC
S-212, cove up from Billy Dreher Island	FS	FS	FS	FS	Increasing trend in pH	Increasing trend in turbidity; decreasing trend in P; among least eutrophic in SC
S-213, Camping Creek Arm	FS	FS	FS	FS	Increasing trend in pH	Decreasing trend in P and BOD_5; among least eutrophic in SC
S-274, the large embayment north of the forebay, in widest part of the lake; near Ballentine and Rocky Point	FS: high Zn in water; sediments, very high Hg and DDT was detected	NS: Cu >acute toxicity	FS	FS	Increasing trend in pH; increasing trend in fecal coliform	Decreasing trend in P, N, and turbidity; increasing trend in fecal coliform; sediments, very high Hg and high Cu and DDT detected; among least eutrophic in SC
SELECTED INFLOWS TO LAKE MURRAY						
S-186, Lake Greenwood discharge, 55.3 miles above dam	PS: low DO	NS: Cu & Zn > acute toxicity	FS	FS		Decreasing trends in pH, BOD_5, TP, TN; increasing trend in DO

STATIONS AND LOCATIONS	AQUATIC LIFE		RECREATION		DHEC COMMENTS	
	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997
S-093, Near mouth of Ninety Six Creek	FS	PS: Cu > acute toxicity	PS: Fecal coliform excursions	PS: Fecal coliform excursions		
S-295, Chappells, 48.3 miles above dam	PS: low DO	NS: Cu > acute toxicity	FS	FS		Decreasing trend in BOD_5; increasing trend in DO
S-305, Little River about 2 miles above mouth	FS	FS	FS	NS: Fecal coliform excursions		Upstream sites were listed as NS for fecal coliform in 1995 report
S-102, Bush River at inflow to Lake Murray	FS	FS	NS: Fecal coliform excursions	NS: Fecal coliform excursions		
S-123, Little Saluda River inflow	PS: DO excursions	PS: DO excursions	NS: Fecal coliform excursions	PS: Fecal coliform excursions		Aquatic life PS designation compounded by decreasing pH, but there is a decreasing trend in BOD_5, TP, TN; increasing trend in fecal coliform
S-255, Clouds Creek inflow	FS	FS	PS: Fecal coliform excursions	FS		
S-290, Camping Creek	FS	NS: Cu & Zn > acute toxicity	NS: Fecal coliform excursions	NS: Fecal coliform excursions		
S-306, Hollow Creek	FS	FS	NS: Fecal coliform excursions	NS: Fecal coliform excursions		

STATIONS AND LOCATIONS	AQUATIC LIFE		RECREATION		DHEC COMMENTS	
	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997	1995 REPORT FOR DATA COLLECTED 1980-1992	1998 REPORT FOR DATA COLLECTED 1993-1997
SALUDA RIVER BELOW SALUDA DAM						
S-152, tailrace	NS: low DO	NS: low DO, pH excursions	FS	FS		Significant decreasing trend in DO, increasing trend in suspended solids, decreasing trends in BOD_5, TP, fecal coliform
S-149, Saluda River at the MEPCO Plant water intake	NS: low DO	PS: low DO	FS	PS: fecal coliform excursions		Significant decreasing trend in DO and TP
S-298, USGS gage, miles below the dam	FS	NS: Cu & Zn > acute toxicity	PS: fecal coliform excursions	PS: fecal coliform excursions		Increasing trend in suspended solids, DO

- FS—fully supporting uses.
- NS—not supporting uses.
- PS—partially supporting uses.
- Increasing and decreasing trends identified in the comments columns are statistically valid, but they are not flow adjusted and the 1998 report only covered trends over the 5 year period, 1993 through 1997.
- “high” and “very high” designations for metals have special meaning: they indicate that the metal concentrations are in the top 10 % and 5 % respectively of metals concentrations that exceed the detection limits.
- It is important to note that measurements of metals represent total concentrations of these constituents and are not intended to indicate that the measurements mean that the sediments are toxic. DHEC uses these measurements only to determine if there is a potential for a problem. More detailed assessments would be needed to determine if any actual impacts might occur.
- Cu and Zn are elevated statewide with concentrations frequently measured in excess of acute aquatic life criteria; however, there are no apparent impacts on biota in the state.
- Definitions of FS, NS, and PS: FS represents areas where the water quality measurements indicated less than 10 % excursions from the water quality criteria for DO, pH, and fecal coliform bacteria, as well as free from any biological evidence of effects of metals and organics unless the frequency of occurrence of these constituents was “extreme”. NS represents areas where the water quality measurements indicated greater than 25 % excursions from the water quality criteria for DO, pH, and fecal coliform bacteria, and/or there was biological evidence of effects of metals and organics or the frequency of occurrence of these constituents was “extreme”.
- An appendix of the reports gives the number of excursions for each station.

Table 7: Number of Locations and How Water Uses Were Supported Based on the 1995 and 1998 Reports – Based on Information in Table 6 (M Indicates Metals are the Cause; N Indicates Nutrients are the Cause; FC Indicates Fecal Coliform are the Cause)

	1995		1998	
	AQUATIC LIFE	RECREATION	AQUATIC LIFE	RECREATION
LAKE MURRAY				
Fully supporting	5	6	1	6
Partially supporting	1, M		2, M	
Not supporting			3, M	
EMBAYMENTS				
Fully supporting	6	6	4	6
Partially supporting				
Not supporting			2, M, N	
SELECTED INFLOWS				
Fully supporting	6	3	4	3
Partially supporting	3, DO	2, FC	2, M, DO	2, FC
Not supporting		4, FC	3, M	4, FC
TAILWATER				
Fully supporting	1	2		1
Partially supporting		1, FC	1, DO	2, FC
Not supporting	2, DO		2, DO, pH, M	
SUMMARY				
Fully supporting	18	17	9	16
Partially supporting	4	3	5	4
Not supporting	2	4	10	4
METALS	**1**		**11**	
Fecal Coliform		7		8
DO	5		3	
NUTRIENTS			**1**	

Table 8: Major Wastewater Dischargers and Number of Minor Dischargers in the Watershed of Lake Murray (Downstream from Greenwood Dam)

		MILLION GALLONS/DAY	NUMBER OF MINOR DISCHARGES
NINETY-SIX CREEK WATERSHED			
	City of Greenwood/Wilson Creek Plant	12.0	
	Number of minor		12
BUSH RIVER WATERSHED			
	City of Newberry/Bush River Plant	3.22	
	Laurens County WRC/Clinton	2.75	
	Number of minor		2
LITTLE RIVER WATERSHED			
	City of Laurens	4.5	
	Number of minor		10
LITTLE SALUDA RIVER WATERSHED			
	Number of minor		3
LAKE MURRAY WATERSHED			
	Number of minor		3

Table 9. Sites listed on the SCDHEC TMDL and 303(d) lists

	IMPAIRED SITE	STATION	COUNTY	IMPAIRED	CAUSE	PRIORITY
	SALUDA RVR AT SC 34 6.5 MI ESE OF 96	S- 186	GREENWOOD	AL	CU	3
	SALUDA RVR AT SC 34 6.5 MI ESE OF 96	S- 186	GREENWOOD	AL	ZN	3
	CORONACA CK AT S- 24- 100 4 MI NW OF 96	S- 092	GREENWOOD	AL	DO	3
	CORONACA CK AT SC HWY 221	S- 184	GREENWOOD	AL	BIO	3
	WILSON CK AT S- 24- 124	S- 235	GREENWOOD	AL	BIO	3
	WILSON CK AT S- 24- 124	S- 235	GREENWOOD	REC	FC	3
	NINETY SIX CK AT SC 702 5.2 MI ESE OF 96	S- 093	GREENWOOD	AL	CU	3
	NINETY SIX CK AT SC 702 5.2 MI ESE OF 96	S- 093	GREENWOOD	REC	FC	3
	SALUDA RIVER AT S. C. ROUTE 39	S- 295	SALUDA	AL	CU	3
	NORTH CK AT JCT WITH US 76 2.8 MI W OF CLINTON	S-135	LAURENS	REC	FC	3
	LITTLE RVR AT SC ROUTE 127	S- 297	LAURENS	REC	FC	3
	LITTLE RVR AT US 76 BUS IN LAURENS ABOVE STP	S- 034	LAURENS	REC	FC	3
	LITTLE RVR AT SC 560	S- 038	LAURENS	REC	FC	3
	LITTLE RVR AT S- 36- 22 8.3 MI NW SILVERSTREET	S- 099	NEWBERRY	REC	FC	3
	LITTLE RVR AT SC 34	S- 305	NEWBERRY	REC	FC	3
	SCOTT CK AT SC 34 SW OF NEWBERRY	S- 044	NEWBERRY	REC	FC	3
	BUSH RIVER AT SC 560 S OF JOANNA	S- 042	NEWBERRY	AL	DO	2
T	BUSH RIVER AT S. C. ROUTE 34	S- 046	NEWBERRY	REC	FC	2
T	BUSH RVR AT S- 36- 41 8.5 MI S OF NEWBERRY	S- 102	NEWBERRY	REC	FC	2
	LAKE MURRAY, BUSH RVR ARM, 4.6 KM US SC 391	S- 309	NEWBERRY	AL	P	2
	LAKE MURRAY, BUSH RVR ARM, 4.6 KM US SC 391	S- 309	NEWBERRY	AL	pH	2
	BLACKS BR, LK MURRAY AT SC 391	S- 223	NEWBERRY	AL	CU	3
	MOORES CK AT HWY 178	S-112	SALUDA	AL	BIO	3
	BIG CK AT SR 122	S-855	SALUDA	AL	BIO	3
	LITTLE SALUDA RVR AT US 378 E SALUDA	S- 050	SALUDA	AL	DO	2
*	LITTLE SALUDA RVR AT US 378 E SALUDA	S- 050	SALUDA	REC	FC	2
	LITTLE SALUDA RVR AT S- 41- 39 5.2 MI NE SALUDA	S- 123	SALUDA	AL	DO	3
*	LITTLE SALUDA RVR AT S- 41- 39 5.2 MI NE SALUDA	S- 123	SALUDA	REC	FC	3
	LK MURRAY AT MARKER 63	S- 279	LEXINGTON	AL	P	2
	LK MURRAY AT MARKER 63	S- 279	LEXINGTON	AL	CU	3
	CAMPING CK S- 36- 202 BLW GA PACIFIC	S- 290	NEWBERRY	REC	FC	2
	HOLLOW CK AT S- 32- 54	S- 306	LEXINGTON	REC	FC	3
	LK MURRAY AT MARKER 166	S- 273	LEXINGTON	AL	CU	3
	LK MURRAY AT MARKER 143	S- 274	LEXINGTON	AL	CU	3
	LK MURRAY AT DAM AT SPILLWAY (MARKER 1)	S- 204	LEXINGTON	AL	CU	3
*	SALUDA RVR JUST BELOW LK MURRAY DAM	S- 152	LEXINGTON	AL	DO	1
	SALUDA RVR JUST BELOW LK MURRAY DAM	S- 152	LEXINGTON	AL	pH	1
	RAWLS CREEK AT S- 32- 107	S- 287	LEXINGTON	AL	BIO	2
T	RAWLS CREEK AT S- 32- 107	S- 287	LEXINGTON	REC	FC	2
	LORICK BR AT PT UPSTRM OF JCT WITH SALUDA RVR	S- 150	LEXINGTON	REC	FC	3
*	SALUDA RVR AT MEPCO ELECT. PLANT WATER INTAKE	S- 149	LEXINGTON	AL	DO	1
*	SALUDA RVR AT MEPCO ELECT. PLANT WATER INTAKE	S- 149	LEXINGTON	REC	FC	2
	FOURTEEN MILE CK AT SR 28	S-848	LEXINGTON	AL	BIO	3
	TWELVE MILE CK AT SR 106	S- 052	LEXINGTON	AL	BIO	3
	TWELVEMILE CREEK AT U. S. ROUTE 378	S- 294	LEXINGTON	AL	CU	3
*	TWELVEMILE CREEK AT U. S. ROUTE 378	S- 294	LEXINGTON	REC	FC	3
	TWELVEMILE CREEK AT U. S. ROUTE 378	S- 294	LEXINGTON	AL	ZN	3
	KINLEY CK AT S- 32- 36 (ST. ANDREWS RD) IN IRMO	S- 260	LEXINGTON	AL	BIO	2
*	KINLEY CK AT S- 32- 36 (ST. ANDREWS RD) IN IRMO	S- 260	LEXINGTON	REC	FC	2
*	SALUDA RVR AT USGS GAUGING STATION, 1/ 2 MI BELOW I- 20	S- 298	LEXINGTON	REC	FC	2
	SALUDA RVR AT USGS GAUGING STATION, 1/ 2 MI BELOW I- 20	S- 298	LEXINGTON	AL	ZN	2

T indicates TMDL designation

***** indicates potential TMDL. Assessment will be done within 2 years

Table 10: Summary of TP, Chlorophyll *a*, and Secchi Depth Conditions at Various Locations in the Inflows and Lake Murray – Includes DHEC Data Only for 1995-98

	TOTAL PHOSPHORUS (MG/L)	CHLOROPHYLL *A* (µG/L)	SECCHI DEPTH (M)
Greenwood Dam (S-186)	0.027	No data	No data
Ninety-Six Creek (S-093)	0.703	No data	No data
Little River (S-099)	0.05	No data	No data
Bush River Embayment (S-309)	0.12	28.6	0.7
Clouds Creek (S-255)	0.34	No data	No data
Blacks Bridge (S-223)	0.05	14.77	1.01
Rocky Creek (S-279)	0.04	11.9	1.4
Dreher Island (S-280)	0.03	6.5	2.0
4.2 Miles from Saluda Dam (S-273)	0.02	5.5	2.8
Ballentine Embayment (S-274)	0.02	5.7	2.4
Forebay (S-204)	0.02	7.3	2.7

Table 11: Comparison of the Percent Contributions of Total Phosphorous Loadings to Lake Murray to the Mean Streamflow from each Tributary

LAKE MURRAY TRIBUTARY	MEAN STREAMFLOW, PERCENT	PHOSPHORUS LOAD, PERCENT
Bush River	3	25
Little Saluda River	4	9
Clouds Creek	1	5
Ninety-Six Creek	4	36
Little River	7	6
Saluda River	81	19